Increased Foreign Revenue Shares in the United States Film Industry: 2000 – 2014

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Abstract

The American film industry, which has historically been driven by the domestic market, now receives an increasing proportion of its revenue from abroad (foreign share). To determine the factors influencing this trend, this paper analyzed data from 11 countries of 2,337 American films released during 2000 – 2014. Both film and country attributes were analyzed to determine each attribute's effect on foreign share, whether its effect size has changed over time and whether each attribute has changed in prevalence amongst films released. The results identified six attributes, star actors, sequels, releases in top markets, release time lag, GDP growth and a language match between film and audience, that contributed to the increase in foreign share.

JEL Classification: L82, F40, Z11
Keywords: Motion Picture Industry, Foreign Share, International Box Office Revenue

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I. Introduction

Movies are one of the largest cultural and economic exports of the United States to the rest of the world. The industry generated $15.8 billion worth of exports in 2013 and contributed $130 billion in sales to the U.S. economy, a value equivalent to 0.78% of the country's gross domestic product (MPAA, 2015). The industry's most successful films often become cultural touchstones, transcending geographical boundaries and generations of viewers. The motion picture industry has increasingly become a transnational enterprise. In the past, revenues from foreign territories were considered an "additional" component of a film's receipts (Walls & Mckenzie, 2012). This was due to the sheer size of the North American market, such that domestic revenues could cover most of the costs to release a film. Remaining profits were driven by the video sales and licensing deals with television networks. Given this cost structure, producers could often attain profitability by focusing on the North American audience. However, today's global film industry has seen the rapid growth of international film markets, especially in Asia Pacific and Latin America, that now comprise a growing share of box office sales. The result is an increase in foreign share, which measures the proportion of a film's revenue from foreign countries (Figure 1).

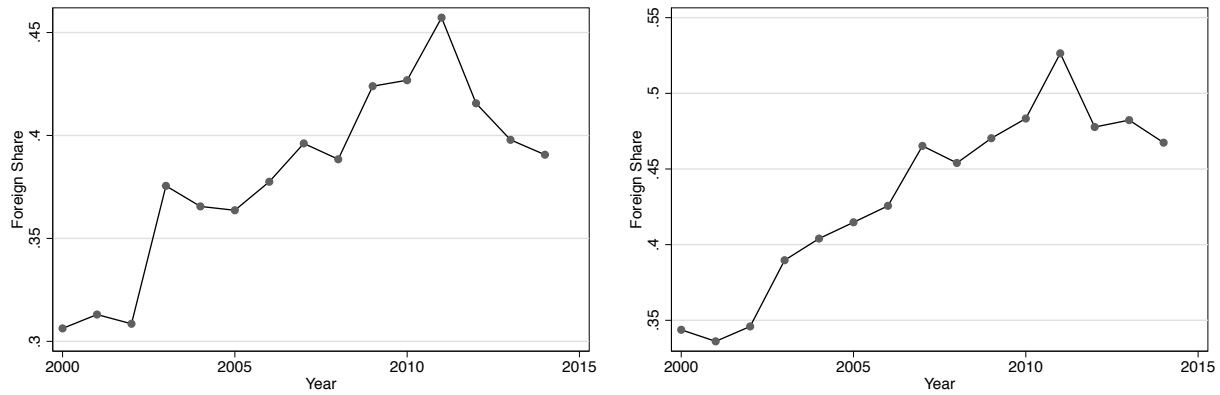

Figure 1. Foreign Shares of U.S. films, 2000 – 2014 (left). Restricting the sample to just films where both domestic and international data were available results in a similar trend (right). The values presented are per-film averages. Foreign share was calculated by taking a film's international revenue as a proportion of its total, worldwide revenue.

Foreign share is an interesting metric as it reflects the larger underlying shifts in the industry, and is also used by film production companies to determine individual film budgets. As

seen from Figure 1 (left), foreign shares have increased over the last 15 years. In 2000, American films received 31% of its revenue from abroad on average. By 2014, they received 39% from abroad. From the data collected, the increase in foreign share was driven by two trends – a decrease in domestic revenue, from $77.7 million to $48.6 million per film, and an increase in international revenue, from $60.4 million to $72.0 million per film, after adjusting for inflation (Appendix A).

Several changes in the industry have accompanied the increase in foreign share. Firstly, the profits from domestic revenue alone have declined (Philips, 2004). This was likely due to increased marketing costs, which, averages around $40 million each for a studio film today, as compared to $12.3 million in 1980 (McClintock, 2014).[1] This, combined with higher production costs and variability in domestic box office revenue, indicates that producers have had to turn to additional revenue streams more urgently. In addition, international markets have grown rapidly in recent years. Experts believe that the Chinese box office, which grew by 49% in 2015, will overtake the U.S. as the largest market in the following year.

Economic research on the film industry has primarily focused on revenue prediction in the domestic market. However, a more holistic picture could be achieved by analyzing both domestic and international revenues. This study aims to understand the film and country variables that have contributed to the increased share of foreign revenues for American films from 2000 – 2014. The study hypothesizes that both *film* and *country* factors contributed to the increase in foreign share. In addition, this was due to the change in composition of films produced, as well as a change in the magnitude of the effect of explanatory variables over time. The study differs from existing work in three ways. Firstly, a novel dataset was created that spans 15 years, and combines film level and country level statistics with box office revenues from eleven countries. Secondly, this study used a temporal approach to understanding foreign share and revenues. Lastly, this study focused on the increase of foreign shares, which is a trend that has not been extensively researched.

[1] Revenue figures are in 2014 U.S. dollars.

II. Literature Review

This study aims to build an explanatory model rather than a predictive one. However, variables that were found to be significant revenue predictors in the literature were also applied to this study, since any variable that influences domestic or foreign revenue also affects foreign share. Many predictors of revenue have been identified using multivariable ordinary least squares (OLS) regression and fall into two broad categories – film attributes and country attributes.

a. Film Attributes

A pioneering study by Litman (1983) is one of the earliest attempts to model motion picture revenue. Litman (1983) utilized OLS regression to analyze different variables, including genre. Given the language barriers that exist when consuming any form of content, themes that are universal or can be expressed visually are more likely to be understood and well received by foreign audiences (Fu & Lee, 2008). This suggests greater international popularity for action and horror films, as opposed to comedies. Accordingly, Lee (2008) found the effects of Action to be positive and Comedy to be negative on box office revenues in Taiwan, South Korea and Japan. On the contrary, Action and Comedy were associated with higher revenues in the American box office (Brewer, Kelley & Jozefowicz, 2009). Taken together, genre and language are potential factors that contributed to the observed increase in foreign share.

Sequels have also been extensively studied in the literature. Sequels draw on an established audience who is already familiar with the narrative world and characters in the film. Accordingly, producers often jump at the chance to produce sequels for successful films. Several studies, including that of Walls and McKenzie (2012) and Brown, Camerer and Lovallo, (2012) find that sequels perform better financially. Basuroy and Chatterjee (2008) found that sequels do not necessarily perform as well as the parent film, but that they do outperform other non-sequels. This effect is enhanced if the sequel is released sooner, and when more sequels in the franchise have been released.

Like sequels, positive reviews from critics are also correlated with higher revenue. Eliashberg and Shugan (1997) found that positive reviews correlated with total revenues, suggesting that critics could be early indicators of box office performance. On the contrary, Basuroy, Chatterjee and Ravid (2003) found evidence supporting the idea that critics played a dual-role, acting as both influencers of ticket sales and predictors.

In addition, Elberse and Eliashberg (2003) argued that the longer the time lag between a film's domestic release and a foreign release, the more its hype and buzz fades away. The study found that the time lag weakens the predictive relationship between domestic revenues and international revenues in four European markets. Hence a film's international revenue is not only subject to the own release date, but also those of the U.S. and other neighboring markets. Other variables investigated in the literature include the number of screens on which a film is released (Elberse & Eliashberg, 2003), production budget (Litman, 1983), holiday or summer releases (Einav, 2007), adaptations (Brown et al., 2012) and star power (Nelson & Glotfelty, 2009). In addition to these variables, this analysis also investigated whether the film's production method (major studio, studio subsidiary or independent production) and the number of top ten largest markets to which the film was distributed influenced its foreign share.

b. Country Attributes

Another area of research focuses on the predictors of success of imported films. Hoskins and Mirus (1988) use the Cultural Discount Theory to describe how content rooted in a particular culture decreases in value to viewers of a different culture. Likewise, Fu and Lee (2008) found that the performance of imported films in Singapore was predicted by how successful these films were in their home countries and the cultural similarity of both countries. Fu and Govindaraju (2010) also investigated cross-cultural similarity in box office preferences by observing the correlation between U.S. box office revenues and revenues in other countries, and found that smaller cultural distance predicted how well two box office markets correlated with each other. The study also incorporated a (cultural distance x year) interaction variable, which was also adapted in the present study to analyze the variables' effect over time. Overall, these studies

demonstrate the role of sociological and cultural factors in understanding the performance of American films abroad.

Furthermore, as a country's wealth increases, so does its demand for normal goods. Research by Dewenter and Westermann (2005) in the German box office have found theatre-going demand to have an income elasticity of 4.48, indicating that of a normal (luxury) good. Likewise, Macmillan and Smith (2001) found cinema consumption to be a normal good in the post-war U.K. market. Thus, increases in GDP per capita should be positively related to film demand in overseas markets, and the growth in these factors over time could explain the increase in foreign revenue streams. The same can be said of population growth, which increases market size and hence the demand for a given good. In addition to these country-specific variables, this analysis also investigated the effect of having a match in language between the film and the country in focus. A match is predicted to be correlated with higher revenues in that country.

III. Data

a. Data Sources

Information was collected on 2,337 individual films spanning 2000 – 2014. This analysis uses data obtained from OpusData, which company provides information and research services related to the motion picture industry. The company claims that its domestic box office data are accurate within 1% of the stated value, while international revenues are accurate within 10%. The dataset was further augmented with film attributes from The Internet Movie Database (IMDB), Box Office Mojo and Rotten Tomatoes. Revenue data was also collected for the ten biggest international markets: China, Japan, France, United Kingdom, India, South Korea, Germany, Russia, Australia & Mexico (MPAA, 2014). These countries represent a diverse sample of economies that vary in size, economic development, culture, protectionist policies and strength of the local film industries.

All revenues were adjusted to 2014 prices using the Consumer Price Index obtained from the U.S. Bureau of Labor Statistics. Per capita GDP and population statistics for individual

countries were obtained from the World Bank's database. A social globalization score for each country over 15 years was obtained from the KOF Globalization Index. The scores were computed by the KOF Swiss Economic Institute. The metric captures each country's per capita Internet use, access to TV and foreign press products. Cultural distance from the United States was tabulated as the absolute difference between the U.S.' score and the score for a country of interest. Tables 1-3 below outline the dependent and independent variables used in the analysis. The natural logarithm was applied to variables that had a skewed distribution.

Table 1. Key Dependent Variables

Variable	Definition	Source
Foreign Share	The proportion of a film's worldwide revenue derived from foreign markets.	Constructed
log(revenue)	A film's territory-specific box office revenue per by country of interest. All values are in log 2014 US dollars.	Box Office Mojo

Table 2. Film Variables

Variable	Definition	Source
log(budget)	Production budget of a film. It excludes advertising and distribution fees.	Opus Data
Screens	The maximum number of screens that the film was screened on in any given week during its North American theatrical exhibition.	Opus Data
Star actor	IMDB calculates a person's StarMeter based on the number of views on their IMDB page aggregated across its millions of worldwide users. 1 = The actor is listed in IMDB's Top 500 men or women based on his/her StarMeter rank as of Nov 8, 2015. 0 = Otherwise	IMDB
Star director	1 = The director is listed in IMDB's Top 500 men or women based on his/her StarMeter rank as of Nov 8, 2015. 0 = Otherwise	IMDB
English	1 = Film's language is English; 0 = Otherwise	Opus Data
Genre	The films were grouped into categories by genre and coded using an indicator variable. 1 = Action/Adventure; 2 = Comedy; 3 = Drama 4 = Thriller/Suspense; 5 = Horror; 6 = Musical/Concert 7 = Documentary	OpusData, IMDB
MPAA	An indicator variable for the film's rating as determined by the Motion Picture Association of America. 1 = G; 2 = PG; 3 = PG-13; 4 = NC-17; 5 = R; 6 = Not Rated	Opus Data
Sequel	This indicates whether the film was based on an existing franchise or sequel. 1 = Sequel; 0 = Non-Sequel	Opus Data

Table 2. (Continued) Film Variables

Variable	Definition	Source
Adaptation	The film was based on an adaptation of a nonfiction book, fiction book, play, TV series, comic or graphic novel, or a spin-off of existing franchises. 1 = Adaptation; 0 = Otherwise	Opus Data
Studio	An indicator variable for whether a film was produced by a major studio or its subsidiaries. 0 = Films produced independently; 1 = Films produced by a studio 2 = Films produced by subsidiaries of a studio	Opus Data, IMDB
Critics	A film's Rotten Tomatoes score, which indicates its percentage of positive published professional critic reviews. Scores range from 0 to 100.	Rotten Tomatoes
Top10markets	The number of markets, out of the ten major foreign territories, that the film was released in. The variable ranges from 0 to 10.	Constructed

Table 3. Country Variables

Variable	Definition	Source
log(GDP)	GDP Per Capita in the year of interest (thousands, normalized to 2014 USD)	World Bank
log(popn)	Population of the country in the year of interest (millions)	World Bank
Release lag	The release date in the country minus the release date in the U.S., indicating the number of days between both.	Constructed
Summer	1 = Film was released in the summer, defined as May-Jul or Dec-Feb (only Australia) 0 = Otherwise	Constructed
Holiday	1 = Film was released within 1 week of Christmas; 0 = Otherwise	Constructed
Cultural Distance	Cultural Distance = $\lvert U_{i,j} - U_{U.S.,j} \rvert$ $U_{i,j}$ is the score on the social globalization index for country *i* in year *j* and $U_{U.S.,j}$ is the score for the U.S. in year *j*. The index ranges from 0 and 100.	KOF Economic Institute
Language match	A dummy variable indicating whether the film's language matches the main language used in the country 1 = Yes; 0 = Otherwise	World Bank

b. Summary Statistics

Table 4 displays the summary statistics for variables in the analysis. The average foreign share for all films is 38.9%, with a standard deviation of 27%. The domestic box office remains the largest in comparison to foreign territories, with a per-film average of $59.74 million and a standard deviation of $82.74 million. Other key markets in terms of expenditures include the United Kingdom and Japan at $12.12 and $13.76 million respectively per film. Overall, average foreign revenues ranged from $1.49 million in India to $26.29 million in China.

Table 4. Summary Statistics for Key Variables

Variable	Mean	Median	Std. Dev.	Min	Max	Observations
Foreign Share	0.389	0.414	0.267	0	1	2,337
Revenues (million USD)						
United States	59.738	31.486	82.741	2.00E-05	836.558	2,337
Australia	6.862	4.036	8.562	0.001	116.600	1,489
China	26.290	10.916	37.719	0.009	320.000	233
France	7.883	3.334	12.543	0.001	193.600	1,420
Germany	7.834	3.136	13.468	1.17E-06	178.200	1,509
India	1.485	0.376	3.258	0.003	38.883	467
Japan	13.761	5.039	25.516	0.009	249.037	846
Mexico	5.161	2.397	7.432	0.007	64.746	1,456
Russia	5.662	2.267	9.046	0.002	128.700	1,227
South Korea	5.862	1.990	10.255	0.0003	115.500	923
United Kingdom	12.122	5.206	19.002	0.0004	165.830	1,672
International (only films with international release)	80.714	26.961	144.118	0.0002	2225.753	2,047
Budget (million USD)	45.432	26.520	52.522	0.001	467.500	2,337
Screens (hundreds)	19.445	24.330	13.812	0.01	44.680	2,337
Critics	50.704	51.000	26.708	0	100.000	2,337
Genre Dummies						
Action/Adventure	0.209	0	0.407	0	1	2,337
Comedy	0.303	0	0.460	0	1	2,337
Drama	0.261	0	0.440	0	1	2,337
Thriller/Suspense	0.113	0	0.317	0	1	2,337
Horror	0.062	0	0.241	0	1	2,337
Musical/Concert	0.015	0	0.123	0	1	2,337
Documentary	0.036	0	0.186	0	1	2,337
MPAA Dummies						
G	0.022	0	0.148	0	1	2,337
PG	0.144	0	0.351	0	1	2,337
PG-13	0.371	0	0.483	0	1	2,337
NC-17	0.002	0	0.046	0	1	2,337
R	0.409	0	0.492	0	1	2,337
Studio Dummies						
Major Studio	0.269	0	0.443	0	1	2,337
Subsidiary of Major Studio	0.130	0	0.336	0	1	2,337
Independent Production	0.602	1	0.490	0	1	2,337
Sequel	0.101	0	0.302	0	1	2,337
Adaptations	0.280	0	0.449	0	1	2,337
English Dummy	0.991	1	0.092	0	1	2,337
Star Actor	0.452	0	0.498	0	1	2,337
Star Director	0.076	0	0.265	0	1	2,337
Top 10 Markets	4.880	6	3.391	0	10	2,337
Release Lag	54.207	27.000	94.832	-1,177.00	2,330.00	13,597

NOTE – All values have been normalized to 2014 US dollars.

Revenue correlations across countries were tabulated (Appendix B, Table B1). Countries in the same geographical region exhibit relatively large correlations, such as between France and Germany ($\rho = 0.880$), France and the United Kingdom ($\rho = 0.804$) and Germany and Russia ($\rho = 0.617$). However, the correlations between European countries are greater in magnitude than those between Asian countries, indicating that tastes across Europe may be more homogenous. Revenues in the U.S. were most correlated with Australia, the United Kingdom and Mexico.

The most popular genres were Action/Adventure (21%), Comedy (30%) and Drama (26%). A large proportion of films were given an MPAA rating of R (40%), followed by PG-13 (37%). For the ten foreign countries in the sample, a U.S. film was released abroad 54 days later on average. The critics' scores have a mean of 50.7 and a median of 51 (out of 100), indicating a relatively even distribution of positively and negatively reviewed films in the sample. In addition, approximately 10% of the films in the dataset were sequels whereas a surprising 28% were adaptations. 45% of films were helmed by a star actor and 8% by a star director.

In order to investigate multicollinearity, the correlations of key variables were tabulated (Appendix B, Table B2). The variables with some of the highest correlations include *screens*, which is highly correlated with *log(domestic)* ($\rho = 0.843$), *log(international)* ($\rho = 0.763$) and *log(budget)* ($\rho = 0.744$). This is not surprising since films with higher budgets are often released on many screens due to their anticipated popularity. Sequels are also slightly positively correlated with the peak number of screens released ($\rho = 0.321$). Other variables do not have larger correlations than 0.201.

c. Limitations of Data

There were a large number of films with missing budget data. Missing information was especially apparent for films with very low domestic revenue. This was likely due to incomplete records, and excluding these films from the dataset led to a less representative sample. For example, the average domestic revenue and foreign share for the 1,248 films with missing budget data were $3.1 million and 0.086 respectively, as compared to $70.1 million and 0.388 for films

with budget data. Many studies have acknowledged this issue, with many restricting their dataset to only wide-released films or the top performing films. In addition, the following data, if available, can be incorporated into future studies – revenues from television licensing fees, video rentals, video sales, and costs from advertising, which range from 30% to 50% of a film's production budget (Phillips, 2004). These additional data would contribute towards a more holistic understanding box office performance. The remainder of the paper is divided into two sections that focus on film and country attributes respectively. Each section begins with the methodology and is followed by the results.

IV. Methodology and Results I: Film Attributes

This section focuses on analyzing the direct role of film attributes through foreign share data. Country attributes were not included in this part of the analysis since foreign share is a metric that groups the international revenue stream as a whole, rather than as individual territories. Ordinary least squares (OLS) regressions were used for all analyses in the paper.

a. Methodology

In regression (1), the dependent variable is per-film foreign share (*Foreign Share*) and the independent variables are the film attributes (*FilmAttributes*) listed in Table 2. *FilmAttributes*Year* interaction terms were added to allow the coefficients to vary by year. *Year* is a continuous variable for the film's release year. β_1 and β_2 are vectors of the corresponding coefficients. μ_k represents year fixed effects and ε_i is the error term.

$$Foreign\ Share_i = \beta_0 + \beta_1\ FilmAttributes_i + \beta_2 FilmAttributes*Year_i + \mu_k + \varepsilon_i \quad (1)$$

Next, a time trend regression was run. For categorical attributes such as genre, this showed how the proportion of a given genre among films released has changed. For continuous variables such as budget, it indicates how average budget has changed over time. The base number of films released per year (*Basefilms*) was included as a control to capture proportional increases, as opposed to an absolute increase due to more films being released yearly.

$$FilmAttribute_i = \gamma_0 + \gamma_1 Year_i + \gamma_2 Basefilms_i + \varepsilon_i \quad (2)$$

An attribute can influence foreign share over time in two aspects. Firstly, the magnitude of a variable's effect on foreign share could change over time. From regression (1), each attribute's effect on foreign share is given by:

$$\frac{\partial \text{ Foreign share}}{\partial \text{ Attribute}} = \beta_1 + \beta_2 \text{ x Year}$$

Secondly, if an attribute that significantly predicts foreign share changes in frequency over time, this would also predict a change in foreign share over time. For example, if sequels positively predict foreign share, more sequels released over time would increase foreign share. From regression (2), each attribute's change in frequency per year is approximated by:

$$\frac{\partial \text{ Attribute}}{\partial \text{ Year}} = \gamma_1$$

For a given year, the product of the two components, labeled θ, indicates how foreign share is changing over time as a result of the change in frequency of a given variable. In addition, β_2 allows the *magnitude* of each variable's coefficient to vary by year. The median year, 2007, was used to calculate the coefficients ($\beta_1 + \beta_2$ x Year) when estimating θ. This is equivalent to obtaining the average of the estimated coefficient over 2000 – 2014.

$$\theta = \frac{\partial \text{ Foreign share}}{\partial \text{ Attribute}} \text{ x } \frac{\partial \text{ Attribute}}{\partial \text{ Year}} = (\beta_1 + \beta_2 \text{ x Year}) \text{ x } \gamma_1$$

A Breusch-Pagan test confirmed the presence of heteroskedasticity in the data ($p < 0.01$). Accordingly, Huber-Eicker-White standard errors were used for all regressions in the paper. As the sample size increases, the robust standard errors should converge to the true standard errors.

b. Results

This results from regression (1) and (2) can be seen below in Table 5. The coefficients in the β_1 and β_2 column are from the same regression, whereas each coefficient in the γ_1 column was from a different time trend regression for each variable respectively. θ, indicates how the change in a variable's frequency over time has contributed to the change in foreign share. θ was calculated only for variables with a time trend (γ_1 was significant) and that predicted foreign

share (β_1 and β_2 were jointly significant). The sign of the θ coefficient summarizes the impact of a given variable on foreign share. The R^2 for regression (1) was 0.523, and those for regression (2) ranged from 0.002 to 0.025. The full results of regressions (1) and (2) can be found in Appendix C (Table C1-2). All fixed effects were significant at the 5% level. In addition, the values of the year fixed effects resemble the observed trend in foreign share in Figure 1, suggesting that the unobserved effects captured could also be contributing to the change in foreign share over time (Appendix C, Figure C1).

Table 5. Effect of Film Attributes on Foreign Share Over Time

	Regression (1)		Regression (2)	(Constructed)
	β_1	β_2	γ_1	θ
Log(budget)[a]	-0.829	0.0004	-0.001	-
	(2.524)	(0.001)	(0.018)	
Screens[a]	1.992***	-0.001***	0.360**	-0.0054
	(0.331)	(0.0002)	(0.148)	
Star Director	11.773*	-0.006*	-0.002	-
	(6.732)	(0.003)	(0.003)	
Critics[a]	0.313	-0.0002***	0.330	-
	(0.08)	(0.00003)	(0.280)	
Star Actor[a]	5.215	-0.00258	0.022***	0.0008
	(4.360)	(0.002)	(0.005)	-
Genre (Baseline = Action)				
Comedy[a]	-0.346	0.0001	-0.009*	-
	(5.529)	(0.003)	(0.005)	
Drama	15.412**	-0.008**	0.003	-
	(6.369)	(0.003)	(0.005)	
Thriller	-5.141	0.003	0.002	-
	(7.178)	(0.004)	(0.003)	
Horror	-4.151	0.002	-0.0004	-
	(11.864)	(0.006)	(0.003)	
Musical[a]	-1.984	0.001	-0.001	-
	(16.781)	(0.008)	(0.001)	
Documentary[a]	8.204	-0.004	-0.001	-
	(12.111)	(0.006)	(0.002)	
Sequel[a]	-12.726**	0.006**	0.006*	-
	(5.095)	(0.003)	(0.003)	
Studio (Baseline = Independent production)				
Subsidiary[a]	9.072*	-0.005*	-0.003	-
	(4.758)	(0.002)	(0.003)	
Major Studio	7.472*	-0.004*	-0.019***	-
	(4.184)	(0.002)	(0.004)	

NOTE – Standard errors are in parenthesis. $\theta = (\beta_1 + \beta_2 * year) * \gamma_1$, where year = 2007.
[a] β_1 and β_2 were jointly significant at the 5% level
***,**,* $p < 0.01$, 0.05 and 0.10 respectively

Table 5. (Continued) Effect of Film Attributes on Foreign Share Over Time

	Regression (1)		Regression (2)	(Constructed)
	β_1	β_2	γ_1	θ
Adaptation	6.377	-0.003	0.007	-
	(3.891)	(0.002)	(0.005)	
MPAA (Baseline = G)				
PG	-10.874	0.005	0.007*	-
	(12.439)	(0.006)	(0.004)	
PG-13[a]	-5.305	0.003	-0.003	-
	(12.343)	(0.006)	(0.005)	
NC-17	-35.396	0.018	0.0001	-
	(37.098)	(0.018)	(0.0004)	
R	-2.093	0.001	-0.002	-
	(12.721)	(0.006)	(0.005)	
Not Rated[a]	15.472	-0.008	0.003	-
	(15.987)	(0.008)	(0.002)	
English [a]	22.578	-0.0113	0.002**	-0.0002
	(27.129)	(0.014)	(0.001)	
Top10markets[a]	-7.158***	0.004***	0.063*	-
	(1.102)	(0.001)	(0.036)	

NOTE – Standard errors are in parenthesis. $\theta = (\beta_1 + \beta_2 * \text{year}) * \gamma_1$, where year = 2007.
[a] β_1 and β_2 were jointly significant at the 5% level
***,**,* p < 0.01, 0.05 and 0.10 respectively

In this model, *budget*, *screens*, *critics*, *star actors*, *sequel*, *studio* (subsidiary films), *English* and *Top10markets* were significant in predicting foreign share, as each variable's β_1 and β_2 coefficients were jointly significant at the 5% level. In addition, several genres (comedy, musical and documentary) and MPAA ratings (PG-13 and Not Rated) were significant in predicting foreign share.

However, only three variables, *screens*, *star actors* and *English*, predicted foreign share in (1) and changed in frequency over time in (2). Per Table 5, *screens* has a negative coefficient ($\beta_1 + \beta_2 * 2007 = -0.015$) when predicting foreign share. The variable refers to the peak number of screens per week on which a film was shown in the U.S. This means that the greater a film's domestic distribution, the lower its foreign share holding all else constant. The coefficient became increasingly negative over time, suggesting a greater dampening effect on foreign share. The negative coefficient combined with the positive time trend suggests that *screens* is associated with a decrease in foreign share over this period.

A film with a star actor had a higher foreign share by 0.037 units ($\beta_1 + \beta_2$*2007) than one without a star actor. This could be due to a more globalized fan base for famous actors, as facilitated by digital media. In addition, the proportion of films with famous actors increased by 2.2 percentage points yearly. This may reflect strategies by movie producers to attract audiences in foreign countries through well-known celebrity actors starring in their movies. Overall, this suggests that star power, in the form of famous actors, contributed to greater foreign share in this period.

English films negatively predicted foreign share in this model. However, a more appropriate interpretation is that non-English films increased foreign share by 0.101 units ($\beta_1 + \beta_2$*2007). These films likely appealed to select foreign audiences leading to a higher foreign share. For example, a Spanish film would appeal to audiences in Spanish-speaking countries, and less to domestic audiences. Since there were proportionately more English films released each year, this led to a decrease in foreign share over time. However, this change is very small as an overwhelming majority (99%) of the films in the dataset are English films. Hence this variable likely played a small role in influencing foreign share over time.

Next, the following variables influenced foreign share through a change in the magnitude of its coefficient over time. A significant β_2 coefficient suggests that preference for that attribute has changed over time, giving rise to a change in its impact on foreign share each year. These variables include *sequels*, *critics*, *top10markets* and *genre*. The coefficient ($\beta_1 + \beta_2$*year) of *sequels* in predicting foreign share is negative during this time period, but was less negative (more positive) over time, as evidenced by the positive sign for β_2. This is consistent with anecdotal evidence that sequels have become increasingly successful worldwide. In 2014, seven out of the ten films with the largest worldwide gross were sequels, as compared to only one out of ten in 1994 (Garrahan, 2014). This may also reflect the change in the type of sequels produced over time, to more sequels from mega-franchises such as *The Hunger Games*, *Star Wars* and *X-Men*, which have global appeal. Since each sequel released had a more positive effect on foreign share than the year before, sequels likely increased foreign shares over time.

Critics' ratings had a negative effect on foreign share. Average critics' score each year remained unchanged but the same score now decreased foreign share by a greater amount each year (β_2 is negative). This suggests that *critics* decreased foreign share over time. Nonetheless, the magnitude of its yearly change, β_2, appears rather small. Next, the coefficient of *Top10markets* is positive and increases over time. Hence, the effect of releasing a film in a top ten foreign market increases foreign share by a greater amount each year. This is consistent with the fact that many of the top ten film markets are rapidly growing markets, such as China, India and Mexico, and reflect greater demand for American films.

The composition of genres has remained consistent over time ($p < 0.05$), with the exception of comedy films, which had a marginally significant decrease of 0.9 percentage points annually. Comedy has historically posed challenges in appealing to foreign audiences, and may be causing movie producers to shift towards other genres. Drama was the only genre that significantly predicted foreign shares in this model. Its coefficient, when allowed to vary by year, was more negative over time ($\beta_2 = -0.008$), indicating an associated decrease in foreign share. Based on the Cultural Discount Theory and the fact that genre choice is well within the control of movie producers, film genres were expected to play a greater role in influencing foreign share over time. A limitation in the methodology is that *genre* classifies each film into one of seven mutually exclusive categories. In reality, most films are best described by a combination of multiple genres. Even films within the same science-fiction genre, such as *Back to the Future (1985)* and *Blade Runner (1982)*, are vastly different from each other. Ideally, more specific genre labels or cross-listing of multiple genres would be used.

The remaining variables were unlikely to have influenced foreign share over time. These variables did not have a significant time trend and the magnitude of their coefficients in predicting foreign share were not significant or did not change in magnitude over time. These included *log(budget)*, *star director*, *studio, adaptation* and *MPAA*.

V. Methodology and Results II: Country Attributes

This section explores how country attributes influence foreign share through a country-level analysis of foreign revenues as the dependent variable. This allowed country demographics, such as GDP and population, to vary with the dependent variable. Revenue data from the United States was excluded from the dependent variable in this regression as the focus lay in understanding international revenues.

a. Methodology

Box office revenues of American films released in each of the 10 foreign countries from the years 2000 to 2014 were grouped into a single large dataset. This model combines data from all countries into a single regression to capture the effect of these variables as they varied across both time and country. Each film contributed up to ten observations to the dataset for a total of 23,133 observations. Year and country fixed effects were also included to isolate unobserved effects that may be correlated with the regression covariates but were not captured in the model. For China and France, the country fixed effects would also account for the countries' protectionist measures in the form of film import quotas and mandatory screenings for local movies (Marvasti & Canterbery, 2005).

The distribution of two variables, *cultural distance* and *population*, against *log(revenue)* was multi-modal and comprised several countries grouped at extreme ends of the distribution (Appendix D, Figure D1). Dummy variables, which corresponded to the "clusters" in the distribution, were created and included as interaction terms in the regression. This allowed the coefficients to capture the effect of varying the independent variable within each cluster, rather than across it. For *cultural distance*, three dummy variables were constructed, representing all countries (*culture_1*), except South Korea, Mexico and China (*culture_2*) and India (*culture_3*). Two population dummy variables were created, representing all countries (*popn_1*), except China and India (*popn_2*). Each dummy term was interacted with its respective independent variable.

Log(revenue) refers to a film's revenue in a given country. *FilmAttributes* represents the vector of film attributes listed in Table 2. *CountryAttributes* represents a vector of country attributes listed in Table 3. β_1 and β_2 are vectors of the respective coefficients. μ_j represents fixed effects for each of the ten countries and μ_k represents fixed effects for each of the fifteen years in the dataset. For each country attribute, a *CountryAttributes*Year* interaction term was also added to allow the coefficient of each variable to vary by the year in which the film was released. *Year* is a continuous variable and ranges from 2000 to 2014.

$$Log(revenue)_i = \beta_0 + \beta_1 CountryAttributes_i + \beta_2 CountryAttributes*Year_i + \beta_3 FilmAttributes_i + \mu_j + \mu_k + \varepsilon_i \quad (3)$$

Next, regression (4) observed how each attribute varied with time. Each country attribute is the dependent variable and the release year is the independent variable. The number of films released each year (*Basefilms*) and country fixed effects, μ_k, were added as controls.

$$CountryAttribute_i = \gamma_0 + \gamma_1 Year_i + \gamma_2 Basefilms_i + \mu_k + \varepsilon_i \quad (4)$$

The following is analogous to the analysis of film attributes in the previous section. Instead of foreign share, international revenues from each of the ten foreign countries are the dependent variable. From regression (3), each attribute's effect on international revenues is:

$$\frac{\partial \text{ International revenues}}{\partial \text{ Attribute}} = \beta_1 + \beta_2 \text{ x Year}$$

From regression (4), each attribute's change in frequency per year is approximated by:

$$\frac{\partial \text{ Attribute}}{\partial \text{ Year}} = \gamma_1$$

The product of these two components, labeled θ, indicates how a given variable leads to a change in international revenues over time. In addition, β_2 allows the *magnitude* of each variable's coefficient to vary by year.

$$\theta = \frac{\partial \text{ International revenues}}{\partial \text{ Attribute}} \text{ x } \frac{\partial \text{ Attribute}}{\partial \text{ Year}} = (\beta_1 + \beta_2 \text{ x Year}) \text{ x } \gamma_1$$

Lastly, the Two-Stage Heckman correction was applied to correct for selection bias in regression (3) (Heckman, 1979). Of the 23,133 observations, 11,895 did not have revenue data. These were used in the Heckman selection model. Missing revenue observations in the ten foreign countries followed a non-random pattern. There were two likely reasons for this. Firstly, distributors decided not to import the film because it was not anticipated to be successful there, based on the preferences of the local audience. Hence, the sample is likely to exhibit an import bias favoring well-performing films. Secondly, missing observations could also be due to records being poorly kept. This is more likely to be an issue in non-English speaking countries where information collection by sources (such as Box Office Mojo) was possibly hindered by language. Records were also more likely to be intact for films that performed well at the box office, leading to an over-representation of films with high box office receipts in the sample.

b. Results

The country variables are the focus of the analysis and the film attributes here function as control variables. This section combines the results from regression (3) and (4). All β_1 and β_2 coefficients are from a single regression, whereas each γ_1 coefficient is from a different time trend regression for each variable respectively. θ was calculated only for variables where γ_1 was significant and β_1 and β_2 were jointly significant ($p < 0.05$). Each variable could influence international revenues over time in two ways – through a change in its coefficient ($\beta_1 + \beta_2$*year) and through its change in frequency captured in (γ_1). For the full results of regression (3) and (4), refer to Appendix D (Tables D1-2). The R^2 values for regression (4) ranged from 0.001 to 0.98, which is a much greater range that the analogous regression (2).[2]

Per Table 6 below, films are increasingly being released earlier in foreign countries, and this has resulted in more revenues received. The negative coefficient for *release lag* is less negative (more positive) over time, suggesting that its dampening effect of lag time on foreign share is diminished each year. The variable's negative coefficient combined with fact that average lag has decreased by 9 days a year, suggests that *release lag* had a positive effect on

[2] The R^2 for (3) was not reported by STATA since the Heckman correction was applied

international revenues over time. Distributors often use early releases as a strategy to increase international revenue, as was seen in *Iron Man 3 (2013)* and *The Avengers (2012)*.

Table 6. Effect of Country Attributes on International Revenues Over Time

	Regression (3)		Regression (4)	(Constructed)
	β_1	β_2	γ_1	θ
Release Lag[a]	-0.151**	0.00007**	-9.127***	0.0959
	(0.067)	(0.00003)	(0.500)	
Holiday[a]	-14.127	0.007	0.0001	-
	(29.265)	(0.015)	(0.001)	
Summer	-17.399	0.009	0.001	-
	(13.758)	(0.007)	(0.002)	
Log(popn) (Baseline = Popn_1)	38.942	-0.02	0.006***	-
	(29.912)	(0.015)	(0.003)	
Popn_2	-82.199	0.012	0.010***	-
	(55.846)	(0.018)	(0.001)	
Log(GDP)	99.076***	-0.049***	0.030***	0.0220
	(28.651)	(0.014)	(0.004)	
Cultural Distance (Baseline = Culture_1)	-2.276	0.001	0.018**	-
	(3.206)	(0.002)	(0.006)	
Culture_2	3.387	-0.001	0.001	-
	(2.329)	(0.001)	(0.009)	
Culture_3	4.725	-0.001	-0.114***	-
	(8.52)	(0.004)	(0.024)	
Language Match[a]	-14.361	0.0075	0.001***	0.001
	(23.311)	(0.012)	(0.0002)	

NOTE – Standard errors are in parenthesis. $\theta = (\beta_1 + \beta_2 * year) * \gamma_1$, where year = 2007.
[a] β_1 and β_2 were jointly significant at the 5% level
***,**,* p < 0.01, 0.05 and 0.10 respectively

Higher GDP per capita is also associated with increased expenditure on American films. In 2007, a 1% increase in GDP per capita predicted a 0.733% ($\beta_1 + \beta_2 * 2007$) increase in foreign share. In addition, individual wealth has increased by an average of 3.0% per year for the countries in the dataset. This suggests that GDP growth is one factor driving the increase in international revenues. Interestingly, the effect of GDP on revenues diminished over time (β_2 is negative) but remained positive throughout. This suggests that GDP increased international revenues, but at a decreasing rate each year. Some of the countries with the highest GDP growth during this period are China, India and Russia (Appendix D, Table D3).

The third variable that influences international revenues over time via θ is *language match*. Every year, the proportion of films that match the language of the local population increased by 0.1 percentage points. This may suggest producers' greater sensitivity to language barriers and attempts to overcome them. In addition, *language match* was associated with increased film revenues. This is likely because the content of the film could be transmitted with higher fidelity to the foreign audience, which resulted in its greater appeal. Overall, this variable was associated with increased international revenues over time.

Next, the following variables had a significant time trend, but did not predict international revenues in this model. This includes *log(popn)* and *cultural distance*. Countries in the dataset increased in population size over time, but the variable was not a significant predictor of revenues in this model. Multicollinearity with *log(GDP)* ($\rho = -0.458$) might have resulted in the lack of explanatory power for *log(popn)*. A potential modification for future work would be to narrow the definition of the variable to just the demographic group that is of prime theatre-going age. In the U.S., individuals between the ages of 18 and 50 account for the greatest proportion of the movie tickets purchased (MPAA, 2015). This might be a better measure of population effects on ticket revenues in a particular country.

Next, the findings for *cultural distance* are contrary to predictions. All three groups (*culture_1 – 3)* do not significantly predict international revenues. In addition, *cultural distance* has increased for the reference group of countries (Australia, France, Germany, U.K., Japan, Russia). This differs from anecdotal evidence that a more connected world has led to smaller cultural distances between countries. One possible reason for this finding is the way in which cultural distance was characterized, using the absolute difference between countries' globalization score, as opposed to an explicit measure of cultural similarity between two given countries. Finding a more direct measure of cultural distance is a means of improvement in future research. Of the remaining variables, *holiday* did not change in its frequency or the magnitude of its coefficient, and *summer* was insignificant in all regressions.

VI. Conclusion

Has foreign share increased because American films have evolved or because the countries that demand them have changed? The study finds evidence that both factors likely contributed to the observed phenomenon. In today's globalized world, the country in context may be just as important as the film itself in understanding revenue distribution. The main challenge this study faced was in developing a systematic approach to analyze the change in foreign share over time, since foreign share has not been extensively studied in the recent literature. To do so, the paper first identified film and country variables that were significant in the literature in predicting revenues domestically and abroad. Next, each variable was analyzed, allowing its coefficient in predicting foreign shares as well as its frequency to vary with time. Overall, this paper finds empirical support for two mechanisms through which film or country variables can influence foreign share, through a change in the magnitude of their impact or a change in their prevalence amongst released films over time.

The first half of the analysis focused on the role of film attributes. The evidence suggested that *star actors*, *sequels* and *top10markets* increased foreign share over this period. *Star actors* positively predicts foreign share and its increased frequency amongst films released suggested an increase in foreign share over time. The latter two variables were constant in number, but the effect of each unit of the variable was greater over time. The analysis also identified variables that decreased foreign share – *screens*, *critics*, *drama* and *English*. It is uncertain whether the film variables that increased foreign share dominated those that decreased it. However, the findings are still useful as it suggests which variables could be further investigated in this regard.

The second half of the analysis focused on the role of country attributes in increased international revenues. The results show that the lag time between a film's local and U.S. release date, GDP per capita and having a match in language likely explained the increase in international revenues over time. Holding domestic revenues constant, this suggested an increase in foreign share. Furthermore, the strong growth of foreign box office markets suggests a greater

role of country attributes in driving the changes in foreign share in the future. Table 7 summarizes the findings for each variable. Variables could increase foreign share in two ways – by having a significant impact on foreign share that changed in magnitude over time (β_2) or by having a significant impact on foreign share and changing in frequency over time (θ). Variables that were not significant ($p > 0.05$) had no impact on foreign share.

Table 7. Summary of Findings

	Increased Foreign Share	Decreased Foreign Share
Film Variables	Star Actor Sequels Top10markets	Screens English Critics Drama (genre)
Country Variables	Release Lag Log(GDP) Language Match	

NOTE – Variables that were marginally significant ($0.05 < p < 0.10$) were not considered to have an impact on foreign share.

This analysis could be extended in several ways. First, the year fixed effects from regression (1) displays a positive time trend that is similar to that for the observed foreign share data. These unobserved effects may have influenced foreign share over time as well. It would be interesting to investigate further, and if possible, identify and include them as explanatory variables in the model. Second, other key aspects of the industry that unfortunately could not be captured in the model include advertising spending and the size of the local film industry in the foreign country. In addition, premium formats such as IMAX and 3-D films have become increasingly prevalent in recent years, and influence revenues through higher ticket prices. Third, consumer habits and preferences have changed with the advent of digital streaming alternatives. These changes have revolutionized the way in which content is being created today and distributed to the audience. These would be important factors to consider in future work.

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Appendix A

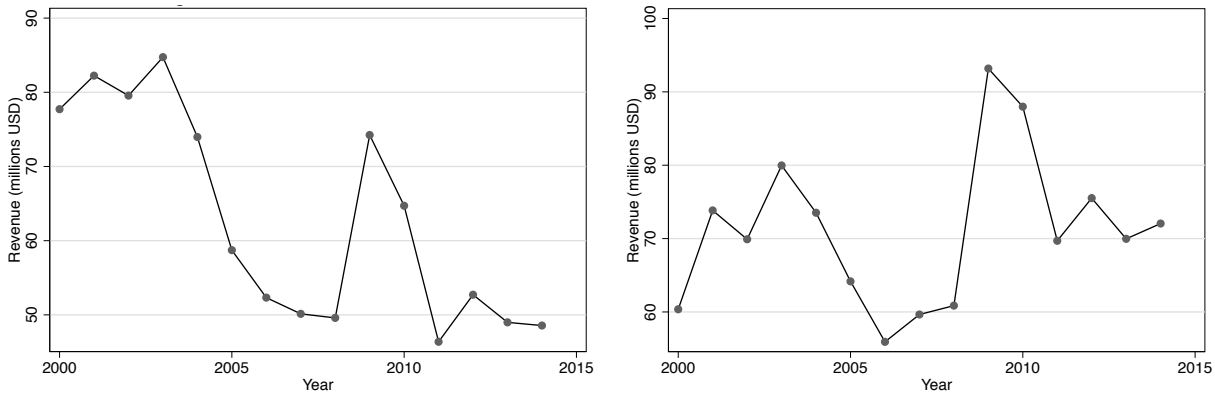

Figure A1. Average domestic (left) and international (right) revenue per film for US films released from 2000 – 2014. The values are per-film averages and are in terms of 2014 U.S. dollars.

Appendix B

Table B1. Correlation of Film Revenues By Country

		1	2	3	4	5	6	7	8	9	10	11
1	Australia	1.000										
2	China	0.445	1.000									
3	France	0.828	0.327	1.000								
4	Germany	0.821	0.281	0.880	1.000							
5	India	0.508	0.469	0.415	0.351	1.000						
6	Japan	0.553	0.169	0.635	0.636	0.228	1.000					
7	Mexico	0.666	0.492	0.594	0.487	0.433	0.423	1.000				
8	Russia	0.69	0.662	0.658	0.617	0.493	0.447	0.649	1.000			
9	South Korea	0.667	0.583	0.591	0.493	0.448	0.566	0.559	0.599	1.000		
10	United Kingdom	0.863	0.259	0.804	0.835	0.408	0.594	0.58	0.472	0.553	1.000	
11	United States	0.871	0.383	0.777	0.762	0.519	0.615	0.793	0.63	0.644	0.838	1.000

Table B2. Correlations for Key Variables

		1	2	3	4	5	6	7	8	9	10
1	log(domestic)	1.000									
2	log(international)	0.789	1.000								
3	Release Year	-0.169	-0.053	1.000							
4	log(budget)	0.678	0.726	-0.129	1.000						
5	Screens	0.843	0.763	-0.006	0.744	1.000					
6	Critics	0.079	0.091	0.031	-0.110	-0.118	1.000				
7	Star Actor	0.063	0.140	0.158	0.135	0.086	0.059	1.000			
8	Star Director	0.139	0.172	-0.052	0.146	0.077	0.180	0.055	1.000		
9	Sequel	0.236	0.278	0.061	0.229	0.321	-0.047	0.010	-0.008	1.000	
10	Adaptation	0.199	0.201	0.013	0.227	0.175	0.117	0.004	0.060	0.095	1.000

Appendix C

Full Regression Results

$$Foreign\ Share_i = \beta_0 + \beta_1\ FilmAttributes_i + \beta_2 FilmAttributes*Year_i + \mu_k + \varepsilon_i \quad (1)$$

Table C1. Regression Results for (1)

	Main Effect		*FilmAttribute*Year* Interaction Term	
	Coeff.	Std. Err	Coeff.	Std. Err
Log(budget)	-0.829	2.524	0.0004	0.001
Screens	1.992***	0.331	-0.001***	0.0002
Star Director	11.773*	6.732	-0.006*	0.003
Critics	0.313	0.08	-0.0002***	0.00003
Star Actor	5.215	4.36	-0.003	0.002
Genre (Baseline = Action)				
Comedy	-0.346	5.529	0.0001	0.003
Drama	15.412**	6.369	-0.008**	0.003
Thriller	-5.141	7.178	0.003	0.004
Horror	-4.151	11.864	0.002	0.006
Musical	-1.984	16.781	0.001	0.008
Documentary	8.204	12.111	-0.004	0.006
Sequel	-12.726**	5.095	0.006**	0.003
Studio (Baseline = Independent production)				
Subsidiary	9.072*	4.758	-0.005*	0.002
Major Studio	7.472*	4.184	-0.004*	0.002
Adaptation	6.377	3.891	-0.003	0.002
MPAA (Baseline = G)				
PG	-10.874	12.439	0.005	0.006
PG-13	-5.305	12.343	0.003	0.006
NC-17	-35.396	37.098	0.018	0.018
R	-2.093	12.721	0.001	0.006
Not Rated	15.472	15.987	-0.008	0.008
English	22.578	27.129	-0.011	0.014
Top10markets	-7.158***	1.102	0.004***	0.001

NOTE – Nominal variables are in 2014 US dollars.
***,**,* $p < 0.01$, 0.05 and 0.10 respectively

Table C1. (Continued) Regression Results for (1)

	Main Effect		*FilmAttribute*Year* Interaction Term	
	Coeff.	Std. Err	Coeff.	Std. Err
Year Fixed Effects (Baseline = 2000)				
2001	-0.059	0.039		
2002	-0.064	0.062		
2003	-0.01	0.084		
2004	-0.004	0.107		
2005	0.019	0.131		
2006	0.051	0.154		
2007	0.083	0.178		
2008	0.108	0.202		
2009	0.139	0.226		
2010	0.186	0.249		
2011	0.233	0.272		
2012	0.233	0.297		
2013	0.23	0.319		
2014	0.248	0.344		
Constant	-0.269	0.210		
Observations	2,337			
R^2	0.523			

NOTE – Nominal variables are in 2014 US dollars. Year fixed effects were jointly significant when tested with a F-test ($p < 0.01$)

***,**,* $p < 0.01$, 0.05 and 0.10 respectively

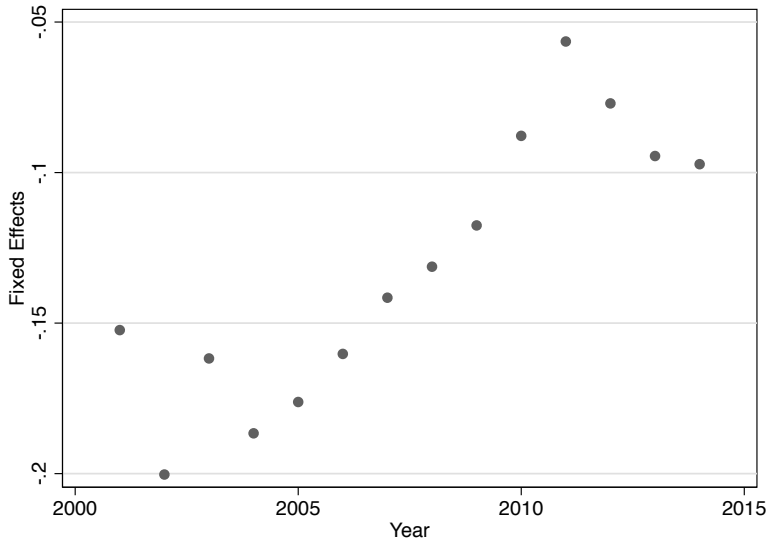

Figure C1. Year Fixed Effects from Regression (1) resemble the observed trend in foreign share.

$$FilmAttribute_i = \gamma_0 + \gamma_1 Year_i + \gamma_2 Basefilms_i + \varepsilon_i \quad (2)$$

Table C2. Time Trend Regression Results for Film Attributes (2)

	Log(budget)	Screens	Star Director	Critics	Star Actor	Sequel	Adaptation
Year	-0.001	0.360**	-0.002	0.330	0.022***	0.006*	0.007
	(0.018)	(0.148)	(0.003)	(0.28)	(0.005)	(0.003)	(0.005)
Basefilms	-0.008***	-0.063***	-0.0001	-0.016	-0.001	-0.0003	-0.0009
	(0.002)	(0.016)	(0.0003)	(0.031)	(0.001)	(0.0004)	(0.001)
Constant	19.382	-692.132**	5.031	-609.178	-43.097***	-11.547*	-13.737
	(36.728)	(294.233)	(5.477)	(558.559)	(10.351)	(6.419)	(9.475)
R^2	0.025	0.008	0.003	0.001	0.018	0.002	0.001
Observations	2,337	2,337	2,337	2,337	2,337	2,337	2,337

***,**,* p < 0.01, 0.05 and 0.10 respectively

Table C2. (Continued)

	Genre Variables						
	Comedy	Drama	Thriller	Horror	Musical	Documentary	English
Year	-0.009*	0.003	0.002	-0.0004	-0.001	-0.001	0.002***
	(0.005)	(0.005)	(0.003)	(0.003)	(0.001)	(0.002)	(0.001)
Basefilms	0.0001	0.0002	0.0001	0.0003	0.0002	0.0002	-0.0003***
	(0.001)	(0.001)	(0.0004)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Constant	18.544*	-6.362	-3.789	0.748	1.853	1.108	-3.918**
	(9.580)	(9.359)	(6.601)	(5.315)	(2.542)	(3.639)	(1.778)
R^2	0.006	0.002	0.002	0.002	0.001	0.0004	0.003
Observations	2,337	2,337	2,337	2,337	2,337	2,337	2,337

***,**,* p < 0.01, 0.05 and 0.10 respectively

Table C2. (Continued)

	Studio Variables		MPAA Variables					
	Subsidiary	Major Studio	PG	PG-13	NC-17	R	Not Rated	Top10 markets
Year	-0.003	-0.019***	0.007*	-0.003	0.0001	-0.002	0.003	0.063*
	(0.003)	(0.004)	(0.004)	(0.005)	(0.0004)	(0.005)	(0.002)	(0.036)
Basefilms	-0.0001	0.0008	-0.0009**	-0.00002	-0.00004	0.0006	0.0001	-0.003
	(0.0004)	(0.001)	(0.0004)	(0.001)	(0.00004)	(0.001)	(0.0002)	(0.004)
Constant	5.794	38.922	-12.909*	7.240	-0.373	3.967	-5.640	-122.048*
	(6.920)	(8.881)	(7.648)	(10.045)	(0.879)	(10.321)	(4.591)	(70.979)
R^2	0.002	0.016	0.002	0.001	0.0003	0.001	0.005	0.003
Observations	2,337	2,337	2,337	2,337	2,337	2,337	2,337	2,337

***,**,* p < 0.01, 0.05 and 0.10 respectively

Appendix D

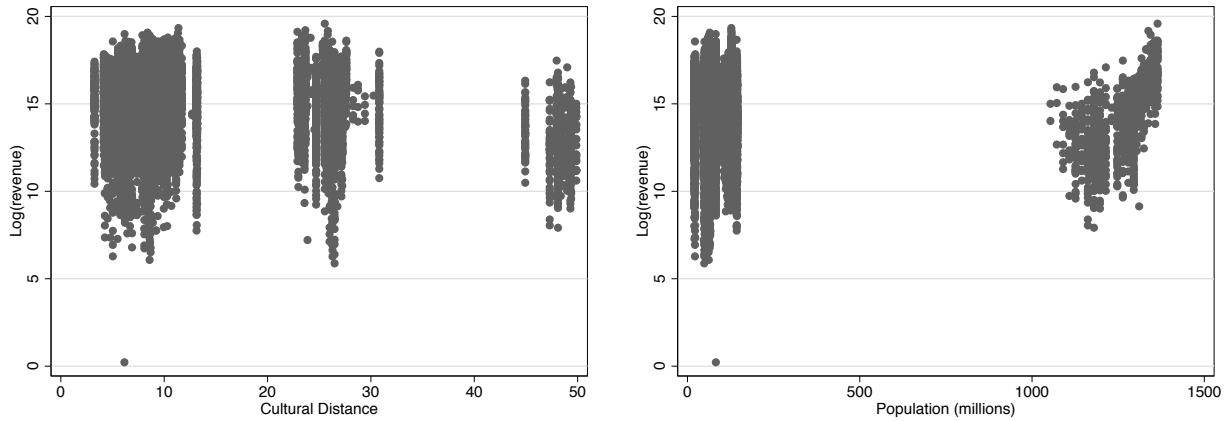

Figure D1. Scatter diagram of Cultural Distance (left) and Population (right) against log(revenue)

Full Regression Results

$$Log(revenue)_i = \beta_0 + \beta_1 CountryAttributes_i + \beta_2 CountryAttributes*Year_i + \beta_3 FilmAttributes_i + \mu_j + \mu_k + \varepsilon_i \quad (3)$$

Table D1. Regression Results for (3) With Heckman Correction

	Main Effect		*CountryAttribute*Year* Interaction Term	
	Coeff.	Std. Err.	Coeff.	Std. Err
Release Lag	-0.151**	0.067	0.00007**	0.00003
Holiday	-14.127	29.265	0.007	0.015
Summer	-17.399	13.758	0.009	0.007
Log(popn) (Baseline = Popn_1)	38.942	29.912	-0.02	0.015
Popn_2	-82.199	55.846	0.012	0.018
Log(GDP)	99.076***	28.651	-0.049***	0.014
Cultural Distance (Baseline = Culture_1)	-2.276	3.206	0.001	0.002
Culture_2	3.387	2.329	-0.001	0.001
Culture_3	4.725	8.52	-0.001	0.004
Language Match	-14.361	23.311	0.007	0.012
Log(domestic)	0.593***	0.022		
Log(budget)	0.386***	0.021		
Screens	0.004	0.003		
Star Director	0.116***	0.04		
Critics	0.006***	0.001		
Star Actor	0.121***	0.026		
Genre (Baseline = Action)				
Comedy	-0.471***	0.04		
Drama	-0.416***	0.04		
Thriller	-0.118***	0.041		
Horror	0.062	0.057		
Musical	-0.664***	0.1		
Documentary	-0.524***	0.123		
Sequel	0.350***	0.035		
Studio (Baseline = Independent production)				
Subsidiary	-0.082**	0.034		
Major Studio	-0.065**	0.027		
Adaptation	0.008	0.025		
MPAA (Baseline = G)				
PG	0.028	0.081		
PG-13	0.043	0.082		
NC-17	1.124***	0.297		
R	0.076	0.087		
Not Rated	0.753***	0.202		
English	-0.495***	0.153		

NOTE – All nominal variables are in 2014 US dollars.
***,**,* $p < 0.01$, 0.05 and 0.10 respectively

Table D1. (Continued) Regression Results for (3) With Heckman Correction

	Main Effect		*CountryAttribute*Year* Interaction Term	
	Coeff.	Std. Err.	Coeff.	Std. Err
Year Fixed Effects (Baseline = 2000)				
2001	0.201	0.192		
2002	0.113	0.256		
2003	0.389	0.345		
2004	0.534	0.446		
2005	0.647	0.552		
2006	0.746	0.658		
2007	0.955	0.774		
2008	1.346	0.889		
2009	1.522	0.981		
2010	1.836*	1.102		
2011	1.980	1.228		
2012	2.248*	1.338		
2013	2.466*	1.453		
2014	2.724*	1.564		
Country Fixed Effects (Baseline = United Kingdom)				
Australia	-1.828*	1.016		
China	132.591	156.56		
France	0.280	0.217		
Germany	0.651*	0.348		
India	131.515	154.304		
Japan	1.393*	0.739		
Mexico	1.526	1.041		
Russia	2.132***	0.808		
South Korea	-0.764	0.73		
Constant	-1.036	3.813		
Censored Observations	11,895			
Uncensored Observations	11,238			
Prob > chi^2	0.000			
Lambda	0.541			
Rho	0.442			
Sigma	1.224			

NOTE – All nominal variables are in 2014 US dollars. Year fixed effects were jointly significant when tested with a F-test ($p < 0.01$). Censored observations were observations with missing revenue data and were used in the selection model. Uncensored observations were observations where all data were present and were used in the prediction model.
***,**,* $p < 0.01$, 0.05 and 0.10 respectively

'Rho' measures the correlation between the error terms in the selection and estimation model. 'Sigma' refers to the estimated standard error of the residuals in the regression equation, and 'lambda' is the inverse Mills ratio (Heckman, 1979).

Table D1. (Continued) Probit Coefficients for Selection Model in (3)

	Coeff.	Std. Err.
Log(opening)	-0.132***	0.01
Log(domestic)	0.210***	0.011
Log(budget)	0.162***	0.011
Screens	0.030***	0.002
Star Director	-0.059	0.036
Critics	0.004***	0
Star Actor	0.120***	0.02
Genre (Baseline = Action)		
Comedy	-0.320***	0.029
Drama	-0.207***	0.033
Thriller	-0.013	0.037
Horror	-0.003	0.047
Musical	-0.135*	0.08
Documentary	-0.144*	0.076
Sequel	0.153***	0.034
Studio (Baseline = Independent production)		
Subsidiary	0.062**	0.029
Major Studio	0.040*	0.023
Adaptation	0.057***	0.022
MPAA (Baseline = G)		
PG	0.302***	0.065
PG-13	0.465***	0.064
NC-17	0.777***	0.204
R	0.524***	0.065
Not Rated	0.209**	0.105
English	-0.282***	0.107
Constant	-5.176***	0.24

***,**,* $p < 0.01$, 0.05 and 0.10 respectively

The coefficients in Table D1 are from the selection model in the Heckman Two-Step correction. They are interpreted as the effect of a variable on the likelihood that a film will be imported (selected for) in any of the ten foreign countries. *Log(opening)*, the logarithm of a film's opening weekend revenue, served as a proxy for a film's anticipated performance abroad. The variable should be positively related to the distributor's decision to import the film. A limitation was that the correlation between *log(opening)* and log(revenue), the dependent variable of interest, was slightly high at 0.560. All other film attributes were included in the selection model, as foreign distributors presumably decide whether or not to import a film based on its attributes

$$CountryAttribute_i = \gamma_0 + \gamma_1 Year_i + \gamma_2 Basefilms_i + \varepsilon_i + \mu_j \quad (4)$$

Table D2. Time Trend Regression Results for Country Attributes (4)

	Country Lag	Holiday	Summer	Log(popn_1)	Log(popn_2)	Log(GDP)
Year	-9.127***	0.0001	0.001	0.006***	0.010***	0.030***
	(0.500)	(0.001)	(0.002)	(0.003)	(0.001)	(0.004)
Basefilms	0.611***	-0.0002**	-0.00004	-0.001	-0.0001	0.001**
	(0.056)	(0.0001)	(0.0002)	(0.0004)	(0.0001)	(0.0004)
Constant	$1.929x10^4$***	-0.123	-1.046	-28.498***	-16.380***	-51.753***
	(996.646)	(1.600)	(3.471)	(6.482)	(1.537)	(7.549)
R^2	0.056	0.001	0.000	0.004	0.451	0.022
Observations	13,597	13,579	13,579	12,892	705	13,597

***,**,* p < 0.01, 0.05 and 0.10 respectively

Table D2. (Continued)

	Culture_1	Culture_2	Culture_3	Language Match
Year	0.018***	0.001	-0.114***	0.001**
	(0.006)	(0.009)	(0.024)	(0.0002)
Basefilms	-0.013***	0.015***	-0.007***	-0.0001**
	(0.002)	(0.0008)	(0.002)	(0.0002)
Constant	-35.397***	22.776	278.081***	-0.082
	(12.517)	(17.111)	(48.484)	(0.489)
R^2	0.862	0.196	0.223	0.984
Observations	10,500	2,612	467	13,597

***,**,* p < 0.01, 0.05 and 0.10 respectively

GDP Per Capita Growth Rate by Country

Table D3. Average GDP Per Capita Growth Rate in 2000 – 2014

Country	Average Growth Rate (%)
China	9.100
India	5.422
Russian Federation	4.662
Korea, Rep.	3.814
Australia	1.550
Germany	1.319
United Kingdom	1.244
United States	**1.046**
Mexico	0.897
Japan	0.842
France	0.673