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ORIGINAL ARTICLE

Effects of Trade Barriers and Cultural Distance on the Domestic Market Share in the Film Industry

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Abstract

The objective of this study is to investigate the effects of trade barriers and cultural distance on the domestic market share in the film industry. We analyze panel data with both two-stage least squares and instrumental-variable methods. These methods can separate the effects of time-invariant measures of trade barriers and cultural difference from country-specific effects. This improvement in the estimation method and the use of a more appropriate measure of trade barriers in the film industry enable us to produce empirical results that are consistent with theoretical arguments. Based on the panel data collected from 30 countries for the period 2001–2013, the empirical results herein indicate that the cultural distance, as well as market size, is an important factor for the domestic market share. Trade barriers are also shown to be a significant factor, but the magnitude of their impact on the domestic market share is much smaller than that of the market size.

1. Introduction

Market access to the national film industry is one of the more controversial issues in international trade. There is concern that free trade in films or media programming can have a negative influence on the diversity of public opinion and the cultural sovereignty of importing countries. Also, foreign films with a strong competitive edge (most often US films) have been argued to cause harm to local film production.

As a consequence, protective commercial policies have been implemented in many countries, including screen quotas requiring theaters to screen national films at least for a certain number of days per year, import quotas, and subsidies for local film production. Audiovisual services, including films, are frequently excluded from members' schedules of concessions in the World Trade Organization's GATS (General Agreement on Trade in Services).

However, the US film industry claims that cultural exceptions are practically a protectionist measure restricting the free flow of foreign artistic works, and it demands that partner countries remove trade barriers (such as screen quotas), reduce subsidies, and strengthen the protection of intellectual property rights.

Considering the importance of this issue, numerous economic studies have been conducted to address the determinants of US dominance in international trade in films and other media programming. They focus on market size, cultural distance, and trade policies (such as screen quotas) as variables that influence the pattern of trade. However, the results of existing empirical studies have not been satisfactory. Almost all studies indicate that market size is a significant predictor of international trade, but cultural distance and trade policies turn out to be either

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insignificant or have an inconsistent sign in many studies. Both market size and cultural distance being two pillars for an explanation of the observed dominance of US films and media programming, further studies on this issue are warranted. We also need more precise empirical evidence on the efficacy of trade policies, which has not been properly quantified in the existing literature.

The objective of this study is to investigate the effects of trade barriers and cultural distance on the domestic market share in the film industry. To do so, we analyze panel data on 30 countries importing US films for the period from 2001 to 2013. The main contributions of this paper are threefold. First, we confirm that cultural distance and market size both have significant positive effects on the share of the market taken by domestic suppliers (the domestic share), which is consistent with theoretical studies. In estimating the panel data models, we employ methods which can estimate the effects of time-invariant variables separately from the significant country-specific effects. Second, we utilize the OECD Services Trade Restrictiveness Index (*STRI*) for motion pictures as a continuous measure of trade barriers, and show that the *STRI* has positive effects on domestic market share. On the other hand, the use of screen quotas, measured using a 0–1 discrete variable, turns out to be insignificant, implying that the screen quota system does not fully represent the extent of trade barriers of a country, and/or it may have not been enforced with rigor, as noted in previous studies. Third, the magnitude of the *STRI* impact on the domestic market share is much smaller than that of the market size.

The remainder of this paper is organized as follows. In Section 2, we review the existing literature on international trade in film and media programming. Section 3 presents econometric models and panel data. Section 4 explains the estimation methods and the empirical results. The concluding remarks are made in Section 5.

2. Literature Survey

2.1 Theoretical Research

Economic studies on international trade in films and media programming have begun to explain why Hollywood dominates the international market. Focusing on product differentiation and the public good nature of films,[1] Wildman and Siwek (1988) argue that the film industry is characterized by economies of scale and that market size is a key factor determining the competitiveness of a film. Filmmakers in a larger market produce a greater variety of high-budget films, which tend to have a higher quality.

Wildman and Siwek (1988) also consider the cultural discount and argue that the value of a film decreases when it is shown in a foreign country. Movie-goers prefer a film that is produced in their native language or reflects their own culture. A foreign film may be dubbed or subtitled, but subtle expressions of emotion cannot be easily delivered to a foreign movie-goer, and thus satisfaction with the film would be reduced. Therefore, all other things being equal, a country tends to import fewer films when the films are produced in a country that is more culturally distant from the importing country.

Waterman (1988) also emphasizes market size and cultural discount as determinants of domestic market share. A large audience base enables producers to invest more in their programs, which leads to higher quality and thus to greater competitive advantage for their programs in the world market. Viewers in foreign countries prefer their local programs to ones imported from the US, but the competitive advantage of the US programs compensates for this effect.

Hoskins and Mirus (1988) argue that the US programs are more competitive in the international market because they receive less cultural discount than those of other countries. Due to the diversity of the US population with immigrants from many countries, the US producers could make programs which are well received in foreign countries. They also note that the cultural discount explains why trade occurs predominantly in some genres, such as entertainment and

[1]First copy production cost is large while marginal cost of distribution is negligible.

drama that are less culture-specific than news and public affairs programming. Hoskins and McFadyen (1991) argue that the US competitive advantage in the global television market comes from economies of scale, first-mover advantage,[2] and the characteristics of the market environment, such as private broadcasters seeking to maximize their audience, the heterogeneous nature of the US population, and the lower tolerance by US viewers to foreign programming.

2.2 Empirical Research

Based on the theoretical arguments above, empirical research has been conducted to test a hypothesis that a country with a larger market tends to have a greater market share of local films or media programming. This hypothesis was generally accepted by all research that we reviewed (Dupagne and Waterman, 1998; Jayakar and Waterman, 2000; Choi, 2011; Oh, 2001; Lee and Bae, 2004; Lee and Waterman, 2007; Fu and Lee, 2008). Market size is often measured by GDP or box office revenue.

The other key variable, cultural discount, represented by cultural distance (for example, between the US and a sample country) or English proficiency turned out to be insignificant or to have an inconsistent sign (Dupagne and Waterman, 1998; Jayakar and Waterman, 2000; Oh, 2001;[3] Lee and Bae, 2004; Chan-Olmsted *et al*., 2008[4]). Jayakar and Waterman, (2000) interpret this result as implying that a foreign film can overcome differences in culture and/or language through dubbing.[5] Meanwhile, Hoskins *et al.* (1989) show that English-speaking countries tend to have greater willingness to pay for US television programming, which suggests linguistic differences as barriers to entry into foreign markets.

In contrast, some studies support the significance of the cultural discount in explaining international flow of films. For example, Fu and Lee (2008) analyze imported films in Singapore from various source countries during February 2002 to January 2004. They find that films from culturally more distant countries experience less box-office success in Singapore than films from countries with more similar cultures. Fu and Sim (2010) examine the international flow of films of nine major exporting countries and report that cultural distance reduces the flow of films between two countries while a common language increases such flow.

Dupagne and Waterman (1998) and Lee and Bae (2004) have considered an import quota and a screen quota, respectively, as policy variables. Contrary to expectations, neither study lends support to the alleged protective effects of restrictive policies. Chan-Olmsted *et al.* (2008) consider the protection of intellectual property rights and show that it is significant in one model but not in another. Dupagne and Waterman (1998) state that a quota as a dummy variable is a crude measure of regulations, and the results may have been different with a more refined measure. Lee and Bae (2004) point out that screen quota requirements in some countries are often ignored by local exhibitors who seek to maximize profits.

3. Econometric Models and Data

We investigate the effects of trade barriers and cultural distance on the domestic market share in the film industry. In line with previous studies, we also include the market size in our econometric model.[6] Thus, the domestic market share of country i in year t (MS_dom_{it}) is regressed on

[2]The US was the first country to make the switch from live performances to film for television dramas.

[3]Among the four dimensions of cultural distance suggested by Hofstede (1980), only power distance is significant in predicting the self-sufficiency ratio of importing countries.

[4]Instead of market share, they consider two dependent variables in their empirical models: (i) US receipts for film and tape rentals, and (ii) US receipts of royalties and license fees.

[5]This interpretation is contradictory to the theoretical argument mentioned above.

[6]According to the theoretical literature, filmmakers in a larger market produce a greater variety of high-budget films. Thus, it is presumed that market size captures the effects of quality and the variety of domestic films on their market share.

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measures of trade barriers (*STRI*), cultural distance (*CD*) and market size.

$$MS\_dom_{it} = \alpha_1 STRI_i + \alpha_2 CD_i + \alpha_3 \log(market\ size)_{it} + f_i + \delta_t + u_{it} \quad (1)$$

where f_i represents the unobserved time-invariant differences between countries after allowing for the explanatory variables; δ_t the unobserved year-specific effects; and u_{it} the random disturbance with mean 0 and variance σ_u^2. If the effects f_i and δ_t are correlated with an explanatory variable $(market\ size)_{it}$, they have to be accounted for in estimating the model even though they are not observable. Otherwise, omitted effects f_i and δ_t will cause an endogeneity problem. To control for f_i and δ_t, fixed-effects models treat them as unknown parameters and use dummy variables for f_i and δ_t. However, due to the time-invariant variables included in equation (1), $STRI_i$ and CD_i, this dummy-variable method cannot separate their effects from f_i. In the next section, we explain the estimation methods employed in this study which can isolate the net effects of the explanatory variables from the country-specific effects.

The dependent variable MS_dom_{it} is the market share of the domestic films, expressed as a percentage. These data were collected from the Korean Film Biz Zone provided by the Korean Film Council.[7]

The trade barriers are measured by the services trade restrictiveness index for motion pictures (*STRI*), published by the Organization for Economic Cooperation and Development (OECD) in 2014. It measures the extent of trade policy restrictiveness covering 18 sectors, including motion picture services[8] for the 34 OECD countries and six major emerging economies. The *STRI* is a weighted average of the scores of restrictive measures (laws and regulations) in five policy areas: limitations on foreign entry, limitations on the movement of people, barriers to competition, regulatory transparency, and other discriminatory measures (OECD, 2014). The individual policy measures in each policy area are assigned a value of 0 (not restrictive) or 1 (restrictive) and a score of each policy area is the sum of the assigned values. To calculate the *STRI*, the five policy areas are weighted according to the relative importance determined by experts. The *STRI* ranges from 0 (completely open) to 1 (completely closed). Like a tariff on imported goods, a high *STRI* is expected to restrict trade in film industry. This variable is time-invariant as its value is constant during the data period from 2001 to 2013 for each country. The data for this *STRI* variable were obtained from the OECD database.[9]

Another measure of trade barriers is the 0–1 binary variable of the existence of screen quotas requiring theaters to screen national films at least for a certain number of days per year. In our study, use of the screen quota variable did not produce any meaningful results, as in Dupagne and Waterman (1998) and Lee and Bae (2004). Thus, we use the continuous index *STRI* which is expected to better represent the extent of trade barriers in general.

The cultural distance (*CD*) for country *i* is represented by the following composite measure (Kogut and Singh, 1988; Hofstede, 2011).

$$CD_i = \frac{1}{6} \times \left\{ \left(\frac{\Delta PDI_i}{\sigma_{PDI}}\right)^2 + \left(\frac{\Delta IDV_i}{\sigma_{IDV}}\right)^2 + \left(\frac{\Delta MAS_i}{\sigma_{MAS}}\right)^2 + \left(\frac{\Delta UAI_i}{\sigma_{UAI}}\right)^2 + \left(\frac{\Delta LTO_i}{\sigma_{LTO}}\right)^2 + \left(\frac{\Delta IVR_i}{\sigma_{IVR}}\right)^2 \right\} \quad (2)$$

[7] www.kobiz.or.kr. The original source of these data is the Cinema Intelligence Service at IHS Technology (https://technology.ihs.com/Services/424103/cinema-intelligence-service).

[8] Motion picture services are defined as motion picture, video, and television program production, post-production, and distribution activities (ISIC rev 4 codes 5911–5914).

[9] http://stats.oecd.org/Index.aspx?DataSetCode=STRI#.

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where PDI_i is the power distance index, IDV_i the individualism versus collectivism index, MAS_i the masculinity versus femininity index, UAI_i the uncertainty avoidance index, LTO_i the long-term versus short-term orientation index, and IVR_i the indulgence versus restraint index.

Hofstede (1980, 2011) has identified the above six dimensions based on factor analyses of questionnaires. It is found that national cultures vary substantially along these dimensions. Each country is positioned relative to other countries through a score on each dimension. By combining the six indices, this *CD* variable measures the cultural distance of each country from the US in the six cultural aspects. Large values of *CD* indicate a large cultural gap and movie-goers in a country with high *CD* tend to have lower willingness-to-pay for the US films, thus restricting import of the US films. The functional form of the index implies that positive and negative distances are weighted equally and that the marginal effect of distance increases as the distance increases.

The data for these six indices were originally constructed in Hofstede *et al.* (2010) and were downloaded from Hofstede Insights (www.hofstede-insights.com). A symbol Δ denotes the difference of the index between country i and the US, and σ is the standard deviation of each index among the countries involved. This *CD* variable is also time-invariant.

This *CD* composite measure has been used to account for the cultural distance between the US and other countries by numerous researchers to analyze the international trade in films, including Oh (2001), Lee and Bae (2004), Chan-Olmsted *et al.* (2008), Fu and Lee (2008) and Fu and Sim (2010). We also use this *CD* measure to estimate the effect of the aggregate cultural distance on movie consumption. In addition, we use each of the six indices of the *CD* measure to compare their individual effects.

The market size of the film industry is measured with three variables based on previous empirical studies. These include box office revenue (*BOR*), the number of screens (*SCR*), and the real gross domestic product (*GDP*); *BOR* and *GDP* are real values expressed in 2005 US dollars. Among the three variables, *BOR* and *SCR* are considered to represent the realized market size and to be relevant variables to explain the domestic market share. In contrast, *GDP* is considered to represent the potential market size and would be less relevant than *BOR* and *SCR* (Oh, 2001; Lee and Bae, 2004). Data on *BOR* and *SCR* were collected from the Korean Film Biz Zone provided by the Korean Film Council, and the data on *GDP* were obtained from the World Development Indicators database at the World Bank.[10] We use the logarithmic values of the market size to obtain a meaningful interpretation of its coefficient; $\alpha_3/100$ measures the percentage-point change (%p) in MS_dom_{it} for a 1% change in the market size.

Table 1 reports the within-country averages over the sample period from 2001 to 2013 for each country of the total 30 countries. The bottom panel reports the order statistics (minimum, maximum, median, and quartiles) of the total observations pooled across countries and years, with the minimum and maximum values noted according to country and year. The domestic market share in India is the highest, with a 13-year average of 93.86% and a maximum of 96.7% in year 2001. The lowest average is 2.48% in Portugal.

Table 2 shows that the three variables of market size are highly correlated, and their correlation coefficients (shown in bold face) are 0.868, 0.919, and 0.858. To avoid a multicollinearity problem, in the next section we include the three variables one by one in estimating equation (1).

4. Estimation Results

In estimating the panel data models, we have to account for the unobserved differences across cross-sectional units and between time periods. In equation (1), they are represented by country- and year-specific effects, f_i and δ_t, respectively. As shown below, f_i is significant and correlated with $(market\ size)_{it}$. Thus, ignoring f_i will cause an endogeneity problem leading to biased results.

[10] http://databank.worldbank.org/.

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Table 1. Within-country averages during the sample period from 2001 to 2013 and the order statistics of the total observations pooled across countries and years

	$STRI_i$[a] (0–100)	CD_i (>0)	MS_dom_{it} (%)	BOR_{it} (mil. $)	SCR_{it} (number)	GDP_{it} (bil. $)
Australia	8	0.03	4.05	670	1,954	736
Austria	19	1.47	2.72	133	570	325
Belgium	11	2.32	5.63	161	501	397
Brazil	32	1.80	12.50	313	2,189	983
Canada	23	0.11	3.23	747	2,915	1,192
Chile	15	2.73	6.43	52	293	135
China	44	5.52	52.32	608	8,219	3,010
Czech Rep.	14	2.07	25.24	46	793	142
Denmark	14	1.13	24.32	138	389	264
France	20	1.75	38.11	1,380	5,397	2,238
Germany	17	1.80	18.71	1,096	4,775	2,981
Greece	14	2.55	8.78	96	417	238
Hungary	14	1.64	7.35	51	466	110
India	27	2.10	93.86	1,117	12,180	1,010
Ireland	14	0.27	2.73	139	403	213
Israel	15	1.56	6.76	78	377	159
Italy	17	1.45	26.11	707	3,757	1,831
Japan	6	3.48	48.30	1,857	3,081	4,574
Korea	14	5.24	51.01	930	1,706	979
Mexico	28	2.73	7.17	579	4,079	910
Netherlands	12	1.34	14.22	220	657	699
New Zealand	9	0.21	3.78	101	377	116
Norway	13	1.17	12.06	125	418	314
Poland	9	2.09	17.60	147	1,011	340
Portugal	13	3.41	2.48	88	543	198
Spain	14	1.76	14.78	771	3,910	1,163
Sweden	16	1.54	21.25	176	901	400
Switzerland	24	1.08	4.85	184	542	429
Turkey	13	2.18	41.01	142	1,503	513
UK	19	0.28	25.27	1,488	3,540	2,428
Minimum	6 (Japan)	0.03 (Australia)	0.20 (Ireland, 2009)	36 (Czech Rep., 2005)	196 (Chile, 2001)	95 (Hungary, 2001)
1st Quartile	13	1.17	4.80	111	465	244
Median	14	1.76	13.10	184	925	453
3rd Quartile	19	2.32	27.35	743	3,318	1,195

(*Continued*)

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Table 1. (*Continued.*)

	$STRI_i^a$ (0–100)	CD_i (>0)	MS_dom_{it} (%)	BOR_{it} (mil. $)	SCR_{it} (number)	GDP_{it} (bil. $)
Maximum	44 (China)	5.24 (Korea)	96.70 (India, 2001)	2,127 (Japan, 2010)	18,109 (China, 2013)	4,913 (China, 2013)
No. of observations	30	30	384	390	385	390

Note: [a] We multiplied the original index by 100.

Table 2. Correlation coefficients

	Between the country-year observations			Between the within-country average	
	log BOR_{it}	log SCR_{it}	log GDP_{it}	$STRI_i$	CD_i
MS_dom_{it}	0.477***	0.610***	0.476***	0.293	0.454**
log BOR_{it}	1	**0.868*****	**0.919*****	0.241	0.070
log SCR_{it}		1	**0.858*****	0.511***	0.196
log GDP_{it}			1	0.368**	0.196
$STRI_i$				1	0.221

Note: *** and ** denote a significant correlation at the 1 and 5% level, respectively.

The fixed-effects models treat f_i as unknown parameters and include dummy variables to account for the f_i. However, since country-specific effects (f_i) are not separable from the time-invariant variables in equation (1), this dummy-variable approach can estimate only the combined effects of $STRI_i$, CD_i, and f_i, but not their individual effects.[11] In this section, we estimate equation (1) using a two-stage least squares method (subsection 4.1) and an instrumental-variable method (subsection 4.2). In subsection 4.1, we also test whether country-specific effects exist and whether they are correlated with $(market\ size)_{it}$.

In previous studies, the country-specific effects were not properly addressed. Using cross-sectional data across countries, Jayakar and Waterman (2000) and Lee and Bae (2004) were not able to account for country-specific effects because there is only one observation for each country. In an analysis of panel data for 14 countries during a seven-year period, Oh (2001) simply assumed that the country-specific effects were uncorrelated with the explanatory variables and just accounted for the error components in calculating the standard errors. This is the random-effects model which rules out the possibility of estimation bias due to country heterogeneity. Lee and Waterman (2007) tested for country-specific effects using panel data collected from six countries for the period from 1950 to 2003.[12] Based on the test results that the country-specific effects were significant but uncorrelated with the explanatory variables, they employed random-effects models. In contrast, our test results in subsection 4.1 show that country-specific effects were significantly correlated with explanatory variables in our panel data.

[11]The year-specific effects (δ_t) can easily be controlled for by year dummies because no country-invariant variable is included in equation (1).

[12]They did not consider the year-specific effects, though.

4.1 Two-Stage Least-Squares (LS) Estimation

This two-stage LS estimation method can isolate the effects of time-invariant variables from the country-specific effects if an orthogonality condition is satisfied (Breusch *et al.*, 2011; Greene, 2011). The orthogonality condition is satisfied in our model, as explained below.

At the first-stage, we use dummy variables to represent the combined effects of the time-invariant variables and the country heterogeneity in equation (1); for country i (=1,⋯, 30) and year t (=2001,⋯, 2013)

$$MS\_dom_{it} = \theta_i + \alpha_3 \log(market\ size)_{it} + \delta_t + u_{it} \tag{3}$$

where $\theta_i = \alpha_1 STRI_i + \alpha_2 CD_i + f_i$, the sum of three terms. Since the country-specific effects (f_i) are captured by θ_i, we can obtain consistent LS estimates for α_3 and δ_t in equation (3). These estimates are equivalent to the LS estimates obtained after the within-transformation approach is applied. Conditional on the consistent estimates of $\hat{\alpha}_3$ and $\hat{\delta}_t$, we calculate residuals which contain the combined effects of the time-invariant variables and the country-specific heterogeneity.

$$\begin{aligned}\hat{\eta}_{it} &= MS\_dom_{it} - \hat{\alpha}_3 \log(market\ size)_{it} - \hat{\delta}_t \\ &= \alpha_1 STRI_i + \alpha_2 CD_i + f_i + \psi_{it}\end{aligned} \tag{4}$$

where $\psi_{it} = u_{it} + e_{it}$ with e_{it} representing the sampling errors of $\alpha_3 - \hat{\alpha}_3$ and $\delta_t - \hat{\delta}_t$. Since consistent estimates of $\hat{\alpha}_3$ and $\hat{\delta}_t$ are used, these sampling errors converge to zero as the number of cross-sectional units approaches to infinity.

At the second stage, we regress the residuals on the observed time-invariant variables, $STRI_i$ and CD_i. Since the trade barriers and the cultural distance were determined before the sample period and remained the same afterwards, they are exogenous in the determination of MS_dom_{it} and thus are uncorrelated with f_i.[13] Therefore, this second-stage LS estimation for equation (4) yields consistent estimates for α_1 and α_2 although f_i is not used as a regressor (Hausman and Taylor, 1981; Breusch *et al.*, 2011; Greene, 2011). To account for possible heteroscedasticity caused by the use of an estimated dependent variable and by the fact that the estimation error of $(\alpha_3 - \hat{\alpha}_3)$ is multiplied by log $(market\ size)_{it}$, we calculate White's heteroscedasticity-consistent standard errors (Lewis and Linzer, 2005; Greene, 2011).[14]

According to the results in Table 3, log(*BOR*) and log(*SCR*) representing the realized market size are positively significant at the 1% and 5% levels, respectively. In contrast, the proxy for the potential market size, log(*GDP*), is not significant even at the 10% level. As expected, the realized market size is more relevant to explain the differences of the domestic market shares across countries. The cultural distance (*CD*) also turns out to be a positively significant factor for the domestic market share, indicating that cultural distance reduces the inflow of foreign films.

To test whether the country-specific effects exist and are correlated with $(market\ size)_{it}$, we calculate the residuals using consistent estimates of $\hat{\alpha}_1$ and $\hat{\alpha}_2$ in equation (4).

$$\hat{\hat{\eta}}_{it} = \hat{\eta}_{it} - \hat{\alpha}_1 STRI_i - \hat{\alpha}_2 CD_i = f_i + \hat{\psi}_{it} \tag{5}$$

where $\hat{\psi}_{it} = \psi_{it} + v_{it}$ with v_{it} representing the sampling errors of $\alpha_1 - \hat{\alpha}_1$ and $\alpha_2 - \hat{\alpha}_2$. Since consistent estimates of $\hat{\alpha}_1$ and $\hat{\alpha}_2$ are used, these sampling errors converge to zero as the number

[13]This uncorrelatedness satisfies the orthogonality condition specified in Breusch *et al.* (2011) and Greene (2011).

[14]Plumper and Troeger (2007) suggest a three-stage LS method, labelled fixed-effects vector decomposition method. They calculate an estimate for country heterogeneity using the residuals from the second-stage regression. At the third stage, they rerun the full model after replacing the unobserved country heterogeneity with the calculated estimate. However, Breusch *et al.* (2011) and Greene (2011) point out that the third-stage regression incorrectly produces too small standard errors. Therefore, we employ the two-stage LS method without running the third-stage regression.

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Table 3. Estimates and test results by the two-stage LS estimation method

	(i)	(ii)	(iii)
$STRI_i$	0.340*** (0.145)	0.204 (0.139)	0.373*** (0.139)
CD_i	6.906*** (0.465)	6.725*** (0.529)	6.660*** (0.535)
market size			
log (BOR_{it})	5.456*** (1.305)		
log (SCR_{it})		5.152** (1.997)	
log (GDP_{it})			3.230 (3.215)
R^2 (%) [a]	39.1	41.9	31.9
No. of observations	384	379	384
	Test for the existence of the country-specific effects[b]		
F-statistic (*p*-value)	124.5 (0.000)	119.5 (0.000)	133.6 (0.000)
	Correlation between the country effects and the market size[c]		
Corr. coeff. (*p*-value)	0.174 (0.000)	0.337 (0.000)	0.238 (0.000)

Notes: [a] This R^2 is calculated without the variation explained by the country-specific effects.
[b] This is to test whether there exist country-specific effects (i.e., differences between countries). Small *p*-values indicate that there exist significant country-specific effects in the dependent variable (*MS_dom*), given barriers, *CD*, and a market-size variable.
[c] This is to test whether the country-specific effects are correlated with the market-size variable included in each regression. Small *p*-values indicate that the country-specific effects are significantly correlated with the market-size variable in each regression.
Year dummies are included in all regression models.
The standard errors are in the parentheses below their coefficient estimates.
***, **, and * denote a significant coefficient at the 1, 5, and 10% level, respectively.

of cross-sectional units approaches to infinity. Thus, the country-specific effects (f_i) can be consistently estimated by the within-country averages of the residuals $\hat{\hat{\eta}}_{it}$.

We now test the null hypothesis of $H_0 : f_i =$ constant for all i, which means that there exist no differences across countries, i.e., no country-specific effects. The bottom panel in Table 3 supports the existence of significant differences across countries in the domestic market share, given the variables for trade barriers, cultural distance, and market size. The correlation coefficients indicate significant positive correlations between f_i and the variables for market size. Therefore, these test results suggest that country-specific effects have to be accounted for to avoid the endogeneity problem.

To evaluate the effectiveness of trade barriers (measured by *STRI*) in promoting the domestic market share, we focus on regression (i) which uses log(*BOR*) to proxy the market size. Its coefficient estimate of 5.456 indicates that the domestic market share (*MS_dom*) increases by 0.05456 percentage point (%p) for a 1% increase in *BOR*. The impact of *STRI* is estimated as 0.340, indicating an increase in *MS_dom* by 0.340%p for an increase of 1 in *STRI*.[15] We now calculate the impact when each variable changes across its interquartile range in the data. To obtain this impact, we multiply the coefficient estimate by the interquartile range of each variable. A change by 569% in *BOR* across its interquartile range (from 111 to 743, in Table 1) is expected to promote *MS_dom* by 31.1%p ($= 569 \times 0.05456$), while an interquartile change by 6 in *STRI*

[15]The actual (not logarithmic) values of *STRI* are used in the regressions and are ranged from 0 to 100.

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(from 13 to 19) is to promote *MS_dom* by 2.0%p (= 6×0.340). These estimates imply that the magnitude of the impact on the domestic market share is much larger when the film market grows than when the trade barriers become higher.

4.2 Instrumental-Variable (IV) Estimation

Hausman and Taylor (1981) suggest an IV estimation method for panel data models which include time-invariant variables and individual effects. We rewrite equation (1) as follows

$$\begin{aligned} MS\_dom_{it} &= \alpha_1 STRI_i + \alpha_2 CD_i + \alpha_3 \log(market\ size)_{it} + \delta_t + \varepsilon_{it} \\ \varepsilon_{it} &= f_i + u_{it} \end{aligned} \tag{6}$$

where f_i is treated as a random variable and thus included in a new error term. To isolate the effects of the time-invariant variables from the unobserved individual effects (f_i), it is required that the model has to include a sufficient number of explanatory variables uncorrelated with f_i (and thus ε_{it}). As explained in subsection 4.1, the trade barriers (*STRI*) and the cultural distance (*CD*) are considered to be exogenous and uncorrelated with f_i, thus satisfying the requirement. However, the proxy variables for the market size are shown to be correlated with f_i in subsection 4.1. For such endogenous proxy variables, we use the deviations from their within-country means as instrumental variables, following the suggestions in Hausman and Taylor (1981) and Breusch *et al.* (1989).

Hausman and Taylor (1981) treat f_i as a random variable but allow f_i to be correlated with some explanatory variables. This is the key difference from the random-effects models which assume f_i to be uncorrelated with all explanatory variables. Treating f_i as a random variable, Hausman and Taylor (1981) apply the generalized method of moments (GMM) with the aforementioned instrumental variables. This GMM can account for disturbance covariances containing f_i and u_{it}, and it is thus expected to produce consistent and efficient IV estimators.[16]

Table 4 reports the IV estimation results, which are consistent with the two-stage LS ones. The 95% confidence intervals of the coefficient estimates in Table 4 overlap with the two-stage LS ones in Table 3, indicating that they are not different at the 5% significance level. However, the IV estimation method produced larger standard errors and lower significance levels than the two-stage LS estimation. One reason for this is that the IV estimation method uses only the exogenous parts of the endogenous variables to identify its effects, thereby reducing the explanatory power. So, the R^2s in Table 4 are lower than the ones in Table 3. Another reason is that the two-stage LS method conditions the second-stage estimation on the first-stage estimates of $\hat{\alpha}_3$ and $\hat{\delta}_t$. Since the uncertainty associated with the estimates is ignored, the two-stage LS standard errors could be underestimated. In sum, we can say that the significance levels in Table 3 are the upper bounds, and the ones in Table 4 are the lower bounds.

In the above estimation, we used the *CD* composite measure which is an average of the six indices weighted by their respective variances. We also include all of the six indices in the same regression model. Table 5 reports the estimation results when the market size is measured by log BOR_{it} and the model is estimated by the Hausman and Taylor (1981) instrumental-variable method.[17] The null hypothesis of the equality of their coefficients is rejected with a *p*-value of 0.001. In this regression shown in the second column (*ALL*), the coefficient for each index represents its net effect when the other five indices are held constant. Since the six indices are correlated with each other, their net effects could be positive or negative depending

[16] The details about the estimation procedures and the *SAS* codes are available from the authors.

[17] We obtained the qualitatively same results when other variables of market size were used and when the two-stage LS estimation method was employed.

Table 4. Estimation results by the Hausman and Taylor (1981) instrumental-variable (IV) method

	(iv)	(v)	(vi)
$STRI_i$	0.297 (0.550)	1.216** (0.495)	1.712*** (0.574)
CD_i	5.059** (2.307)	3.795 (2.367)	2.895 (2.508)
market size			
log (BOR_{it})	4.983*** (1.760)		
log (SCR_{it})		1.047 (2.395)	
log (GDP_{it})			−3.880 (4.203)
R^2 (%)	13.2	8.9	5.3
No. of observations	371	371	371

Notes: Year dummies are included in all of the regression models.
The standard errors are in parentheses below their coefficient estimates.
***, **, and * denote a significant coefficient at the 1, 5, and 10% level, respectively.

on their correlations. With the six indices included, the effect of log BOR_{it} is significant at the 10% level but the one of *STRI* is not.

We also include the six indices one by one. In these regressions ($PDI \sim IVR$), the coefficient for each index represents the total effect, i.e., the sum of its net effect and the indirect effect through the correlations with the other indices. Thus, the coefficient for each index captures the effect of cultural distance in all of the six aspects. Five indices of *PDI, IDV, UAI, LTO*, and *IVR* have significant total effects on the domestic market share at the 1% or 5% levels; only *MAS* is not significant. Their estimates are within the 95% confidence intervals. In the regressions ($PDI \sim IVR$), the effect of log BOR_{it} is significant at the 1% or 5% levels but the one of *STRI* is not.

4.3 Robustness Checks: Lagged Effects of the Market Size

It might take time for the market size to influence the domestic market share in each country. To consider such lagged effects of the market size, we use its lag-one variable.

$$MS\_dom_{it} = \alpha_1 STRI_i + \alpha_2 CD_i + \alpha_3 \log(market\ size)_{i,t-1} + f_i + \delta_t + u_{it} \tag{7}$$

The estimation results for equation (7) are summarized in Table 6. These results are qualitatively the same as the ones with the contemporaneous market size in Tables 3 and 4. For regression (i) which uses log(*BOR*) to proxy market size, the two-stage LS estimates in Table 6 are 0.461 for *STRI*, 7.000 for *CD* and 1.971 for log (*BOR*) while the estimates in Table 3 are 0.340, 6.906, and 5.456, respectively. The corresponding estimates and their significance levels are qualitatively the same, although the lagged $\log(BOR_{i,t-1})$ has a weaker impact than the contemporaneous $\log(BOR_{it})$. When the Hausman and Taylor IV method is employed, the estimation results in Table 6 are also qualitatively the same as the ones in Table 4.

In addition, use of the lagged values could reduce a possible simultaneity problem. For example, the box office revenue (BOR_{it}) as a measure of market size in equation (1) is assumed to have a causal effect on the domestic market share (MS_dom_{it}) during the same period. However, their relation could be simultaneous in that having a strong domestic film industry leads to higher box office revenue due to higher quality of domestic films. If there exists such

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Table 5. Estimation results by the Hausman and Taylor (1981) IV method when all and each of the six indices in the *CD* composite measure are used

	ALL	*PDI*	*IDV*	*MAS*	*UAI*	*LTO*	*IVR*
PDI_i	7.733** (3.130)	7.549** (3.560)					
IDV_i	1.174 (1.025)		2.324** (0.994)				
MAS_i	2.052 (1.448)			0.792 (1.936)			
UAI_i	−3.108** (1.419)				2.976** (1.286)		
LTO_i	2.404** (1.033)					2.976** (1.286)	
IVR_i	4.184** (1.791)						5.599*** (1.912)
$STRI_i$	−0.558 (0.481)	−0.163 (0.626)	0.045 (0.574)	0.400 (0.586)	0.315 (0.510)	0.315 (0.510)	0.329 (0.465)
log ($BOR_{i,t}$)	3.642* (1.867)	5.003*** (1.751)	4.952*** (1.759)	5.265*** (1.786)	4.561** (1.851)	4.561** (1.851)	4.371** (1.804)
R^2 (%)	18.4	13.9	13.2	12.7	13.0	13.0	15.4
No. of observations	361	371	371	371	371	371	361

Notes: When all of the six indices are included (*ALL*), the null hypothesis of equal coefficients is rejected with a *p*-value of 0.001.
Year dummies are included in all of the regression models.
The standard errors are in the parentheses below their coefficient estimates.
***, **, and * denote a significant coefficient at the 1, 5, and 10% level, respectively.

Table 6. Estimation results when the lagged values of the market size are used

	Two-stage LS estimation			Hausman and Taylor (1981) IV estimation		
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
$STRI_i$	0.461*** (0.140)	0.231 (0.144)	0.493*** (0.145)	0.833* (0.488)	0.830* (0.455)	0.767** (0.484)
CD_i	7.000*** (0.559)	6.795*** (0.539)	6.934*** (0.610)	8.992*** (2.871)	8.642*** (2.709)	9.123*** (2.966)
market size						
log ($BOR_{i,t-1}$)	1.971 (1.411)			−0.437 (1.881)		
log ($SCR_{i,t-1}$)		4.777** (2.033)			−0.606 (2.358)	
log ($GDP_{i,t-1}$)			0.680 (0.818)			0.111 (0.760)
R^2 (%)	23.9	21.0	22.7	11.3	11.2	11.6
No. of observations	384	380	383	373	373	373

Notes: Year dummies are included in all of the regression models.
The standard errors are in the parentheses below their coefficient estimates.
***, **, and * denote a significant coefficient at the 1, 5, and 10% level, respectively.

two-way causation, the estimation results obtained with the contemporaneous BOR_{it} could be biased. Since the lagged values of box office revenue have been determined in the previous period t−1, the relation is one-way from $BOR_{i,t-1}$ to MS_dom_{it} in equation (7). As explained above, the results in Table 6 with the lagged market size are qualitative the same as the ones in Tables 3 and 4 with the contemporaneous market size. It appears that our main results about the determinants of the domestic market share and the effectiveness of trade barriers are not sensitive to a possible simultaneity.[18]

5. Concluding Remarks

Using panel data from 30 countries for the period from 2001 to 2013, we have examined the determinants for the domestic market share in the film industry and evaluated the effectiveness of trade barriers. When estimating the panel data models with the time-invariant variables, we paid special attention to the country-specific effects that could cause an endogeneity bias. The empirical results reveal that the cultural distance as well as the market size is a significant factor for the domestic market share in the film industry, which is consistent with theoretical studies. For a measure of the trade barriers, we have utilized *STRI* published by OECD and have shown that *STRI* has a positive impact on the domestic market share. However, the magnitude of the *STRI* impact is much smaller than the one of the market size.

The empirical analysis has shown that significant differences in the domestic market share still exist across countries given trade barriers, cultural distance, and market size. Instead of investigating the sources of the differences, this study has focused on consistent estimation with controlling for the unobserved country-specific effects. To better understand the determinants of the domestic market share, it would be worth identifying additional factors.

[18]This weak argument is due to the use of lag-one variables only. As there exists persistence in the market size, lagging one period could mitigate the effect of simultaneity but would not be enough to remove it. Since the data period of this study is from 2001 to 2013, too short to use more lagged variables, we report these results only for supplementary evidence.

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