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Review disagreements, cultural capital, and cultural discount on imported hollywood movies in China

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ABSTRACT

Within the context of mounting competition faced by Hollywood movies in the global cinema market, particularly in emerging markets, this paper examines the influence of review disagreements and cultural capital on the cultural discount of imported Hollywood blockbusters in China's movie market. Using a dataset of 652 movies from the U.S. spanning 1994–2019, we find that review disagreements between U.S. and Chinese consumers exacerbate the cultural discount on imported Hollywood movies in China. However, cultural capital, measured by the accumulated revenue of specific imported movie genres in China, effectively mitigates this discount. We also observe a reduction in the discount for movie genres with fewer language barriers. Accounting for endogeneity due to reverse causality and selection bias, we identify a significant structural break in 2012. In the post-2012 era, collaboration involving China's censorship, quota rules, and film-production laws has improved the market mechanism and cultural capital accumulation, enhancing the performance of imported Hollywood movies in China. Minority movies, characterized by being less mainstream and commercial, are more sensitive to review disagreements, while cultural capital plays a greater role in mitigating the discount for mainstream Hollywood movies. These findings have significant implications for professionals involved in the distribution and screening of Hollywood movies in China.

1. Introduction

Improvement in standard of living along with growth in distribution channels have contributed to increase in demand for international motion pictures in emerging economies. In recent years, trade flows involving the global motion picture industry have received more attention. The issue of "unbalanced" international trade flows in the motion picture market has been discussed by Ref. [1]. Hollywood, which is synonymous with the American movie industry, dominates the international movie market [2–6]. Hollywood has established itself as a dominant force in the global market, propelled by its biggest stars and films. This is particularly evident in economies lacking robust policies to safeguard their domestic film industries, as observed in cases like Mexico [7] and Germany [8,9]. Despite stringent protection measures, including state censorship and import quotas, China, being the largest emerging economy, has emerged as the largest international market for Hollywood movies [10]. Notably, the box office revenues of imported Hollywood movies in China have skyrocketed, surging 60-fold from 0.33 billion RMB in 2001 to 18.57 billion RMB in 2019 (See

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Table 1).

Hollywood studios have been exporting revenue-sharing movies to the booming Chinese movie market since the 1990s. Currently, after their Chinese distribution and exhibition partners cover tax and promotion costs, Hollywood studios can claim 25 % of box office revenue from revenue-sharing movies in China. Typically, revenue-sharing movies are big-budget blockbusters produced by major Hollywood studios, taking advantage of import quotas and censorship approvals [11,12]. Consequently, imported Hollywood movies have performed well, contributing to approximately one-third of China's box-office revenue in recent years [13,14]. For example, out of 368 movies released in China in 2019, only 42 movies (11.4 %) were imported from Hollywood due to import quotas and censorship, yet the box office revenue of imported Hollywood movies accounted for about 31.4 % of the total box office revenue. Each imported Hollywood movie still earns roughly three times the average revenue of domestic movies in the Chinese market, despite the cultural advantages of domestic movies [10,14]. However, since 2018, the escalating trade tensions and tariff disputes between the United States and China have put pressure on Hollywood's performance in China's cultural market [10,14,15].

Furthermore, Hollywood's box office revenue increasingly relies on international markets, but the total international revenues from the Asia-Pacific region have declined for Hollywood motion pictures in recent years [10,16]. The dominance of Hollywood movies in the international trade of motion picture products has faced challenges from fast-growing movie markets in countries such as Australia, China, India, Japan, Nigeria, and South Korea [10,15,17–21]. Hollywood has lost its monopoly power in Asia and must now consider institutional and cultural factors in movie production and distribution to effectively sell itself in these emerging Asian movie markets.

While imported Hollywood movies, in general, have performed well in China, some blockbusters set within the American cultural environment have had relatively less appeal to Chinese viewers and experienced disappointing box office performances [14]. Previous studies have found that China has the weakest mirroring effect with Hollywood movies' box office rankings compared to other sample countries, indicating resistance and challenges faced by Hollywood studios in China's movie market [10]. China's policies, such as censorship and import quotas, restrict the number of imported movies and encourage the steady development of the Chinese motion picture industry [14]. The concept of "cultural discount" in international trade of entertainment products arises from the discrepancies in the appreciation of movies in countries with cultural distance from the home country. Hollywood films still perform well in China, but Hollywood studios are becoming increasingly aware of the institutional and cultural obstacles they face. This issue of cultural discount has been widely observed and discussed in Hong Kong, Taiwan, and other Asian countries or regions [3–5]. Surprisingly, this issue has not been addressed for mainland China, which has different institutions and a distinct cultural environment from the U.S.

Chinese viewers may find it challenging to understand the language and identify with the values and beliefs portrayed in Hollywood movies due to differences in national institutions and behavioral patterns. While media and cultural products from the U.S. have overall been successful in China, the problem of cultural discount still persists in many imported Hollywood movies. This problem is evident in the case of imported Hollywood movies, as reflected by the disadvantageous position they face in China (see Table 1, where the cultural discount is measured by the ratio of box office revenues in the U.S. and Chinese markets).[1] Throughout the entire sample period, the revenue differences for the same movie in the U.S. were as much as 36 times higher compared to China. Between 2001 and 2003, these differences were even higher, reaching over 70 times more revenue in the U.S. than in China. Thus, the cultural discount of imported Hollywood movies is a widely observed phenomenon in the Chinese movie market.

However, there are a few exceptional cases where the cultural discount is negligible or even reversed, such as Billy Lynn's Long Halftime Walk in 2016, Resident Evil 6 in 2017, and Johnny English Strikes Again 3 in 2018, indicating a smaller cultural discount or even higher revenues in China. These unexpected results could be attributed to box office failures associated with these movies in the U.S. market, coinciding with tremendous box office success in China.[2] Therefore, the success of imported Hollywood movies in China heavily relies on a reasonable understanding of the underlying culture to appreciate the movies. This paper investigates the effect of the domestic cultural environment on the box office performance of Hollywood movies screened in China.

First, the appreciation of cultural products such as movies depends on consumers' experiences, making it challenging to evaluate the creative content, including plot and characters, before consumption [22,23]. This is particularly true for imported movies that are

[1] The ratio of box office revenues in the domestic and foreign markets provides a straightforward measure of the disparities in the appreciation of movies across different markets. However, it is important to note that this ratio measure is potentially influenced by various factors beyond cultural discount, including market size, market structure (such as differences in ticket prices and consumer spending on movies), and macroeconomic factors [3,44]. Therefore, when focusing on a single receiving country like China, a simple box office ratio only reflects the "relative cultural discount." It allows us to examine whether the cultural discount of imported American movies has changed over time or if certain types of movies experience a higher or lower discount compared to others [3–5]. In the subsequent analysis, we address the measurement issue by utilizing the estimated coefficients from a log-linear regression of Chinese box office revenues for imported American movies on their domestic revenues. This approach enables us to simulate a more accurate measure of cultural discount by controlling for factors such as market size, structure, and macroeconomic conditions. We would like to express our appreciation to one referee who provided valuable advice on addressing this measurement issue early on in this section.

[2] Studies on these cases can provide direct evidence regarding the reasons for success in China. Ang Lee, the director of Billy Lynn's Long Halftime Walk in 2016 and an Academy Award Best Director, is well-known in China. Resident Evil 6, a sequel released in 2017, performed very well at the box office. Two of the five previous movies in this series were released in China in 2010 and 2013 and also performed very well. Additionally, Johnny English Strikes Again 3, a sequel released in 2018, was also successful. Although only one of the two previous movies in this series was released in China in 2003, the lead actor, Rowan Sebastian Atkinson, was the most popular foreign comedian in China. Thus, there is evidence suggesting that some imported Hollywood movies with previously good exposure in China could have performed even better in the Chinese movie market than in the home market [73,87].

Table 1
Imported hollywood blockbusters in the Chinese market (1994–2019).

Year	Number of movies	Total Revenue in billion RBM (¥)	Average Revenue in million RBM (¥)	Average cultural discount
1994	1	0.03	26	61
1995	6	0.28	47	44
1996	9	0.83	93	22
1997	5	0.22	44	18
1998	6	0.57	95	17
1999	5	0.12	24	63
2000	10	0.19	19	60
2001	13	0.33	25	77
2002	17	0.38	22	100
2003	19	0.39	20	77
2004	14	0.46	33	61
2005	20	0.57	29	55
2006	23	0.88	38	39
2007	18	1.11	62	59
2008	19	1.25	66	40
2009	24	2.23	93	36
2010	29	3.91	135	19
2011	37	5.56	150	13
2012	46	8.15	177	15
2013	46	8.68	189	7
2014	38	12.43	327	5
2015	44	14.81	337	9
2016	58	18.45	318	5
2017	44	21.48	488	5
2018	59	20.98	356	14
2019	42	18.57	442	17
Average	25	5.49	141	36

Data source: Chinese Movie Micro Dataset 1994–2019. The cultural discount on an imported Hollywood movie is measured by the ratio of its box office revenues in the U.S. and Chinese markets.

rooted in foreign cultures, as their life cycles are often short (typically six to ten weeks), making it difficult for local audiences to fully grasp them. In such cases, local audiences rely on extrinsic cues to assist them in making purchase decisions [16,24,25]. Due to advancements in information technology, moviegoers now have the opportunity to express their views about movies through a variety of mediums [26,27]. Several studies have identified the effects of the interaction of various media factors on a movie's success. These factors include advertisements [28], word-of-mouth [26], reviews and ratings from both critics and laypeople [17,29], movie awards [5,30], online promotion campaigns [31], and internet media ranking as well as online buzz [32]. Technological advancements allow people worldwide to share their cultural experiences through online media. Chinese viewers also accumulate and share their experiences concerning different cultural products. Consumer reviews posted on the internet play an important role in decision-making process of moviegoers [29,33–37]. Thus, differing views among consumers in the U.S. and Chinese markets (also known as "review disagreements") can reflect the cultural distance between two countries when it comes to evaluating specific movies. These disparities in movie evaluation can have an impact on the market performance of Hollywood movies in China.

Additionally, the demand for cultural products exhibits a characteristic of positive addiction in consumption [8]. This means that the enjoyment derived from consuming cultural products increases as individuals develop the ability to appreciate a particular form of cultural expression. This ability is a result of accumulating past consumption capital [38]. Accumulating personal consumption capital for foreign cultural products can be challenging for individuals due to the cultural distance involved. Therefore, in the case of international trade of cultural products like movies, the concept of social consumption capital becomes even more significant. Social consumption capital refers to the influence of peers or relevant others on an individual's utility [39,40]. It is argued that cultural capital is a component of social consumption capital and has the power to influence individual consumption decisions.

Numerous psychological experiments have confirmed a positive correlation between the exposure frequency and choices made by people [40]. Small groups of consumers for certain movie genres usually prefer what they are familiar with or used to. The internet provides a social platform for consumers to learn and share their experiences and develop social networks. Foreign movie genres that have done well in local markets are likely to be more successful in the Chinese movie market. Consequently, the preference for and appreciation of Hollywood movies in China may be an accumulation process of cultural capital driven by repeated exposure and ongoing consumption of the same movie genres year after year.

[39] defines cultural capital as an asset that contributes to cultural value. Hollywood movies constitute cultural capital, including long-standing dispositions and habits formed over a long period of repeated exposure and consumption in international and local markets. It has been argued that the success of well-known movie franchises, such as Star Wars or the Indiana Jones movies, has been able to generate and maintain a long-term co-creational and loyal relationship between generations of consumers and movies [41]. Thus, accumulation of cultural capital in the form of repeated exposure and consumption of the same genre of movies might effectively contain the cultural discount on Hollywood movies.

This study contributes to the literature in three ways. First, to the best of our knowledge, this is the first study which examines the

effect of review disagreements (as a proxy of cultural distance between China and the U.S.) on cultural discount of imported Hollywood movies in China. Internet reviews, such as user ratings, have developed rapidly and are popular among the younger generation in both U.S. and China. Millions of young people with smartphones are the most important viewers of Hollywood movies in China. Potential association between cultural distance and the success of a movie calls for more consideration of internet media connections between the U.S. and China's movie markets [32,42,43]. The fast development of internet social media and digital platform economy in both China and the U.S. provides a unique opportunity for a societal experiment to explore the dynamic interaction between cultural distance and market performance of Hollywood movies in China. Thus, review disagreements between the two countries due to the cultural distance also deserve serious consideration when examining and analyzing the cultural discount on Hollywood movies in China.

Second, we estimate the effect of cultural capital of imported Hollywood movies on cultural discount in China using the historically accumulated box office revenues. We measure cultural capital of Hollywood movies through repeated exposure and consumption of the same-genre movies in local markets.

The "dynamic economies of scale" linked to the international distribution and screening of Hollywood movies imply that foreign viewers become familiar with the fundamental storylines of specific Hollywood movie genres. Additionally, they may develop a strong attachment to particular stars or groups of characters within those genres [44,22]. This affinity is further reinforced as viewers share their opinions through social media platforms. Furthermore, it is worth noting that international trade levels rise and remain high [8, 9]. This effect is demonstrated when a genre of movies encourages movies in the same genre to imitate the winning production formula by incorporating similar plots, characters, and stars that attract Chinese viewers. Thus, the availability of local market experience, as a proxy for the accumulated cultural capital of Hollywood movies attracts Chinese viewers by lowering the search and matching costs in experiential goods market [32,45,46]. This paper offers fresh insights into the dynamic process of accumulating cultural capital and how it influences cultural discount.

Third, a majority of research on the Chinese film market has primarily relied on qualitative research methods [14,47,48]. The potential reverse causality between explanatory variables (such as, review disagreements and cultural capital) and movie success, as well as the selection bias arising from the censorships and import quota policies calls for careful consideration of endogeneity problem in a quantitative analysis [22,29]. The accumulation of cultural capital, through repeated viewing experiences of a particular genre of movies, results in increased appreciation and knowledge about new movies within the same genre [44]. When a specific Hollywood movie succeeds in China, it tends to attract more attention on the internet and can impact the level of review disagreement between China and the U.S. This social bandwagon effect leads to a greater imitation of the winning production formula, including the use of similar characters or stars, ultimately influencing the accumulation of cultural capital [44,22,29]. Consequently, there exists a potential issue of reverse causality between review disagreements (cultural capital) and movie success, which can cause an endogeneity problem.

The instrumental variable (IV) regression is often used to correct potential endogeneity when studying the international movie market. We apply both ordinary least square (OLS) and generalized method of moments (GMM) regression techniques to estimate the effects of review disagreements and cultural capital on cultural discount of Hollywood movies in China. The results derived from OLS and GMM regressions are qualitatively similar, and are not biased by the selection of certain movie genres or dramatic institutional changes around 2012. Therefore, it can be argued that our findings, derived from quantitative analysis, remain robust across various model specifications even after addressing potential issues of reverse causality and selection biases.

The remainder of this paper is organized as follows. The next section reviews the literature and develops some testable hypotheses. Section 3 discusses the data and empirical specifications. Empirical results are presented and discussed in Section 4. Section 5, which concludes the paper, includes directions for future research.

2. Literature review and hypothesis development

Most of the literature regarding the internet user reviews centers around the valence (i.e., positivity or negativity) and volume (i.e., popularity or unpopularity) of internet user reviews and how they affect market performance. However, in the context of the motion picture industry, there are mixed findings regarding the impact of the valence and volume of internet reviews on market performance [49]. argue that the adverse effect of negative reviews is stronger than the favorable effect of positive reviews. Existing studies, such as [42,50], find that evaluations of reviewers indirectly influence the revenues through screen allocations [51]. argue that it is the reviewing valence rather than volume that seems to matter in box office revenues. Some studies, such as [32], have found that the valence measure of internet user reviews may have negative associations with box office revenues. Additionally [52], argues that the impact of user review valence on box office revenues depends on the cultural differences between movie viewers and reviewers. In other words, the cultural environment of the viewers and reviewers plays a crucial role in determining the effect of user review valence on box office revenues.

In contrast to studies focusing on the valence of evaluations [26,32,53], find that the main driver of box office performance is the volume of reviews rather than their valence [26]. finds that the "buzz" of online word-of-mouth (eWOM) can have a significant effect on box office revenue, which supports the theory that eWOM primarily works through generating an informative impact on awareness in the movie market. These studies suggest that most explanatory power comes from the volume, and not the valence of user reviews.

To reconcile these conflicting findings [34], performed a meta-analysis of 51 eWOM studies including 13 movie articles and concluded that both volume and valence exert statistically significant positive impacts on market outcomes. Using a dataset involving time-varying professional critics and eWOM [29], showed that volume and valence of user reviews exert a positive impact on box-office revenues. Thus, the volume and valence of user reviews of a movie within the same country, which reflect a similar cultural

environment, are likely to be strongly correlated with each other and have similar effects on market performance.

However, for a study involving user reviews from more than one country (i.e., China and the U.S.), consumers with different cultural background are more likely to have different evaluations, which can affect the willingness to pay for a movie. The underlying cultural distance is reflected in review disagreements between the U.S. and China found in online media evaluations. Differences in values and beliefs give rise to differences in valence. The difference between review volume in the U.S. and China indicates differences in popularity, viewer attention, and awareness (or "Buzz"), which is more dependent on the relative market size than cultural distance between two countries. Hence, the differences in review valence between the U.S. and China are a better measure of cultural distance than review volume. In this paper, we only consider the valence aspect of internet media reviews.[3]

When the level of review disagreement is relatively high, Chinese consumers may be relying on the opinions of people that they share a similar cultural background with. Review disagreement likely offers a negative signal for consumers in China and may worsen the cultural discount on box office revenues. Internet media evaluation (IME) is a measure of online user reviews that indicates reviewers' and consumers' positive disposition to a product. Therefore, we focus on the difference between review valence in the U.S. and China (i.e., the IME review disagreement) to test a hypothesis concerning the negative effect of review disagreements on cultural discount as follows.

Hypothesis 1. The cultural discount on imported Hollywood movies in China increases with the level of review disagreements between the Chinese and US consumers.

[54–56] argue that foreign media exposure usually forms or reinforces the positive perception of a country. Movies are experiential consumption goods involving interaction between the movies and viewers [57]. [19,20] argue that exposure to other countries through media content positively influences preferences for imported commodities and foreign culture. Hence, the cultural discount on imported cultural products in a foreign market is a path-dependent phenomenon related to cultural proximity and local market experience [58]. Using data on 19 countries over 15 years [59], finds a delayed but overall positive impact from Hollywood movies and tourist visits from the U.S. on the likelihood of non-U.S. people buying the U.S. goods. To promote international distribution, Hollywood movie producers tend to strategically build global consumer awareness of the basic storyline, stars, and set of characters [22,60]. Thus, the financial success of Hollywood movies in China is also influenced by the experiences of Chinese viewers with relevant media content exposure, specifically repeated exposure to a movie genre over an extended period.

Films that benefit from repeated exposure, such as sequels, parts of a franchise, or remakes, are thought to have greater box office appeal because they have "built-in" audiences, according to industry analysts [32,53,61–63]. [44] use repeated exposure tactics to explain how U.S. TV programs can reduce their cultural discount and be successful in the international market. They argue that only TV programs that have more than three seasons, or at least 65 episodes, can succeed in international TV market. Similarly, accumulation of cultural capital that Hollywood movies can effectively attain through long-term and repeated exposure decreases their cultural discount. The argument presented earlier was based on the information environment before the digital economy era. However, the success of Korean TV single-season series consisting of 16–20 episodes in the international market can be seen as a reflection of the rapid accumulation of cultural capital in current market trends.

Based on this discussion, we have a hypothesis concerning the cultural capital as follows.

Hypothesis 2. The cultural discount on imported Hollywood movies in China decreases as individuals accumulate cultural capital through repeated exposure to such movies.

3. Empirical specifications and data description

The cultural discount on imported foreign movies has seldom been directly examined using empirical data [44,64,65]. The simple box office ratios presented in Table 1 may be a misleading measure of cultural discount. This is because the differences in box office revenues of a movie in the U.S. and China are influenced by several factors, such as the market size and structure, screen allocation strategies, movie ticket prices, levels of consumer spending on movies, and other general economic factors. Hence, a simple box office ratio cannot solely represent the cultural discount and therefore cannot be directly analyzed to investigate its determinants.

To fully map the dynamics of a Hollywood movies' box office performance in China requires a sophisticated analytical technique, such as the multiple regression analysis. Following [3,4,29,42], we use an OLS model to estimate the effect of review disagreements and cultural capital on cultural discount as follows:

$$\ln CR_{ijt} = \alpha_0 + \alpha_1 \ln AR_{ijt} + \alpha_2 RD_{ijt} + \alpha_3 lnCC_{ijt} + \alpha_4 CoProd_{ijt} + \alpha_5 Award_{ijt} + \alpha_6 Squel_{ijt} + \alpha_7 Remake_{ijt} + \alpha_8 Genre_j + \alpha_9 X_t + Y_t + \varepsilon_{ijt} \quad (1)$$

In equation (1), the dependent variable is the natural logarithm of box-office revenue of the imported Hollywood movie i of genre j in year t in China ($lnCR_{ijt}$). The natural logarithm of the box-office revenue in the U.S. ($lnAR_{ijt}$) is included as an independent variable.

[3] For robustness check, we replaced differences in valence with differences in volume to capture the cultural distance between two countries. However, the empirical results were mostly unaffected, which is consistent with [29,34]. They find that volume and valence of user reviews had similar effects. To avoid the problem of serious multicollinearity between valence and volume variables in our regressions, in this paper, we only use differences between the valence of two countries as a proxy for cultural distance in this study and control for differences in the market size using macroeconomic indicators such as the GDP *per capita* and total number of screens in the two countries.

Note that we use the natural logarithm of box-office revenues because the levels of these two variables are highly skewed [29,66]. Hence, the estimated coefficient of the revenue in the U.S. (α_1) is used as a proxy for cultural discount. The higher the estimated coefficient of the revenue in the U.S. ($\alpha_1 > 0$) in equation (1), the smaller the cultural discount on imported Hollywood movies in China. The subscript i ($i = 1 \ldots 652$) indicates all 652 imported Hollywood movies, while the subscript j ($j = 1 \ldots 10$) indicates all ten mutually inclusive movie genres. The subscript t ($t = 1994 \ldots 2019$) indicates the year in which the movie was released in China. For simplicity, we drop the subscripts in the rest of the paper.

The main explanatory variable is the review disagreements between the U.S. and China (*RD*). Specifically, we define review disagreements $RD = IME_{USA} - IME_{China}$, which captures differences in the viewer valence between the U.S. and China for each imported Hollywood movie. Higher review disagreements represent a greater appreciation of the movie by U.S. consumers compared to Chinese consumers, indicating a higher cultural distance between the two countries. The statistically significant and negative estimated coefficient of the review disagreements variable ($\alpha_2 < 0$) implies that, given the revenue in the U.S., a higher cultural distance leads to a cultural discount by reducing the box office revenue in China. This also allows us to test Hypothesis 1.

Regression equation (1) can also be used for testing Hypothesis 2, which suggests a positive and statistically significant estimated coefficient of the cultural capital associated with imported Hollywood movies. We test the effect of the cultural capital in Hypothesis 2 by using the logarithm of the accumulated box office revenues of the same genre imported movies, which have been screened in the Chinese market until the end of the previous year, as a proxy for cultural capital (*lnCC*) of an imported Hollywood movie. The lagged value of the box office revenue can limit the endogeneity problem caused by reverse causality between cultural capital and the current-box office revenues. The estimated coefficient of cultural capital in equation (1) is expected to be positive and statistically significant ($\alpha_3 > 0$). This indicates that, based on the revenue in the U.S., a higher level of cultural capital is likely to decrease the cultural discount by increasing the box office revenue in China, which also allows us to test Hypothesis 2.

Control variables include a dummy variable for US-China co-productions (*CoProd*),[4] numbers of movies that won and were nominated for movie awards (award), dummy variables for sequels (*Sequel*) and movie remakes (*Remake*). Dummy variables are also used for ten movie genres (*Genre*) to capture the fixed effects of the imported Hollywood movies by genre. We also use a vector of macroeconomic variables (*X*) to control for differences in market size and structure. This includes the natural logarithm of the annual GDP *per capita* in the two countries (*lngdpc* and *lngdpa*) and the natural logarithm of the annual number of screens in China and the U.S. (*lnscreenc* and *lnscreena*). Year dummies (*Y*) are also included in the regression equation to capture the common time dynamics; ε_{it} is the usual error term.

As our main explanatory variables (i.e., review disagreement and cultural capital) may be subject to endogeneity problem, we also apply the generalized method of moments (GMM) estimation technique to estimate equation (1). This approach, which involves the use of instrumental variables (IVs), is widely used in the existing literature on movies as an additional robustness test of the base-line results [29,42].

The data used in this study, which covers the 1994–2019 period, are mainly sourced from the Chinese Movie Micro Dataset (CMMD). The CMMD makes use of a number of industry sources available, such as the social media websites, including the Internet Movie Database (*IMDb*), *Douban*, and *Baidu* [32,67,68]. suggest that social media websites, such as *Douban* and *Baidu,* have played important roles in connecting consumers with digital content, reviews, and other consumers in China.[5]

We now turn to variable measurements and discuss their descriptive statistics presented in Table 2.

First, the box-office revenues of the two markets were converted into the same currency units (10,000 RMB Yuan) and then transformed into natural logarithms for use in our regressions. For an imported Hollywood movie, the average box-office revenue in the U.S. market (10.88) is significantly higher compared to the Chinese market (8.88). We measure the valence aspect of the internet media reviews by using the average movie review ranking in both countries. In the US, IME rating of a movie is based on 0–10 scale on *IMDb* website. China's IME is also measured using the same scale on *Douban* website [32].[6] The review disagreement variable (*RD*) has a negative average value (−0.56) in Table 2, suggesting a higher average *Douban* ranking in China (7.14) than the average *IMDb* ranking in the U.S. (6.58). Moreover, the cultural capital of an imported Hollywood movie is measured by the accumulated box-office revenues of the previously imported movies within the same genre screened in China. For a movie that falls into more than one genre, we use the average accumulated box-office revenues of the same move across all genres as its cultural capital. We use the natural logarithm of cultural capital because the accumulated box office revenues are also highly skewed (*lnCC*). For movies in early years without cultural capital, following [29], a value of 1 was added to cultural capital values. This adjustment ensures that the logarithm of

[4] [69] argue that the cross-regional film collaboration (especially within the Asia-Pacific region) can promote the understanding of the global fusion of cultural products and the reconfiguration of geographic, political, economic, and cultural relations.

[5] *Douban* is the most popular social networking service (SNS) website in China. This website allows the registered users to comment on (and rate) movies, books and music and share their experiences. The collective opinions of the users serve as a guide to other potential consumers and thus *Douban* has transformed into a powerful marketing and distribution channel for digital media. At the same time, the rise of the search engine *Baidu*, which is China's version of *Google,* also works as a social hub for online search and unauthorized sharing. Thus [32,90], conclude that websites and Apps such as *Douban* and *Baidu* have become vital communication devices for today's consumption culture in China.

[6] In 2016, *Douban* had more than 200 million registered users sharing their views about movies and movie stars. Thus, *Douban* can be seen as the Chinese version of *IMDb*. Specifically, overall evaluations of each movie are rated by *Douban* registered users on a 5-star (10-point) scale of excellence: 0 stars (0 points) = "worst or no comment"; 1 star (2 points) = "very poor"; 2 stars (4 points) = "poor"; 3 stars (6 points) = "fair"; 4 stars (8 points) = "recommended"; and 5 stars (10 points) = "highly recommended." To ensure consistency with *IMDb* rating, one-star *Douban* rating represents two points and thus *Douban* rating also provides ranking of each movie on a scale of 0–10.

Table 2
Descriptive statistics (652 observations over the 1994–2019 period).

Variable	Mean	Std. Dev.	Min	Max
Logarithm of Chinese box office revenue (*lnCR*)	8.88	1.62	0	12.95
Logarithm of American box office revenue (*lnAR*)	10.88	1.56	0	13.34
Review Disagreements (*RD*)	−0.56	0.62	−3.3	1.4
American IME (IMDbranking)	6.58	0.97	1.60	8.90
Chinese IME (Doubanranking)	7.14	0.97	2.90	9.50
Logarithm of Cultural Capital (*lnCC*)	13.21	1.84	0	16.04
Co-production dummy (*Co-Prod*)	0.08	0.27	0	1
Awards winning (*wins*)	12.28	27.13	0	243
Awards nominations (*nominations*)	28.29	42.02	0	348
Sequel dummy (*Sequel*)	0.44	0.50	0	1
Remade dummy (*Remake*)	0.11	0.31	0	1
Action	0.56	0.50	0	1
Comedy	0.24	0.43	0	1
Science Fiction	0.27	0.44	0	1
Romance	0.07	0.26	0	1
Family	0.04	0.19	0	1
Adventure	0.44	0.50	0	1
Thriller	0.12	0.32	0	1
Drama	0.24	0.43	0	1
Horror	0.18	0.38	0	1
Other	0.02	0.12	0	1
Logarithm of GDP *per capita* in China (*lnrgdppc*)	9.20	0.40	8.05	9.56
Logarithm of GDP *per capita* in the U.S. (*lnrgdppa*)	10.93	0.08	10.65	11.04
Logarithm of total screens in China (*lnscreenc*)	9.48	1.28	6.91	11.15
Logarithm of total screens in U.S. (*lnscreena*)	10.57	0.07	10.19	10.63
Cumulative episodes in America (*Aexp*)	1.02	2.46	0	23
Cumulative episodes in China (*Cexp*)	0.56	1.22	0	8
Lagged Cultural Capital (*L2lnCC*)	12.49	2.62	0	15.56

the cultural capital variable exists.

Second, only 53 of the 652 imported Hollywood movies (8 %) were jointly produced by the U.S. and China. Co-production of imported movies can alleviate the cultural discount by co-financing, sharing cultural knowledge, and hiring Chinese movie stars and famous directors [13,69,70–72]. We also use the numbers of movies that won and were nominated for movie awards to capture the industry recognition of production quality and influence. The average numbers of awards won (12.28) and nominations (28.29) are testament to high production quality and impact of Hollywood movies. Moreover, 288 of 652 imported Hollywood movies (44 %) were sequels. Despite censorships and import quotas in China, several sequels officially released in China have been very successful [14]. We also include a dummy variable for movie remakes (*Remake*), which covers 11 % of all imported Hollywood movies.

Third, following [3,4], we categorize all imported Hollywood movies into ten mutually inclusive genres: action, comedy, science-fiction, romance, family, adventure, thriller, drama, horror, and others. Although genres are widely used in the classification of movies, many movies involve elements of more than one genre and thus can be categorized into multiple genres. This can also be observed in *IMDb* dataset used in this paper. Moreover, producers add new genres in movie sequels to make them more attractive to viewers [61]. Hence, we follow a mutually inclusive categorization of genres to capture the multiple genre attributes. Approximately 56 % of the movies in our sample are regarded as action films, which represents the largest movie genre. Adventure (44 %), science-fiction (27 %), comedy (24 %), and drama (24 %) account for relatively small but significant percentages of the movies. Romance and family genres, respectively account for 7 % and 4 % movies. Only 10 out of 652 imported Hollywood movies (about 2 %) are documentary, biography, and music movies which are included in "others" category. We use others category as the baseline genre in our regression analysis. In general, commercial movies, such as action, adventure, sci-fi, comedy, and drama, comprise the majority of imported Hollywood movies. This observation aligns with the findings of [73], who indicate that Chinese audiences tend to prefer large-scale action and sci-fi Hollywood blockbusters.

Fourth, the natural logarithm of the annual GDP *per capita* (PWT 10.0, see Ref. [74]) and the total number of screens [75,76] in the U.S. and China are included to control for the difference in the supply and demand sides of the market. In Table 2, the GDP *per capita* ($10.93 > 9.2$) as a proxy for the demand and total number of screens ($10.57 > 9.48$) as a proxy of the supply are both much higher in the U.S. compared to China, which also partially explains the revenue gap between the two markets. As these variables are measures of annual demand and supply, as an alternative, one can also use year dummies to capture the common time dynamics in our regressions.

Finally, the descriptive statistics of the three IVs are presented in the bottom panels of Table 2. The three IVs include the number of previous episodes of movie sequels already screened in the U.S. market (*Aexp*), the number of previous episodes of movie sequels already screened in the Chinese market (*Cexp*), and two period lag of cultural capital (*L2lnCC*) proxied by accumulated revenues of the

same genre Hollywood movies screened in China. Out of the 288 movie sequels in our sample, before screening in China, an average of 1.02 previous episodes were screened in the U.S. market. However, an average of only 0.56 previous episodes were screened in the Chinese market, which reflects the fact that many episodes of movie sequels were never officially released in China due to import quota and censorship [14].[7] Two-year lagged values of cultural capital have a much lower average (12.49) and higher standard deviation (2.62) than contemporaneous cultural capital (13.21 and 1.84). This suggests that the accumulation of cultural capital has accelerated and has become more concentrated in several movie genres.

4. Empirical results

4.1. Baseline results

Pooled film-level data over the 1994–2019 period is used to estimate equation (1). Estimation results, which show the heterogeneous effect of review disagreements and cultural capital on cultural discount in a stepwise manner, are shown in Table 3. The independent variables included in the first column include the box office revenue in the U.S. market, review disagreement and cultural capital, and macroeconomic variables. As doing well in the U.S. market is a clear signal of a movie's global appeal, it is not surprising that the U.S. box-office revenues have a positive and statistically significantly effect on box-office revenues of Hollywood movies in China. Since both box-office revenue variables are in logarithms, the estimated coefficient a_1 can be interpreted as the elasticity of the Chinese box-office revenue with respect to the U.S. market box-office revenue. A 100 % increase in the U.S. box-office revenue increases the box-office revenue in China by 50 %, *ceteris paribus*.

Thus, good performance in the home country can serve as an effective form of advertisement in foreign markets. To simulate the "relative cultural discount," we use the estimation coefficients from Table 3 and the descriptive statistics from Table 2. Table 2 shows that an imported Hollywood movie is expected to generate logarithmic revenue of 10.88 in the U.S. Assuming all other factors remain constant, a one standard deviation increase in revenue in the home market (1.56, as shown in Table 2) would result in an expected revenue increase of approximately 78 % (=50 % * 1.56) in China. This increase represents roughly half of one standard deviation of the logarithmic revenue in China (1.62, as shown in Table 2), given an expected logarithmic revenue of 8.88. Consequently, the simulated "relative cultural discount" (box office revenue ratios) would be approximately 16 ($=e^{10.88+1.56}/e^{8.88+0.78}$), which is comparable to the ratios presented in Table 1.

We use the review disagreements as a proxy for cultural distance between China and the US. When an imported Hollywood movie is more popular in the U.S. compared to China, the cultural discount at the Chinese box-office is higher, resulting in decreased box office revenues in China. Since the dependent variable (box-office revenue) is in logarithm, the estimated coefficient of the review disagreement variable in levels can be interpreted as percentage change in the Chinese box-office revenue due to a one-point change in review disagreement. Hence, if the viewer rating of a Hollywood movie in the U.S. was one-point higher than the rating in China, the box-office revenue of the movie in China would be 17 % lower, which supports Hypothesis 1. Using the estimation results, we can simulate the impact of review disagreement on cultural discount on box-office revenue in China. For a one standard deviation review disagreement (0.62 points in Table 2), due to the cultural distance between the two countries, the box office revenue of imported Hollywood movies in China could drop by about 11 % (=17 %*0.62). A one standard deviation increase in review disagreement increases the cultural discount from 16 to 18 ($=e^{10.88+1.56}/e^{8.88+0.78-0.11}$). The larger cultural distance decreases the market performance of imported Hollywood movies in China, providing support for Hypothesis 1.

The estimated coefficient a_3 in equation (1) can be interpreted as the elasticity of the Chinese box-office revenue with respect to the cultural capital. A 100 % increase in the accumulated box office revenue of the same genre movies in China can increase its box-office revenue by 33 %. In a simulated scenario, a one standard deviation growth in cultural capital (1.84 in Table 2) can increase the Chinese box-office revenue by about 61 % (=33 %*1.84). A one standard deviation increase in cultural capital decreases the cultural discount from 16 to 8.8 ($=e^{10.88+1.56}/e^{8.88+0.78+0.61}$). The greater accumulation of cultural capital in the local market improves the market performance of imported Hollywood movies in China. Thus, there is sufficient evidence to support Hypothesis 2, which states that cultural capital can effectively alleviate the cultural discount.

In Table 3, we also used macroeconomic variables to control for differences in demand and supply levels between the two markets. Increase in demand for Hollywood movies in China coincided with rapid growth in China's economy over the sample period of 1994–2019. Estimation results presented in column 1 of Table 3 show that a 100 % increase in Chinese GDP *per capita* increases the box-office revenues of imported Hollywood movies in China by 152 %. As the Chinese GDP *per capita* grew by 151 % from 1194 to 2019, the demand for Hollywood movies in China increased by about 230 % (=152 %*1.51). On the contrary, the U.S. GDP *per capita* is much higher than China, which also reflects the differences in demand for cultural good between China and the US. Hence, growth in the U.S. GDP *per capita* in logarithms from 10.65 to 11.04, by about 39 % (see Table 2) continues to dominate the cultural orientation of the Hollywood movie production, which has implications for cultural discount in China. It is not surprising that a 100 % increase in the U.S. GDP *per capita* decreases the box-office revenue in China by 1013 % (see column 1 of Table 3). Thus, China's demand for Hollywood movies decreased by about 395 % (=1013 %*0.39).

On the supply side, over the sample period, the total number of screens in China increased by about 424 % (from 6.91 to 11.15 in logarithms, see Table 2) and contributed to the box-office revenue by about 204 % (=48 %*4.24). The effect of the total number of

[7] Chinese viewers can access some previous episodes of movie squeals, not officially screened in China, through unauthorized DVD rental, underground cinemas, satellite television, and the Internet. However, such access is a poor substitute for official screening.

Table 3
Review disagreements, cultural capital and cultural discount in China, (Pooled-OLS estimation over the 1994–2019 period).

Dependent variable: Logarithm of Chinese box office revenue (*lnCR*)	(1)	(2)	(3)	(4)	(5)
Log U.S. box office revenue (*lnAR*)	0.50***	0.44***	0.49***	0.43***	0.42***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Review Disagreements (*RD*)	−0.17**	−0.17**	−0.19**	−0.20**	−0.30***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Cultural Capital (*lnCC*)	0.33***	0.29***	0.38***	0.34***	0.20***
	(0.05)	(0.05)	(0.05)	(0.05)	(0.06)
Co-production		0.77***		0.79***	0.75***
		(0.16)		(0.16)	(0.16)
Wins		0.00		0.00	0.00
		(0.00)		(0.00)	(0.00)
Nominations		0.00		0.00	−0.00
		(0.00)		(0.00)	(0.00)
Sequel		0.07***		0.07***	0.05***
		(0.01)		(0.01)	(0.01)
Remake		−0.02		0.00	−0.01
		(0.14)		(0.14)	(0.14)
Logarithm of GDP *per capita* in China	1.52**	1.40**			
	(0.66)	(0.64)			
Logarithm of GDP *per capita* in the U.S.	−10.13***	−10.05***			
	(2.24)	(2.17)			
Logarithm of total screens in China	0.48***	0.53***			
	(0.16)	(0.15)			
Logarithm of total screens in the U.S.	−0.82	−0.12			
	(3.52)	(3.42)			
Action					0.25**
					(0.12)
Comedy					−0.44***
					(0.12)
Science Fiction					0.29**
					(0.12)
Romance					0.10
					(0.18)
Family					0.06
					(0.23)
Adventure					0.17
					(0.11)
Thriller					0.09
					(0.15)
Drama					−0.22*
					(0.13)
Horror					−0.09
					(0.13)
Year dummy	No	No	Yes	Yes	Yes
R-squared	0.513	0.549	0.532	0.570	0.604
N	652	652	652	652	652

Note: The values in parentheses below each estimated coefficient are the estimated standard errors. ***, **, and *, respectively, represent significance at the 1 %, 5 % and 10 % level.

screens in the U.S. on box-office revenue in China is statistically insignificant (see Table 3) and hence the effect on cultural discount in China is also insignificant. Thus, changes in the market size and macroeconomic factors in China and the U.S. account for about 39 % (230 % + 204%–395 %) growth in box-office revenue of imported Hollywood movies in China. Due to these changes, the simulated cultural discount has decreased from 16 to 11 ($=e^{10.88+1.56}/e^{8.88+0.78+0.39}$) over the entire sample period spanning from 1994 to 2019.

In column 2 of Table 3, estimation results after including additional control variables are presented. Our basic conclusions concerning the impact of the review disagreements (−17 %) and cultural capital (29 %) on cultural discount of Hollywood movies in China continue to hold and thus both Hypotheses 1 and 2 are supported. Estimation results presented in column 2 of Table 3 show that co-production of movies can increase the box-office revenues in China by about 77 %. Hence, co-production can potentially decrease the cultural discount from 16 to 7.5 ($=e^{10.88+1.56}/e^{8.88+0.78+0.77}$). This result is consistent with the view that international collaborations can improve the box-office performance of foreign movies in China [13,69,70]. However, the effect of winning and nomination for international movie awards on box-office revenues of Hollywood movies in China is statistically insignificant (see Table 3). International recognition may reflect different values and beliefs from Chinese culture and cannot increase the box-office appeal in China.

The qualities and achievement reflected by the awards do not always "sell'' in the market, especially in a foreign country. Thus, it is not surprising that cinematic qualities and achievements in the U.S., such as higher ranking and award winnings/nominations, may not have significant appeal to viewers in China [5].

Movie sequels with significant followers can have a positive and statistically significant effect on box-office revenues as shown in column 2 of Table 3. Movie sequels also increase the frequency of repeated exposure to a movie genre, which can have a positive effect on cultural discount (7 %). This result is consistent with the findings of [14,32,53]. However, the estimated coefficient of movie remakes in Table 3 is statistically insignificant, which is consistent with [63]. [63] argue movie remakes is an uncertain proposition and does not always increase box-office revenues. Estimated results presented in Table 3 show that Hollywood remakes screened in China do not lead to a significant increase in Chinese box-office revenues.

In column 3 of Table 3, estimation results involve replacing annual macroeconomic variables with year dummies, which can more efficiently capture the common time dynamics. The main estimation results presented in column 3 of Table 3 are qualitatively similar to those presented in other columns (of course, the estimated coefficients change in size). The results presented in column 4 of Table 3 show that the main estimated results are not sensitive to inclusion of additional control variables. When we add nine genre dummies (the "other" genre as the baseline group) in column 5, the negative effect of review disagreements increases in magnitude (−30 %), while the positive effect of cultural capital decreases in magnitude (20 %). Thus, Hypotheses 1 and 2 are supported by empirical evidence presented in Table 3.

Several studies [3–5,77,78] regard movie genres as important explanatory variables for box-office revenues. More importantly, genres can be meaningfully discussed in relation to cultural discount in international markets. For example, humor is widely recognized as culture specific, and hence comedies may involve significant language barriers or subtle behavioral patterns [79]. It is difficult for Chinese audiences to fully understand and appreciate Hollywood comedies, which involve higher cultural discount compared to other genres. Similarly, romance, drama, and horror genres are also highly dependent on language or subtle behavior patterns that are culture specific. On the contrary, action movies, science fiction, and adventure are arguably less culture specific and thus subject to lower cultural discount [3].[8]

Estimated results presented in column 5 of Table 3 show that action (25 %) and science-fiction (29 %) movies have significantly lower cultural discount possibly due to the narrative transparency with fewer language barriers and readily comprehensible behavior patterns [80]. It has been argued that Chinese audiences prefer large-scale action and sci-fi Hollywood blockbusters [73]. In contrast, comedy (−44 %) and drama (−22 %) movies from Hollywood, which are more dependent on language and subtle behavior patterns, have significantly higher cultural discount in China's movie market. Hence, we conclude that genres with narrative transparency, such as action and science fiction movies, can effectively alleviate the cultural discount on imported Hollywood movies in China.

4.2. Accounting for potential endogeneity and structural breaks

We start by discussing the possibility of significant reverse causality between review disagreements, cultural capital, and box office revenues, which can bias the OLS estimates. The current box-office revenues may influence current user reviews [13]. To resolve the potential endogeneity problem arising from reverse causality, equation (1) was re-estimated using the generalized method of moments (GMM) technique. Following [29,42,81,82], among others, we use lagged values of the contemporaneous explanatory variables as IVs. Specifically, three IVs (previous episodes of movie sequels in the U.S. market (*Aexp*), previous episodes of movie sequels in the Chinese market (*Cexp*), and lagged cultural capital (*L2lnCC*), for review disagreements and cultural capital were used.

GMM estimation results are shown in Table 4. Full sample estimation results involving 652 imported Hollywood movies shown in column 1 of Table 4 can be compared with OLS results in column 5 of Table 2. The estimated coefficient of the review disagreements in column 1 of Table 4 is larger (−43 %) in size but statistically insignificant, while the estimated coefficient of cultural capital using GMM is much larger (2.07) than the OLS estimation. The estimated standard errors of the regression coefficients are larger in size for both explanatory variables (1.5 and 0.99 in Table 4, compared to 0.08 and 0.06 in Table 3). Thus, it can be argued that the estimated coefficients and standard errors of review disagreements and cultural capital are biased downwards in the case of OLS estimation involving the full sample.

IVs in GMM estimation must satisfy two requirements: the instrument must be correlated with the included endogenous variables but orthogonal to the error term. Given that the first-stage *F*-statistic of the three IVs is 1912.14 in column 1 of Table 4, we can reject the null hypothesis that the IVs are weak instruments. Hence, the first requirement is likely to be met. The orthogonality requirement is checked with an over-identification test (Hansen's *J* statistic) on the joint hypotheses of the correct model specification and orthogonality conditions. The null hypothesis is that all instruments are valid. Rejection of the null hypothesis implies that the instruments do not satisfy the required orthogonality conditions. As Hansen's *J* statistic in column 1 of Table 4 is statistically insignificant, we do not reject the null hypothesis that the IVs are uncorrelated with the error term. Hence, the orthogonality requirement is also met for GMM estimation. Thus, we conclude that our IVs are valid for GMM estimation.

The usefulness of the GMM method is also dependent on whether endogenous regressors are exogenous. The Chi-square-based endogeneity C-test (also known as the difference-in-Sargan statistic) was used to determine the exogeneity of the endogenous regressors. Endogeneity C-tests for the full sample yield a Chi-square statistic of 19.73 and an associated *p* value close to zero, suggesting

[8] Existing studies [91], argue that appreciation of the imported Hollywood movies that belong to the thriller genre by German audiences requires certain level of familiarity with the US culture even though struggle between good and evil is a common feature of thrillers. Thus, unlike the wide agreements concerning the comedy or action movies, evaluation of other movie genres (e.g., thrillers) may vary across cultures.

Table 4
Review disagreements, cultural capital and cultural discount in China (Pooled-OLS and GMM estimation over the 1994–2019 period).

Dependent variable: Logarithm of Chinese box office revenue (*lnCR*)	(1) GMM 1994–2019	(2) OLS 1994–2011	(3) GMM 1994–2011	(4) OLS 2012–2019	(5) GMM 2012–2019
Review Disagreements (*RD*)	−0.43	−0.15	−3.18	−0.48***	−2.81**
	(1.50)	(0.12)	(2.19)	(0.11)	(1.42)
Cultural Capital (*lnCC*)	2.07**	0.07	0.41	0.35***	0.40***
	(0.99)	(0.08)	(0.39)	(0.07)	(0.11)
First-stage F-statistics	1912.14***		473.45***		25,235.69***
Hansen J-tests (chi 2)	0.00		0.00		2.12
p value	***1.00***		***1.00***		***0.15***
Endogeneity C-test (chi 2)	19.73***		0.50		6.54**
p value	***0.00***		***0.78***		***0.04***
Control variables	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes
N	652	275	275	377	377

Note: The values in parentheses below each estimated coefficient are the estimated standard errors. Bold *italic* values below each estimated coefficient are the estimated *p-values*. ***, **, and *, respectively, represent significance at the 1 %, 5 % and 10 % level.

that OLS estimation is likely to be subject to significant endogeneity [83]. Thus, GMM method is useful for correcting the bias caused by the endogeneity of review disagreements and cultural capital.

In columns 2 to 5 of Table 4, subsample results for 1994–2011 and 2012–2019 are presented. The subsamples reflect a structural break in the time series in 2012. Specifically, in Feb 2012, China and the U.S. reached agreement on issues related to film industry exchanges and film culture development.[9] Ignoring the structural break might lead to biased results. For example, estimation results using the 1994–2011 data show that neither review disagreements nor cultural capital has a statistically significant effect on Chinese box-office revenue in both OLS and GMM estimation. C-tests results using 1994–2011 data yields an insignificant Chi-square statistic, which suggests that review disagreements and cultural capital might be exogenous variables prior to 2012. In columns 2 and 3 of Table 4, OLS and GMM estimation results are qualitatively similar, which confirms the absence of serious endogeneity problem in the OLS model. This result could be attributed to the fact that in the early 1994–2011 period, the Chinese movie market was subject to a more rigid market mechanism, which was insensitive to market signals such as the user reviews and cultural capital.

However, in the later 2012–2019 period, C-test result for endogeneity yielded a chi-square statistic of 6.54 with a *p* value of 0.04, suggesting the presence of a statistically significant endogeneity problem (i.e., review disagreements and cultural capital are not exogenous variables). Significant first-stage *F*-statistic and insignificant Hansen *J* statistic presented in column 5 of Table 4 suggest that the IVs used in GMM estimation are valid. The significant negative estimated coefficient (−2.81) and standard error (0.11) of review disagreements in column 5 of Table 4 much larger than OLS estimation (−0.48 and 0.11) results in column 4 of Table 5. The estimated GMM coefficient (0.40) and standard error (0.11) of cultural capital are also smaller than OLS estimation (0.35 and 0.07) results. Based on the results presented in columns 2 to 5 of Tables 4 and it can be argued that statistically significant downward biases in OLS estimation mainly occurred in the late transition period (i.e., 2012 to 2019).

It has been argued that only TV programs with more than three seasons or at least 65 episodes could succeed in the international TV market [44]. However, this argument was based on the information environment before the digital economy. The success of Korean TV single-season series consisting of 16–20 episodes in the international market may indicate the accelerating accumulation of cultural capital in current market trends.[10] Our own results, divided into two time periods (1994–2011 and 2012–2019), also support the notion of accelerating cultural capital accumulation. We found that significant results were only observed in the more recent period of 2012–2019. This suggests that after 2012, there is a more sensitive market mechanism for review disagreement and an accelerated accumulation of cultural capital. The transition of the Chinese movie market was successful in the later period characterized by a flexible market mechanism, which was sensitive to user reviews and cultural capital.

4.3. Accounting for potential selection biases

The issue of the aggregation bias in the national data on movie markets has been addressed by, among others, [29,51,84]. They argue that using aggregated data across many heterogeneous markets may reflect a distribution strategy rather than the influence of

[9] During the 1990s, the number and total revenues of imported Hollywood movies in China increased slowly due to strict import quotas and censorship (see Table 1). However, after China's accession to the World Trade Organization (WTO) in 2001, there was a significant change. The annual quota for overseas movies doubled from 10 to around 20 movies in 2002 [47]. The main deregulation reform occurred in 2012 when China and the United States reached agreements on film industry exchanges and film culture development. As part of these agreements, the Chinese government agreed to increase both the annual import quota to 34 movies and the American box office share from 13 % to 25 %. Additionally, a majority of the quota was allocated to Hollywood blockbusters, and Chinese movie companies were allowed to directly import and invest in Sino-American joint ventures for movie-making [10]. Consequently, the Chinese movie market, like other movie-importing countries, is now dominated by Hollywood movies [92].

[10] We are grateful to a reviewer for bringing this new market trend to our attention.

Table 5
Review disagreements, cultural capital and cultural discount in China by genre and period (GMM estimation).

Dependent variable: Logarithm of Chinese box office revenue (lnCR)	Mainstream "commercial" genres		Ordinary "commercial" genres		Minority genres	
	(1) 1994–2011	(2) 2012–2019	(3) 1994–2011	(4) 2012–2019	(5) 1994–2011	(6) 2012–2019
Review Disagreements (RD)	−1.33	−0.98*	−1.79	1.90	2.10	−1.89**
	(1.37)	(0.51)	(3.21)	(3.47)	(1.55)	(0.92)
Cultural Capital (*ln*CC)	7.82	1.35***	0.49	0.36	−0.37	0.60***
	(6.03)	(0.37)	(8.19)	(0.91)	(0.58)	(0.12)
First-stage F-statistics	133.82***	12,561.81***	127.08***	12,116.83***	5661.83***	14,859.73***
Hansen J-tests (chi 2)	0	1.13	0	2.22	0	0.18
p value	***1.00***	***0.29***	***1***	***0.14***	***1***	***0.67***
Endogeneity C-test (chi 2)	5.51*	3.06	2	2.32	5.17*	4.6*
p value	***0.06***	***0.22***	***0.37***	***0.31***	***0.08***	***0.1***
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes
N	208	269	185	267	117	125

Note: The values in parentheses below each estimated coefficient are the estimated standard errors. Bold *italic* values below each estimated coefficient are the estimated *p-values*. ***, **, and *, respectively, represent significance at the 1 %, 5 % and 10 % level.

user reviews. In the context of imported Hollywood movies in this paper, strict import quota and censorship applied by the Chinese government represent a black box of selection problems. The structural break in the data around 2012, identified in Section 4.2, can also be attributed to the selection bias arising from China's import quota and censorship regimes, which may have affected the import of Hollywood movie genre from 2012 onwards.

Some existing studies, such as [10,14], suggest that Hollywood studios can benefit by having a good relationship with Chinese government and its censorship authorities, which is the gatekeeper of imported movies. As the second-largest movie market, approval for screening a movie in China can have a significant impact on financial performance of a movie. As indicated by Refs. [13,85,86], the Chinese government does not want the Chinese audiences to watch movies that might negatively impact Chinese culture and/or promote individualism. Accordingly, the potential selection bias arising from the import quota and censorship in China may invalidate our OLS and GMM estimation results.

To deal with potential aggregation biases [51,84], recommend using data from individual geographic markets. For the purposes of our paper, we use data on similar movies over the early (1994–2011) and late (2012–2019) periods to limit the selection bias over time. Data presented in Table 1 suggests that Chinese censorship authorities favor importing "commercial" movie genres. Mutually inclusive movie genres imported by China can be categorized into three groups: (i) the main-stream "commercial" genre: the most favored imported Hollywood movies are action (56 %, see Table 2) and adventure (44 %), which target box-office revenue and are easier for Chinese audience to comprehend; (ii) ordinary "commercial" genre: sci-fiction (27 %), comedy (24 %) and drama (24 %) are less favored by Chinese censorship authorities due to language barriers and behavior patterns; and (iii) minority genre: horror (18 %), thriller (12 %), romance (7 %), family (4 %) and others (2 %, mainly biography, documentary and music) account for less than 20 % share of the imported movies as Chinese censorship authorities are more cautious towards these movies [85]. GMM estimation results by genre groups over the two times periods are presented in Table 5.[11]

GMM estimation results presented in columns 1 and 2 of Table 5 imply that action and adventure movies were significantly affected by the 2012 policy change. The GMM estimation results concerning the mainstream "commercial" genre are insignificant before 2012 (see column 1 of Table 5), while the negative effect of review disagreements and the positive effect of cultural capital are statistically significant over the 2012–2019 period (see column 2 of Table 5). The successful transition of the Chinese movie market has provided space and channels for internet user reviews and accumulated local cultural capital to affect the cultural discount on imported Hollywood movies that target revenue rather than specific culture. However, in the case of the ordinary "commercial" movie genres (especially for comedy and drama), the cultural distance is likely to be too large for Chinese audiences to overcome [83]. The effect of review disagreements and cultural capital on cultural discount of box-office revenues in China in columns 3 and 4 of Table 5 is statistically insignificant. Thus, we conclude that the full sample estimation results are subject to selection bias.

Empirical results presented in Table 5 suggest that structural break in 2012 is significant for the minority (including horror, thriller, romance, family), and other (including biography, documentary, and music) genres. Like the GMM estimation results for the mainstream "commercial" genres, the effect of review disagreements and cultural capital in the case of the minority genre cultural discount is statistically insignificant in the early 1994–2011 period, but significant in the 2012–2019 period. These results align with the findings of [16], which also suggest that "niche-market" imported Hollywood movies (such as horror, musical, and Western genres) exhibit similar patterns to mainstream "commercial" genres in terms of the moderating effect of cultural gaps.

The effect of review disagreements in the case of the minority genres (−1.89) is about twice as large as the main-stream

[11] We also conducted more disaggregated empirical estimation based on each genre for the two time periods. More disaggregated estimation yielded results that are qualitatively similar to the aggregated genre group-based results presented in Table 5. The genre-based estimation results for the two time periods are available from the authors upon request.

"commercial" genres (−0.98). The consumers of minority genres in the U.S. and China usually comprise small and closed social networks in internet communities. They share similar views for certain cultural products and are highly coordinated to learn and share knowledge and experience of movie consumption on the internet. Thus, review disagreements in minority movie genres exaggerate the cultural discount more than the mainstream "commercial" genres.

Finally, the effect of cultural capital in the case of minority genres (0.6) is less than half of the same effect for mainstream "commercial" genres (1.35). Since the small and closed social networks in internet communities are also fairly dynamic over time, the accumulated cultural capital from previous box-office revenues of the minor genres depreciates much faster than the cultural capital in main-stream "commercial" genres. Thus, the cultural capital in minority genres has a smaller effect on box-office revenues than the mainstream "commercial" genres. The selection bias leads to not only qualitatively but also quantitatively heterogeneous estimation results across movie genres.

5. Conclusion and discussion

The dominance of Hollywood movies on a global scale has been extensively studied in cultural and media studies [2–5]. China's position as the largest international market for Hollywood movies presents significant potential for growth. However, the limited positive reception of Hollywood movies in China and the cultural discount problem faced by imported American movies have become significant challenges. This study examined the effects of review disagreements and cultural capital on the cultural discount and market performance of imported American movies in China. The findings indicate that review disagreements increase the cultural discount, while cultural capital helps mitigate it [16]. Certain movie genres, such as action and science fiction, experience less cultural discount due to their universal appeal [44]. The study also highlights the importance of internet user reviews and the structural break in the Chinese movie industry since 2012 [47].

The findings of this study align with previous research on the influence of cultural distance, market dynamics, and genre preferences on the performance of imported Hollywood movies in China [16,44]. They provide insights into the importance of review disagreements and cultural capital in shaping the cultural discount and market outcomes. The study also highlights the potential of co-production and the need for Hollywood studios to consider cultural differences and leverage internet media for movie promotion.

The managerial implications of this study are twofold. First, movie exporters should take cultural differences into account and make use of internet media, particularly social media platforms and online forums, for effective movie promotion [73,87]. Second, the study suggests that co-production with Chinese studios can help overcome cultural discount and navigate the quota and censorship systems [32,71,72,85,86].

This study has several limitations. First, the scope of the analysis could be extended by examining the influence of social networks and internet media on box office revenues [41]. Second, the study's reliance on average movie review rankings as a measure of review valence may overlook the variability of review sentiments. Future research should consider employing more sophisticated techniques, such as natural language processing (NLP), to capture the nuanced valence of reviews [88]. Additionally, the study acknowledges the need for more detailed data and advanced techniques to analyze the cultural context and trade dynamics in the international movie market [3–5,29,32,42,43,89].

Future research in this area can explore the impact of social networks and internet media on the competition between imported and domestic movies [41]. Further investigation is needed to analyze the relationship between online platform promotion, distribution strategies, and market outcomes. The influence of factors such as star power, budgets, release strategies, and global performance on international movie trade flows should also be examined. Additionally, the impact of international collaborations, relationship management, and cultural adaptation on China's movie market deserves further attention [1,14,15,71,72]. Lastly, with ongoing negotiations and trade tensions, future studies should explore the implications of policy changes and trade agreements on the dynamics of the global movie industry [10,14].

Additional information

No additional information is available for this paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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