

# Cross-border circulation of films and cultural diversity in the EU

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**Abstract** This paper explores new data sources on multilateral trade in films among EU countries and with the USA in offline cinema and in online video-on-demand distribution. We observe variations in trade patterns across countries and films and explore how they affect cultural diversity. We find that the EU film market is highly fragmented and cross-border film availability in cinema is low. We explore different aspects of the cultural discount hypothesis by means of a standard Helpman and Krugman (Market structure and foreign trade. Increasing returns, imperfect competition, and the international economy, MIT Press, Cambridge, 1985) trade model with economies of scale and a two-stage Heckman (Econometrica 47(1):153–161, 1979) estimation procedure. Our results show that cultural distance, success in the home market and the size of the film budget influence trade of films between countries. US films have a lower propensity to get into export markets, relative to their success in the home market. Consumer demand for imported films is relatively smaller in large EU economies, except for films imported from the USA that are only marginally affected. We also show that trade patterns in online film distribution are not fundamentally different. As online distribution occurs downstream from theatrical release, online distributors can benefit from cinema market experience to make a better selection of films. This results in a lower impact of domestic market shares on online trade patterns.

**Keywords** International trade · Films · Cinema · Online media · Cultural diversity

**JEL Classification** F13 · F14 · Z10

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## 1 Introduction

Helpman and Krugman (1985) argue that industries with high fixed costs benefiting from economies of scale tend to be more competitive when they are located in large home markets and face significant trade costs. Operating in a large home market enables firms to maximize economies of scale, be more competitive and produce a larger variety of products. That, in turn, will make industries based in larger economies more successful exporters, compared to those that export from smaller economies, and take a more than proportionate share of domestic markets in these smaller economies.

The film industry fits the aforementioned characteristics. It has high fixed production costs, benefits from economies of scale and faces significant trade costs related to cultural distance. These characteristics would explain why film producers located in the large US market dominate not only their home market, but also account for a large market share in smaller countries.<sup>1</sup> A number of empirical studies have documented the application of the Helpman and Krugman (1985) model to film trade and find evidence for the large- versus small-country effect. This may reduce the supply of local cultural content in smaller countries and is often used as an argument in favour of film production subsidies in those countries. Marvasti (2000) and Marvasti and Canterberry (2005) show that the predominance of US films grows despite cultural and trade barriers. Oh (2001) explores the determinants of the share of domestic films in total box office revenues (the self-sufficiency ratio) using a panel of 14 countries over 7 years. He concludes that variations in self-sufficiency can be explained primarily by box office revenue and some measure of cultural distance from the USA. Waterman and Lee (2005) show how EU film producers gradually lost their home market shares to US producers between the 1950s and 1990s. Ferreira and Waldfogel (2013) attribute the loss of market share to the interaction between economies of scale, larger export markets and improvements in film quality. Hanson and Xiang (2011) distinguish two sources of trade costs in film trade: the cost of cultural distance between countries and fixed costs of market access in a country. Meloni et al. (2014) use a two-stage estimation procedure to estimate the drivers of US film exports. They find that product quality differences affect both the number of films exported and revenue per export market.

The cultural discount hypothesis (Hoskins and Mirus 1988) adds another trade cost element to the Helpman and Krugman (1985) model that is specific to cultural goods. Cultural trade costs do not only depend on cultural distance between country pairs, but may also vary across products that are traded between a specific country pair. Some films are less easy to understand in different cultures because there are culture-specific elements in the narrative that cannot be translated. The cultural discount hypothesis has been empirically explored by several authors. Hoskins and

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<sup>1</sup> The conclusions from the economies of scale trade model go against a general finding in the international trade literature that buyers prefer goods produced in the home market (McCallum 1995). For some cultural goods such as music, this home bias is found to be even stronger than for ordinary goods (Gomez-Herrera and Martens 2015). But fixed production cost in music is much lower than in film.

Mirus (1988), Hoskins and McFayden (1991) and Waterman (1998) presented evidence in favour of the cultural discount hypothesis for the TV industry. Lee (2006) uses differences between genres in US–Hong Kong film trade to measure if some US genres are closer to Hong Kong culture than others. Lee (2008, 2009) analyses the cultural discount on US film imports in East Asia. He shows that genres affect box office receipts. For instance, he finds a negative relationship between drama awards and box office receipts and this effect grows stronger with increasing cultural distance from the USA. Walls and McKenzie (2012) quantify the cultural discount factor in film trade between seven countries. In line with the Helpman and Krugman (1985) model they find evidence that it benefits larger producer countries who can relatively export more films compared to smaller countries. They show that the supply of US films has responded to global demand as the relative size of the US domestic market has decreased. Park (2015) finds an increasing trend of movies being imported into Australia from non-US countries. He attributes this fact to changes in the composition of the population, which have affected consumer preferences and have reduced the cultural discount factor for films from some origins.

From a microeconomic perspective, economics of films is related both to the characteristics of the film itself (McKenzie 2010) and to more general characteristics of the media industry. Prag and Casavant (1994) show that budget, quality and stars have a significant effect on film rentals, although only when advertising costs are omitted. They use box office from 642 films released in USA. Chisholm et al. (2015) explore the impact of sequels, advertising, theatre allocation, screens and cultural distance. Ravid (1999) includes non-theatrical (offline video sales) film distribution revenues in his study. He finds that general and parental guidance ratings play a role in the financial success of a film. He shows that family films and sequels increase revenues and rates of return. Elberse and Eliashberg (2003) use a sample of 164 films and find that screens are the main determinant of revenues. John et al. (2017) show that the ability of directors has an impact on the profitability of a film. According to Eliashberg and Shugan (1997), critics could be interpreted either as an influencer or as a predictor of success. Using a sample of US data from 1991 to 1992 on weekly revenues, they find evidence of the predictor perspective. This topic has been later on explored by a number of other authors (Basuroy et al. 2006; Reinstein and Snyder 2005; Gemser et al. 2007). Having received an award also contributes positively to the success of a film (Nelson et al. 2001; Deuchert et al. 2005). Ratings of consumers are also shown to play a role in performance (Liu 2006 and Chintagunta et al. 2010). Finally, other factors as advertising (Moul 2008; Elberse and Eliashberg, 2003), allocation of theatre screens (Prieto-Rodríguez et al. 2015) or asymmetry between past and future film releases (Gutiérrez-Navratil 2014) also have an impact on the performance of a given film.

Apart from Meloni et al. (2014) and Hanson and Xiang (2011), none of the film trade studies mentioned makes a distinction between the probability that a film is exported and the revenue per export market. They take the number of films traded between a country pair as exogenously observed in the data and attribute differences in film revenue between home and export markets to the cultural discount hypothesis. Excluding films that are not traded may induce a non-random sample error or selection bias in the analysis. In this paper we apply a two-stage Heckman (1979)

estimation procedure to the Helpman and Krugman (1985) trade model to avoid this problem. We control for cultural distance, country and genre fixed effects. This helps us to disentangle three factors that play a role in film trade: fixed production costs or the large- versus small-country effect, trade costs due to cultural distance between country pairs, and film-specific cultural trade. This provides a more accurate formulation of the cultural discount hypothesis and an empirical measurement of each of its components.

Empirically, we use a rich dataset that traces film trade between 27 EU Member States and the USA. Many previous studies were limited to US exports only or to a smaller set of countries. The multilateral trade model enables us to compare the relative exports performance across a range of smaller and larger economies and distinguish country- and film-level factors that play a role in that performance. We also compare film trade patterns in offline (cinema) and online (digital video-on-demand) film distribution, though the latter dataset is limited and permits only the estimation of the first stage of the model (the extensive margin).

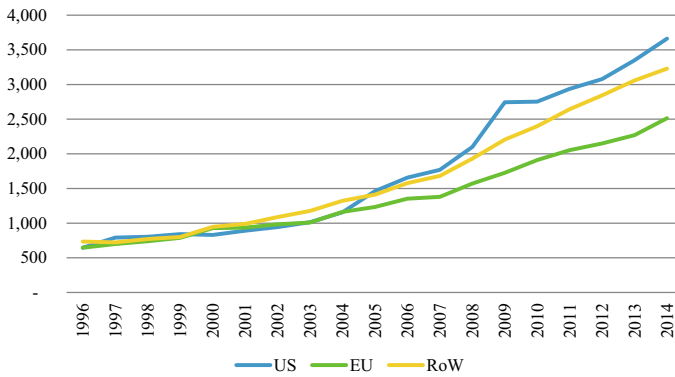
Our model and dataset confirm the validity of the Helpman and Krugman (1985) trade model as well as the cultural discount hypothesis. The marginal propensity to travel is larger for films produced in larger countries compared to films from smaller countries. This applies both to US–EU trade and to trade between EU countries. Cultural distance between country pairs, success in the home market and the size of the film budget show the expected results at the extensive margin of trade (the number of films traded), except for US–EU film exports. US films have a lower propensity to get into export markets, relative to their success in the home market. Bigger film budgets help them into export markets but the marginal return per USD invested is lower compared to EU films in the EU market. We find supportive evidence for the large- versus small-country fixed cost trade hypothesis. Large economies export relatively more films. Consumer demand for imported films is relatively smaller in large EU economies, except for films imported from the USA that are only marginally affected. The propensity to travel across borders varies by genre, but is inversely related to consumer demand for these genres.

The rest of the paper is structured as follows: Sect. 2 presents some descriptive data on film production, trade, market fragmentation and cultural diversity in film, for both online and offline film distribution channels in the EU. Section 3 shifts to analytical mode and discusses an empirical trade model and the estimation results. Section 4 concludes.

## 2 What is going on in film trade? Some descriptive statistics

### 2.1 Data

We use data from three sources. First, we take annual cinema screening data at the film title level for the period 1996–2014 from the Lumière database, collected by



**Fig. 1** Film production by country and year. *Source:* IMDb and authors' calculations

the European Audiovisual Observatory.<sup>2</sup> Lumière covers cinema in 38 countries. We restrict the analysis to EU Member States only.<sup>3</sup> It contains 23,639 films that were released in EU cinemas during the period 1996–2014. Apart from film titles, the data contain information on producers and distributors and the number of admissions.

Second, we use a dataset on film titles available in online video-on-demand (VoD) streaming services. It consists of the complete film catalogue (title, release year, director) for 38 VoD websites in 10 EU Member States,<sup>4</sup> resulting in a sample size of 21,874 distinct film titles (see Table 5). Information on 6 Netflix country catalogues in the EU was obtained from the Netflixable website.<sup>5</sup>

Third, we collected film data from IMDb, a worldwide online film database.<sup>6</sup> We collect data on the total number of films produced<sup>7</sup> by country and year, the country of origin and year of production of each film, names of the producer, director and major artists and their countries of origin, the production budget, consumer review scores, etc. We match IMDb data with film titles in the Lumière and VoD databases (see Table 11 in Appendix).

<sup>2</sup> The Lumière database can be found at <http://lumiere.obs.coe.int/web/search/>.

<sup>3</sup> There are no data for Malta in Lumière. We exclude Ireland from the analysis since data available are not complete.

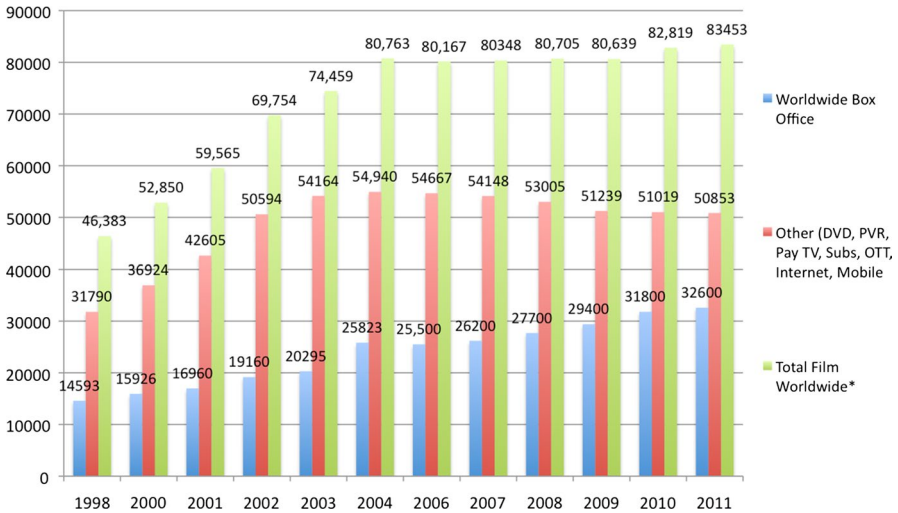
<sup>4</sup> Austria, Belgium, France, Germany, Ireland, Italy, Netherlands, Poland, Slovenia and Spain. The data were collected by Aniko Hannak and Christo Wilson, from the College of Computer and Information Science at North-Eastern University, on behalf of the European Commission. Data can be made available on request.

<sup>5</sup> <https://netfixable.com/>.

<sup>6</sup> The data for IMDb were obtained from <ftp://ftp.fu-berlin.de/pub/misc/movies/database/>. They were then imported to a relational database using the scripts that can be obtained here: <https://imdbpy.sourceforge.io/>.

The database can now be obtained using the instructions described here: <http://www.imdb.com/interfaces/>.

<sup>7</sup> IMDb contains several types of film material, incl. TV films and series, video material and short films. We selected only standard feature films.



**Fig. 2** Worldwide revenue for films. *Source:* Mediamorphosis blog <https://dwmw.wordpress.com/tag/film-industry/>

## 2.2 Film production, distribution and market fragmentation

Figure 1 shows how film production has rapidly increased over the period 1996–2014. Cumulative world feature film production<sup>8</sup> reached about 91,000 titles over the period 1996–2014 according to IMDb, the most comprehensive database on films. About 40% of these films were produced in the USA and 30% in the EU. Waldfoegel (2016) argues that digitization of production and distribution has greatly reduced costs and thereby enabled a boom in film production, despite stable or declining revenues. Growth in production is not matched by growth in box office revenue. US box office revenue has remained rather flat between 1.2 and 1.5 billion USD per year over the same period. Admissions in the EU remained equally flat ranging between 600 and 850 million EUR. Worldwide box office revenue continues to grow but slower than film production. The contribution from downstream distribution windows such as TV, DVD sales and rentals and, in recent years, digital VoD distribution, has declined since 2005<sup>9</sup> (see Fig. 2). Around 60% of EU film production and 26.2% of US film production make it into EU cinema (Table 1). Capacity constraints in cinema screens create a bottleneck on film distribution. Some EU countries manage to get a reasonable percentage of their film production into the cinema circuit though, including France, Italy and some of the smaller Eastern European producers where local film production started growing fast in the 1990s.

<sup>8</sup> We restricted IMDb data to feature film productions with duration between 60' and 140', suitable for cinema audiences, in order to exclude short films and video clips, etc. Data on duration were obtained from the ftp server of the Freie Universität de Berlin: <ftp://ftp.fu-berlin.de/pub/misc/movies/database/frozendata/>.

<sup>9</sup> According to statistics on the Mediamorphosis blog <https://dwmw.wordpress.com/tag/film-industry/>.

**Table 1** Film production and availability in cinema (1996–2014) *Source:* Films produced from IMDb include only cinema releases with duration between 60' and 140'; film in cinema from Lumière, authors' calculations. Runtimes obtained from <ftp://ftp.fu-berlin.de/pub/misc/movies/database/frozendata/>

Country	Films produced (IMDb)		Films in cinema (Lumière)		% of films available in cinema
	# Films	%	# Films	%	
AUT	634	0.9	318	1.4	50.2
BEL	735	1.1	295	1.3	40.1
BGR	144	0.2	72	0.3	50.0
CYP	44	0.1	3	0.0	6.8
CZE	560	0.8	560	2.5	100.0
DEU	3812	5.6	1513	6.7	39.7
DNK	567	0.8	536	2.4	94.5
ESP	1928	2.8	1379	6.1	71.5
EST	90	0.1	90	0.4	100.0
FIN	458	0.7	338	1.5	73.8
FRA	4332	6.4	2801	12.4	64.7
GBR	3188	4.7	1530	6.8	48.0
GRC	522	0.8	96	0.4	18.4
HRV	161	0.2	59	0.3	36.6
HUN	479	0.7	240	1.1	50.1
ITA	2280	3.4	1517	6.7	66.5
LTU	57	0.1	28	0.1	49.1
LUX	129	0.2	11	0.0	8.5
LVA	58	0.1	47	0.2	81.0
NLD	923	1.4	471	2.1	51.0
POL	468	0.7	369	1.6	78.8
PRT	415	0.6	254	1.1	61.2
ROM	228	0.3	228	1.0	100.0
SVK	78	0.1	59	0.3	75.6
SVN	94	0.1	62	0.3	66.0
SWE	709	1.0	709	3.1	100.0
EU27	23,093	34.1	13,585	60.0	58.8
USA	19,848	29.3	5196	23.0	26.2
RoW	24,740	36.6	3856	17.0	15.6
Total	67,681		22,637	100.0	33.4

In order to get a complete picture of the number of films available to consumers we combine local production and imports (in Table 2) for cinema (cumulative 1996–2014) and in Table 3 for online VoD distribution (snapshot for 2015 only). The classification of films by countries of origin (production) and destination (consumption) constitutes a bilateral trade matrix.

Larger economies have more films in the market. France has the largest number of films in the EU market, with around 3000 titles in cinema and VoD, followed at some distance by the UK, Germany, Italy and Spain. In the long tail we find smaller countries, mostly in Eastern and Southern Europe, with less than one hundred films

**Table 2** Film supply and trade in the EU (number of films in cinema 1996–2014). *Source:* European Audiovisual Observatory and authors' calculations

CoO/CoD>	AT	BE	BG	CY	CZ	DE	DK	ES	EE	FI	FR	GB	GR	HR
FRA	802	1934	217	43	794	907	602	1827	220	434	2899	683	480	100
GBR	409	509	197	71	753	627	655	1423	241	389	735	1301	307	94
ITA	125	202	36	10	148	186	152	575	12	60	347	117	74	16
DEU	979	255	105	19	313	1782	255	696	92	140	301	204	89	35
ESP	79	138	47	12	97	121	85	2983	43	115	220	78	63	19
SWE	70	61	13	2	80	120	289	184	60	233	42	55	24	13
CZE	7	8	3	-	1239	20	8	11	-	8	6	9	4	2
DNK	77	105	41	1	140	138	1203	165	39	78	84	65	43	13
NLD	11	133	1	-	28	39	26	64	7	3	15	10	3	1
POL	4	9	1	-	189	7	5	28	4	2	28	21	9	3
FIN	20	14	18	-	62	27	38	46	58	748	32	9	10	6
AUT	467	35	10	-	32	162	47	58	11	8	46	19	12	6
BEL	58	268	19	7	48	67	49	114	15	16	148	37	44	7
PRT	5	14	3	-	6	8	1	49	-	-	48	5	-	-
HUN	12	13	5	-	37	9	10	24	1	6	20	17	3	3
ROM	7	13	6	-	5	4	7	18	1	5	26	12	4	7
GRC	13	9	-	5	4	12	8	23	1	2	19	5	80	-
EST	4	5	4	-	6	7	-	5	127	11	2	-	-	-
BGR	4	-	111	-	7	4	-	5	-	-	6	-	5	-
SVN	-	3	3	-	9	2	-	1	1	-	3	2	-	1
HRV	3	3	3	-	10	1	3	5	-	-	3	-	1	58
SVK	-	1	-	-	70	6	-	-	-	-	2	3	-	-
LVA	1	-	3	-	-	1	-	-	3	-	-	1	-	-
LTU	-	1	3	-	2	-	-	-	1	-	1	-	-	-
LUX	2	3	-	-	-	3	-	6	-	-	8	1	-	-



**Table 2** (continued)

CoO/CoD>	AT	BE	BG	CY	CZ	DE	DK	ES	EE	FI	FR	GB	GR	HR	
CYP	-	-	-	-	-	-	-	-	-	-	-	1	1	-	
EU films	3159	3736	849	170	4079	4260	3443	8310	937	2258	5041	2655	1256	384	
US films	1400	1808	1246	303	1609	2222	2044	1284	3416	1463	2852	3002	608	552	
RoW films	396	461	195	26	249	556	329	224	1007	190	1224	1507	127	66	
Total	4955	6005	2290	499	5937	7038	5816	9818	5360	3911	9117	7164	1991	1002	
CoO/CoD>	HU	IT	LT	LU	LV	NL	PL	PT	RO	SK	SI	SE	Total	# Films	Reach
FRA	477	998	145	641	181	1264	437	870	438	427	341	622	18,783	2801	6.71
GBR	337	794	116	161	178	1049	432	466	335	329	351	545	12,804	1530	8.37
ITA	82	2308	14	39	17	409	83	203	61	73	58	76	5483	1517	3.61
DEU	189	308	38	52	89	505	248	301	155	149	134	209	7642	1513	5.05
ESP	91	182	34	48	34	212	121	189	66	48	52	72	5249	1379	3.81
SWE	50	53	16	12	47	202	73	35	27	44	25	1441	3271	709	4.61
CZE	6	5	1	1	4	25	77	3	6	321	10	4	1788	560	3.19
DNK	67	85	25	27	63	194	93	52	41	91	63	187	3180	536	5.93
NLD	2	7	2	5	5	963	7	9	6	11	21	25	1404	471	2.98
POL	13	12	1	-	4	15	436	7	4	54	9	15	880	369	2.38
FIN	19	21	5	3	14	37	23	16	13	36	13	124	1412	338	4.18
AUT	31	28	5	7	6	63	24	25	14	20	16	30	1182	318	3.72
BEL	33	72	12	26	11	267	33	49	35	34	30	49	1548	295	5.25
PRT	2	21	-	2	-	30	6	450	3	1	-	1	655	254	2.58
HUN	238	13	1	1	4	31	11	7	53	21	16	3	559	240	2.33
ROM	17	13	-	3	2	19	7	17	619	6	15	10	843	228	3.70
GRC	6	8	-	1	2	8	13	8	4	-	6	11	248	96	2.58
EST	3	-	1	-	10	21	5	3	6	2	3	7	232	90	2.58

Table 2 (continued)

CoO/CoD>	HU	IT	LT	LU	LV	NL	PL	PT	RO	SK	SI	SE	Total	# Films	Reach
BGR	2	-	3	-	-	5	10	2	1	1	3	1	170	72	2,36
SVN	1	1	-	-	1	2	-	-	1	3	100	2	136	62	2,19
HRV	5	9	2	-	-	-	5	1	3	4	14	3	136	59	2,31
SVK	2	-	-	-	1	5	6	-	2	94	-	-	192	59	3,25
LVA	2	-	3	-	54	-	-	-	1	-	-	-	69	47	1,47
LTU	1	1	30	-	5	-	-	-	-	3	-	1	49	28	1,75
LUX	-	1	-	3	-	3	3	4	-	-	-	-	37	11	3,36
CYP	-	-	-	-	1	-	-	-	-	-	-	-	3	3	1,00
EU films	1676	4940	454	1032	733	5329	2153	2717	1894	1772	1280	3438		13,585	5,00
US films	1656	2609	650	239	971	2360	1799	1550	1650	1834	977	1041	41,145	5196	7,92
RoW films	291	539	92	43	272	877	328	411	190	385	192	171	10,348	3856	2,68
Total	3623	8088	1196	1314	1976	8566	4280	4678	3734	3991	2449	4650		22637	5,28

**Table 3** Film supply and trade in online VoD distribution in EU10 (2015)

CoO/CoD	AUT	BEL	DEU	ESP	FRA	GBR	IRL	ITA	POL	SVN	Total	# Films	Reach
FRA	345	1123	294	656	2365	286	150	304	204	57	5784	3244	1.78
GBR	329	261	323	623	416	826	270	279	167	48	3542	1665	2.13
ESP	102	108	93	1229	171	76	29	82	68	10	1968	1345	1.46
ITA	88	87	84	287	191	80	30	826	46	7	1726	1242	1.39
DEU	591	117	544	226	128	148	36	89	93	19	1991	1002	1.99
BEL	30	425	20	37	111	31	15	21	10	4	704	489	1.44
POL	18	16	20	19	26	20	9	8	242	0	378	295	1.28
AUT	160	27	29	26	30	23	12	8	11	0	326	221	1.48
DNK	40	37	36	78	29	40	19	21	39	5	344	167	2.06
SWE	47	25	34	51	41	36	9	31	20	6	300	151	1.99
NLD	26	49	24	31	24	27	7	6	5	3	202	121	1.67
IRL	23	16	23	22	22	39	52	14	11	0	222	112	1.98
PRT	4	16	3	22	28	17	4	2	3	0	89	60	1.48
FIN	18	13	18	19	24	14	2	6	8	1	123	58	2.12
HUN	18	7	14	13	17	8	2	8	5	0	92	53	1.74
CZE	14	6	11	6	14	8	1	1	15	0	76	52	1.46
ROM	9	14	7	11	16	8	6	5	4	1	81	40	2.03
GRC	3	6	3	11	10	12	4	5	3	0	57	32	1.78
SVN	2	1	1	1	4	1	0	1	0	24	35	28	1.25
BGR	7	5	4	7	10	5	2	4	6	1	51	23	2.22
LUX	6	10	5	3	9	2	0	2	3	0	40	21	1.90
EST	10	2	4	1	2	2	1	0	3	0	25	17	1.47
HRV	2	3	1	4	3	1	0	1	2	6	23	16	1.44
LTU	3	6	4	5	0	0	0	0	0	0	18	11	1.64
LVA	4	0	4	1	1	0	0	0	0	0	10	6	1.67

**Table 3** (continued)

CoO/CoD	AUT	BEL	DEU	ESP	FRA	GBR	IRL	ITA	POL	SVN	Total	# Films	Reach
SVK	1	2	0	0	2	1	0	0	0	1	7	6	1.17
CYP	0	1	0	0	0	0	0	0	1	0	2	2	1.00
MLT	0	0	0	0	0	1	0	0	0	0	1	1	1.00
EU	1900	2383	1603	3389	3694	1702	660	1724	969	193	18,217	10,480	1.74
USA	2022	1255	2032	2596	1878	4138	1242	1900	742	233	18,038	7646	2.36
RoW	895	766	839	1117	1065	1190	417	433	297	64	7083	3748	1.89
Total	4817	4404	4474	7102	6637	7030	2319	4057	2008	490	43,338	21,874	1.98

Reach = (films  $\times$  number of country markets where films are available)/number of films = (row total/#films)

**Table 4** Availability index by country of origin (Lumière cinema)

# Countries where a film is available	All films	US films	EU films	Other films				
1	11,841	52.3%	1511	29.1%	8161	59.5%	2229	57.8%
2	3357	14.8%	591	11.4%	2106	15.4%	674	17.5%
3	1515	6.7%	340	6.5%	910	6.6%	271	7.0%
4	866	3.8%	230	4.4%	503	3.7%	143	3.7%
5	648	2.9%	209	4.0%	323	2.4%	118	3.1%
6	483	2.1%	168	3.2%	248	1.8%	73	1.9%
7	373	1.6%	132	2.5%	198	1.4%	44	1.1%
8	348	1.5%	129	2.5%	171	1.2%	54	1.4%
9	270	1.2%	125	2.4%	110	0.8%	37	1.0%
10	259	1.1%	102	2.0%	130	0.9%	28	0.7%
11	219	1.0%	91	1.8%	99	0.7%	31	0.8%
12	231	1.0%	102	2.0%	98	0.7%	31	0.8%
13	195	0.9%	91	1.8%	86	0.6%	19	0.5%
14	202	0.9%	117	2.3%	70	0.5%	16	0.4%
15	216	1.0%	136	2.6%	68	0.5%	12	0.3%
16	180	0.8%	101	1.9%	68	0.5%	13	0.3%
17	167	0.7%	100	1.9%	52	0.4%	16	0.4%
18	161	0.7%	106	2.0%	50	0.4%	7	0.2%
19	184	0.8%	129	2.5%	48	0.4%	8	0.2%
20	197	0.9%	146	2.8%	43	0.3%	8	0.2%
21	171	0.8%	123	2.4%	43	0.3%	7	0.2%
22	178	0.8%	132	2.5%	41	0.3%	5	0.1%
23	181	0.8%	142	2.7%	32	0.2%	7	0.2%
24	136	0.6%	104	2.0%	29	0.2%	3	0.1%
25	46	0.2%	28	0.5%	16	0.1%	2	0.1%
26	13	0.1%	11	0.2%	2	0.0%		
Total	22,637		5196		13,705		3856	
Availability		15.2%		30.1%		10.9%		10.1%

Availability indicator is defined as the ratio of actual over potential availability of products from a country of origin in a country of destination. If the EU market were a perfectly open market, all digital media products would be available in all 27 countries and the ratio would peak at 100%

in cinema and only a few dozen films in VoD. VoD services roll-out is more limited in these countries compared to the rest of the EU. The most important source of supply, both offline and online, is US-produced films that account for 40–50% of all available films in cinema and VoD—less in France and Belgium and more in the UK and a few smaller countries, which provides evidence for the cultural discount hypothesis. Domestic films are the second most important source, or films produced in countries with a shared language. This confirms once more that cultural proximity is a major driver in markets for cultural goods, second only to US market dominance (Gomez-Herrera and Martens 2015).

**Table 5** Availability index (VoD films)

# Countries	All films		EU films		US films		Other	
	# Films	%	# Films	%	# Films	%	# Films	%
1	11,351	51.9	6319	60.3	3096	40.5	1936	51.7
2	5289	24.2	2345	22.4	1936	25.3	1008	26.9
3	2316	10.6	870	8.3	1040	13.6	406	10.8
4	1366	6.2	477	4.6	678	8.9	211	5.6
5	750	3.4	251	2.4	398	5.2	101	2.7
6	473	2.2	129	1.2	291	3.8	53	1.4
7	245	1.1	61	0.6	163	2.1	21	0.6
8	64	0.3	20	0.2	35	0.5	9	0.2
9	18	0.1	6	0.1	9	0.1	3	0.1
10	2	0.0	2	0.0		0.0		0.0
Total	21,874		10,480		7646		3748	
Index	19.8		17.4		23.6		18.9	

Availability indicator is defined as the ratio of actual over potential availability of products from a country of origin in a country of destination. If the EU market were a perfectly open market, all digital media products would be available in all 27 countries and the ratio would peak at 100%

Tables 4 and 5 measure geographical market fragmentation in online and offline film distribution. We define an availability indicator as the ratio of actual over potential availability of products from all countries of origin (CoO) in all countries of destination (CoD). If the EU were a perfectly open and integrated market, all films would be available in all countries and the ratio would peak at 100%. The overall availability index for films in EU cinemas reaches 15.2% only. More than half of all films are available in one country only. The data show a wide gap in geographical distribution between US and EU films in the EU market—US films are nearly three times more widely distributed in the EU than EU films. EU films turn out to be very domestic products—nearly 60% is available in one country only, usually the country of origin. We try to find out why this is so in Sect. 3 below.

Availability is somewhat better in VoD (20%), especially for EU films. Note that US films are less widely distributed online than offline. Nevertheless, these figures remain far below the 80% cross-border availability in digital music (Gomez-Herrera and Martens 2015) or more than 95% availability in e-books (Batikas et al. 2015). There is evidence that larger global VoD distribution platforms reduce geographical market segmentation compared to smaller national VoD platforms. For instance, in Netflix cross-border availability of films in EU is around 31% (Batikas et al. 2015). Differences in availability may be related to differences in the underlying economics of cinema and VoD. Offline cinema is a sequential supply-side-driven business model that limits the variety of films available to screen capacity. This rationing allows cinemas to maximize revenue from price discrimination as first “window” in the release sequence. The average age of film in cinema is about 1.5 years. Online VoD distribution is usually the last window in the sequence, though this may start to

change in large global VoD platforms.<sup>10</sup> The average age of a film in VoD distribution is 7.6 years.<sup>11</sup> VoD trades off age against variety. The largest VoD providers in the EU have a catalogue size between 1000 films in Germany and 3200 in France. Cinema distribution cannot match this variety in availability because of limits on the number of screens.

### 2.3 Cultural diversity in film in the EU

Table 6 present some evidence in favour of the cultural discount actually helping American films to dominate the world market. EU-produced films account for 44% of all titles available in EU cinema over the period 1994–2014 but only 29% of all admissions. US films account for only 45% of titles and 67% of admissions. One important reason is that US films are more widely available in the EU than EU films. US market reach in the EU is about three times the reach of EU films (last column in Table 3). As a result, the EU lead in number of titles produced is eroded by higher availability of US films in EU country markets.

However, US films also fetch a consumer demand premium in the EU market, compared to EU films. The last four columns in Table 6 are calculated as the ratio of supply over admissions (minus 1).<sup>12</sup> That is a crude indicator of consumer preferences for films from different origins. A positive figure means consumers are more interested in films from this origin than supply indicates (premium demand); a negative figure implies the reverse. Table 6 shows that, on average, domestic films and US films fetch a consumer premium demand; films from other EU countries or elsewhere in the world show a negative premium. Premiums vary considerably across countries. A negative demand premium may be due to an oversupply of domestic films, low quality perception and a genre composition that does not match consumer preferences. Contrary to what the home bias hypothesis in international trade suggests, we find that some countries have a fairly large negative premium on domestic film including Portugal, Romania and Austria. More worryingly, large producers like Spain and Germany show significant negative premiums on domestic film production, while other large producers like Italy and France receive not positive (zero) premium for their productions.

The bilateral trade matrices at the extensive (number of films) and intensive (number of admissions) margins of trade (Tables 2 and 3) provide evidence for the large- versus small-country effect of the cultural discount hypothesis or the

<sup>10</sup> The sequence, time lags and duration of these distribution windows are regulated in several EU countries (Ranaivoson et al. 2014).

<sup>11</sup> Data on the age of films in cinema and VoD can be made available on request. Since we only have cross-sectional VoD data for early 2015 we only know the age of a film at that moment in VoD screening, not the age at first VoD screening or the duration of VoD screening. For Netflix UK, for example, the vast majority of films do not stay longer than 1 year in the catalogue (Batikas et al. 2015).

<sup>12</sup> If we would have data on the number of screens on which a film is available in a country we could build a more refined indicator of supply. However, that index of supply would be heavily correlated with consumer demand because the number of screens would be a proxy for interest (demand). Our simple approach avoids correlation between supply and demand.

**Table 6** Competition in domestic markets

Country Market	By number of firms (supply side)				By admissions (demand side)				Premium demand					
	Domestic (%)		USA (%)		Domestic (%)		USA (%)		Domestic		USA		RoW	
	Domestic (%)	USA (%)	RoEU (%)	RoW (%)	Domestic (%)	USA (%)	RoEU (%)	RoW (%)	Domestic	USA	RoEU	RoW		
CY	0	62	32	5	0	80	17	3	-	0.3	-0.5	-0.5		
LU	0	20	76	4	0	61	34	4	0.3	2.1	-0.5	0.1		
LT	2	60	29	8	4	76	15	5	0.6	0.3	-0.5	-0.4		
LV	3	52	31	14	3	76	15	7	0.0	0.5	-0.5	-0.5		
SK	3	50	40	8	4	73	20	4	0.3	0.5	-0.5	-0.6		
SI	3	53	33	10	3	76	16	5	-0.1	0.4	-0.5	-0.5		
BG	4	60	28	9	2	82	12	4	-0.3	0.4	-0.6	-0.5		
EE	4	60	26	10	5	76	13	5	0.3	0.3	-0.5	-0.5		
GR	4	38	50	8	7	67	23	3	0.6	0.8	-0.5	-0.6		
BE	5	38	48	10	4	72	21	3	-0.1	0.9	-0.6	-0.7		
HR	5	58	30	7	5	75	16	5	-0.1	0.3	-0.5	-0.3		
PT	7	42	39	11	2	78	17	3	-0.7	0.8	-0.6	-0.7		
HU	7	51	32	9	5	79	13	3	-0.3	0.5	-0.6	-0.7		
NL	8	42	34	16	12	69	16	4	0.4	0.6	-0.5	-0.7		
RO	8	59	26	7	2	84	11	4	-0.8	0.4	-0.6	-0.4		
AT	8	38	43	11	3	71	23	3	-0.7	0.9	-0.5	-0.7		
PL	10	50	31	9	19	63	14	4	0.9	0.3	-0.5	-0.6		
FI	12	53	29	7	20	62	15	4	0.7	0.2	-0.5	-0.4		
DK	14	51	27	8	23	58	15	4	0.7	0.1	-0.4	-0.5		
CZ	16	47	29	7	17	64	15	3	0.1	0.4	-0.5	-0.5		
GB	17	44	17	22	15	77	3	5	-0.1	0.8	-0.8	-0.8		
SE	17	45	28	10	20	63	13	4	0.2	0.4	-0.5	-0.6		
ES	18	42	28	12	10	73	13	4	-0.4	0.7	-0.5	-0.7		
IT	23	44	24	9	24	60	13	3	0.0	0.4	-0.4	-0.6		



**Table 6** (continued)

Country Market	By number of firms (supply side)			By admissions (demand side)			Premium demand					
	USA (%)		RoW (%)	USA (%)		RoW (%)	USA		RoW			
	Domestic (%)	RoEU (%)	Domestic (%)	RoEU (%)	Domestic (%)	RoEU (%)	Domestic	RoEU	RoW			
DE	23	41	25	10	16	68	13	4	-0.3	0.7	-0.5	-0.6
FR	31	35	19	15	31	55	10	4	0.0	0.6	-0.5	-0.7

Number of films is the number of unique titles  $\times$  number of country markets where they are available. Premium demand is calculated as the ratio of supply over demand minus 1

**Table 7** Share of Top50 films in total admissions. *Source:* authors' calculations

Country market	Share of top 50 films from				
	All origins	Home	USA	EU	RoW
HRV	0.32	0.05	0.29	0.12	0.05
GRC	0.31	0.07	0.27	0.13	0.03
LUX	0.30	0.00	0.26	0.18	0.04
LTU	0.27	0.04	0.24	0.10	0.05
SVK	0.24	0.04	0.22	0.10	0.03
SVN	0.21	0.03	0.20	0.09	0.04
LVA	0.22	0.03	0.20	0.08	0.05
ROM	0.19	0.02	0.18	0.06	0.03
BGR	0.19	0.02	0.17	0.06	0.04
PRT	0.18	0.02	0.17	0.08	0.03
CZE	0.22	0.12	0.17	0.08	0.03
POL	0.22	0.13	0.16	0.07	0.03
EST	0.17	0.05	0.16	0.06	0.04
AUT	0.18	0.02	0.16	0.10	0.03
SWE	0.19	0.11	0.15	0.07	0.03
GBR	0.17	0.09	0.15	0.02	0.03
HUN	0.16	0.04	0.15	0.06	0.02
FIN	0.19	0.12	0.15	0.08	0.04
DEU	0.17	0.07	0.14	0.07	0.03
BEL	0.14	0.03	0.13	0.07	0.02
NLD	0.15	0.07	0.13	0.07	0.03
DNK	0.17	0.11	0.13	0.09	0.03
ESP	0.13	0.05	0.12	0.05	0.03
ITA	0.15	0.11	0.11	0.05	0.02
FRA	0.14	0.09	0.11	0.05	0.02
EU avg	0.19	0.06	0.17	0.08	0.03

equivalent wmarket size effect in the Helpman and Krugman (1985) trade model. Using the data in these tables, we find that larger domestic markets (in terms of number of domestic films produced) are positively correlated (0.58) with export market reach (the average number of export markets to which a domestic film is exported). Conversely, larger markets show relatively more domestic films (0.84) and import relatively less films from other EU countries (−0.48) and from the USA (−0.11). Note that the negative correlation between domestic market size and imports from the USA is much weaker than for imports from other EU countries. Similarly, larger domestic markets (in terms of number of admissions) have relatively larger audiences for domestic films (0.56) and relatively smaller audiences for imported films from other EU countries (−0.31). By contrast, domestic market size has little impact on the relative audience size for films imported from the USA (−0.04).

Premium demand for US films is driven by box office hits and diminished by competition. Table 7 shows that the Top50 films (1996–2014) from the USA have

**Table 8** Successful film exporters. *Source:* authors' calculations

Country	% of domestic and exported admissions over total number of admissions		Share of admissions in EU film production (%)
	Domestic (%)	Exports (%)	
LUX	5	95	0.1
BEL	27	73	2.2
GBR	35	65	11.0
AUT	51	49	2.3
SVK	52	48	5.1
ROM	56	44	1.7
DNK	60	40	4.0
DEU	63	37	11.1
SWE	64	36	0.4
FIN	73	27	2.4
FRA	73	27	20.8
LVA	74	26	0.3
ESP	75	25	10.3
PRT	81	19	1.9
EST	81	19	0.6
GRC	81	19	0.7
HRV	82	18	0.4
BGR	83	17	0.5
HUN	83	17	1.8
ITA	87	13	11.1
CZE	87	13	4.1
SVN	92	8	0.4
NLD	93	7	3.4
POL	97	3	2.8
LTU	98	2	0.2
EU avg	62	38	100

a much higher EU market share than Top50 domestic EU films in that same market. That, in turn, allows US producers to invest more in the next film production and increase chances of reaching the Top50 again. However, these figures vary substantially across countries. US films can reach up to a third of the total market in smaller countries like Croatia, Greece, Latvia and Luxemburg. The number and variety of films available in these countries is more limited, and consumers converge on the most popular films. At the other end of the spectrum, larger and more developed film markets like Germany, Belgium, France, Italy and Spain offer a wider variety of titles and the market share of the Top50 is much smaller. That lowers the market share of top-ranking US films as well. They face more competing titles in the market, and consumers spread their film expenditure over a larger number of titles.

It is not all gloom though in the EU film industry. Some countries manage to generate considerable export revenue. Table 8 identifies successful EU film exporters, based on the share of exports in total revenue. The export performance of the largest EU producers is mixed. The UK does very well, making about two-thirds of its revenue in export markets. That figure goes down to about a third for Germany and down to a quarter for France and Spain, with large producer Italy closing the big league ranks at 13% only. The performance of smaller producers is spread out across the entire range, with for instance Belgium, Austria and Slovakia doing well, mainly because they have cultural and linguistic proximity with larger neighbouring country markets. That proximity often comes with film distribution companies that span neighbouring markets and facilitate trade. Having efficient distribution channels may be as important for the promotion of film exports as having a shared culture.

### 3 Explaining the observed patterns of film trade

#### 3.1 Methodology

The descriptive statistics in the previous section looked at film trade from various angles and helped us to discover a number of patterns. However, we are still missing a picture of the combined impact of all these factors on film trade. Moreover, we would like to bring individual film characteristics into the analysis. To combine all this we estimate a standard international trade model on these film data. We use a two-stage Heckman model that separates the drivers of trade at the extensive margin (availability of a film in a foreign country) and the intensive margin (consumer demand or admissions per film). We estimate the model at the level of individual film titles. We track all bilateral imports and exports in offline cinema among the EU27 countries and the USA. For VoD we have data for 10 EU countries only. We estimate the first stage (availability of a film in a foreign country) in the Heckman model on cinema and VoD data. The second stage can only be estimated on cinema data because we have no admissions or view data for VoD film services. Nevertheless, we will attempt to make some partial comparisons between offline and online film distribution.

The first step in the Heckman model is a Probit equation that estimates the probability that two countries trade or not, in this case, the decision to export a film from country A to country B. In the second step the expected values of the trade flows between two countries (the number of admissions that the film attracts in the destination country), conditional on these countries effectively trading, are estimated using OLS. In order to identify the parameters on both equations, a selection variable is required. This variable should be correlated with a country's propensity to export but not with its current levels of exports. Some examples in the literature have opted for common language, common religion (Helpman et al. 2008), governance indicators of regulatory quality or the historical frequency of trade. The first stage is defined as follows:

$$s_{kijt} = \gamma_0 + \gamma_1 \log \text{Cop}_k + \gamma_2 \log \text{share}_{kj} + \gamma_3 \log \text{budget}_k + \gamma_4 \log \text{CD}_{ij} + \mu_g + \mu_i + \mu_j + \mu_p + \varepsilon_{kijt}, \quad (1)$$

where

$$\begin{aligned} s_i &= 1 \text{ if } \text{Adm}_{kijt} > 0 \\ s_i &= 0 \text{ otherwise.} \end{aligned}$$

and  $\text{Adm}_{kijt}$  is the number of admissions of film  $k$  produced in country  $i$  and available in country  $j$  in year  $t$ . The exclusion variable is  $\text{Cop}_k$ , the number of countries participating in the production of film  $k$ . We expect this variable to have a positive influence on availability, but not on the number of admissions. Arguably, we expect films to be more available in those countries that contributed to the production of the film.  $\text{Share}_{kj}$  is the market share of domestic film  $k$  in home market admissions. We construct this variable using Lumière admissions.  $\text{Budget}_k$  is the budget of film  $k$  as reported by IMDb, as a proxy for production quality.

There are no significant geographical distance-related physical transport costs for films. However, cultural trade costs may constitute a more important obstacle to trade. As a measure of country-level trade costs we include  $CD_{ij}$  that measures the cultural distance between country  $i$  and country  $j$ .<sup>13</sup> We expect to see a negative impact for the cultural distance variable in the model. It is customary in such models to also include a dummy variable for countries that share a common language as this would reduce cultural distance. However, since films are usually translated (subtitled or dubbed) for screening in another country, common language may not be an appropriate measure of cultural trade costs; we therefore exclude it. Language may come with cultural references that may be hard to translate or interpret in some countries. This may trigger a cultural discount trade cost at product or film title level. Since we have no film-specific explanatory variables this product-level cultural discount will be left in the unexplained residual of the regression. Lee (2006) measures product-level cultural discount costs at the level of genre categories. We control for genre effects by adding a dummy for each of the 14 genres in IMDb.<sup>14</sup>

We include a set of origin and destination country fixed effects to control for any unobserved country factors—factors that turned out to be relevant in the descriptive statistics. We also include producer, time and genre fixed effects to control for any other potential unobserved heterogeneity in the model.

In the second stage we include the same set of variables except for the exclusion variable. The Inverse Mills ratio accounts for the potential selection bias:

$$\log \text{Adm}_{kijt} = \gamma_0 + \gamma_1 \log \text{share}_{kj} + \gamma_2 \log \text{budget}_k + \gamma_3 \log CD_{ij} + \mu_g + \mu_i + \mu_j + \mu_p + \varepsilon_{kijt}. \quad (2)$$

Our model includes country and film characteristics as explanatory variables in each step. The advantage of a sample selection model comes from the fact that

<sup>13</sup> This variable is detailed in Hofstede (2001). It contains the following dimensions: (1) power distance, which expresses the degree to which the less powerful members of a society accept and expect that power is distributed unequally; (2) uncertainty avoidance, which expresses the degree to which the members of a society feel uncomfortable with uncertainty and ambiguity; (3) individualism versus collectivism; (4) masculinity versus femininity; (5) long-term orientation versus short-term orientation; and (6) indulgence versus restraint.

<sup>14</sup> About half of all films have more than one genre identifier. They will tick two or more genre dummies in the regression.

the estimation of the decision to export a film and the quantity of ticket sold are not modelled as completely independent. In fact, in the real world the second stage is conditioned by the first—the audience can only watch a film if it is offered in a given theatre. Therefore, the model allows for some positive correlation between both error terms to better reflect this process. The exclusion variable is the number of co-producer countries of a film. We expect this variable to affect the availability of a film in a given country, since co-production gives cultural and commercial roots to film in more than one country. As Table 9 shows, the Inverse Mills ratio is significant, which indicates the presence of selection bias and confirms that it is better to use the Heckman two-stage estimation technique.

Film characteristics include the film budget and the success of the film in its home market (share in home market admissions). We expect to see a positive impact of all these variables on film trade. We add producer fixed effects for independent producers (“indies”) and the 8 major US film producers (Universal, Sony, Warner, Paramount, Twentieth Century Fox, DreamWorks, Disney and MGM) that account for 25% of all films and nearly 80% of all admissions in our cinema dataset.

We run the model on the entire Lumière dataset and on two separate subsets, films produced in the USA and films produced in the EU.

### 3.2 Estimation results for offline cinema

Table 9 presents the estimation results for the number of films and the admissions per film in the Heckman model applied to EU26 Lumière cinema data. Results are presented separately for all films, for US film exports to the EU and for intra-EU film exports.

When we combine all films, cultural distance between country pairs has a statistically significant negative impact on the availability of films and no significant impact on admissions or consumer demand. This is also true for intra-EU film trade, but surprisingly not for US–EU film trade. The very counterintuitive results for US film exports to the EU are somewhat hard to explain. It may reflect the wider market reach of US films in the EU and indicate that the disadvantages of cultural distance were overturned by the strong consumer appeal of US films in the EU.

Analysis of the country fixed effects coefficients (see Table 12 in Appendix) confirms the Helpman and Krugman (1985) market size hypothesis and the cultural discount hypothesis: larger markets have a higher propensity to export films. There is a strong positive correlation (0.76) between market size (number of domestic films produced) and the probability to export a film to another country. As expected, almost all exporting country fixed effects coefficients are statistically insignificant on the intensive margin: exporting a film—often based on success in the home market (see below)—is no guarantee that it will succeed. Conversely, the destination country fixed effects at the extensive margin of trade confirm that larger countries import relatively more films (correlation 0.90); they offer a larger variety of films to consumers despite the fact that the variety of domestic films is already higher. However, the intensive margin coefficients show that larger markets have relatively smaller audiences for imported films (correlation 0.23), precisely because there is

**Table 9** Explaining patterns of cross-border film trade (Lumière cinema data 1996–2014)

Variables	All films		US films in EU		EU films in EU	
	(1)	(2)	(3)	(4)	(5)	(6)
	Probability of a film being exported	Log number of admissions	Probability of a film being exported	Log number of admissions	Probability of a film being exported	Log number of admissions
Log number of co-producer countries	0.208*** (0.013)		0.145*** (0.015)		0.369*** (0.029)	
Domestic market share	0.106*** (0.003)	0.042 (0.039)	0.085*** (0.003)	0.024 (0.051)	0.123*** (0.004)	0.128** (0.060)
Log film budget	0.071*** (0.004)	0.327*** (0.033)	0.076*** (0.004)	0.260*** (0.051)	0.058*** (0.007)	0.337*** (0.057)
Cultural distance	-0.034*** (0.008)	0.005 (0.055)	0.565*** (0.048)	-4.734*** (0.433)	-0.025*** (0.009)	-0.069 (0.060)
Mills ratio	-1.887*** (0.400)		-2.524*** (0.672)		-1.281** (0.517)	
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Producer FE	Yes	Yes	Yes	Yes	Yes	Yes
Genre FE	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-3.849*** (0.111)	13.258*** (1.789)	-3.570*** (0.120)	21.161*** (2.573)	-4.111*** (0.157)	10.772*** (2.497)
Observations	864,975	864,975	461,700	461,700	402,800	402,800
R-squared		0.349		0.344		0.388

Robust standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

more product variety on these markets. Since they are larger however, even a relatively small audience can still make a film successful in a large-country market. These findings show the benefits of applying a two-stage procedure in the estimation of the drivers of film trade.

Success in the home market (domestic market share) has a positive impact on the number of films traded, but the impact is not so clear on admissions per film. The latter is mainly due to a statistically insignificant effect on the intensive margin in US–EU exports; the coefficient is positive for EU–EU trade. Films are often tested in the domestic market before the decision to export is taken. Somewhat surprisingly however, US films do not have an easier time to get into foreign markets; they need to be more successful (a higher market share) at home than EU films in their home market before they can travel abroad. The coefficients on US to EU film exports are lower than on EU to EU exports. This implies that for the same market share at home, the USA exports less films to the EU compared to exports between EU countries.

Film budgets have a strong impact on the intensive margin of trade (admissions), but less on the extensive margin or the decision to export. Big-budget films travel more easily and are box office successes abroad, another confirmation of the Helpman and Krugman (1985) and the cultural discount hypothesis regarding market size effects. The higher film budget coefficient for US compared to EU films at the extensive margin (columns 3 and 5 in Table 9) indicates per USD or EUR invested US films have a higher propensity to travel. On the other hand, comparing the coefficients on budget in columns 4 and 6 (intensive margin) shows that the rate of return in foreign markets, per EUR or USD of investment, is higher for EU than US films, conditional on being exported.

Desai and Basuroy (2005) and Lee (2006) show that genre familiarity has an influence on the market performance of a film. However, these studies measure genre effects at the level of box office revenue only. To avoid selection bias, our model splits the extensive and intensive margin of trade and estimates genre effects separately for each margin. Surprisingly, we find that the genre fixed effects coefficients are negatively correlated between the extensive and intensive margin, for all trade ( $-0.70$ ) as well as for US–EU ( $-0.81$ ) and for intra-EU trade ( $-0.58$ ).<sup>15</sup> This would suggest that there is a mismatch between the propensity of different genres to travel across borders and consumer demand for these genres in the countries of destination. Film producers would gain from changing the mix of genres in their trade portfolio.

Table 14 in Appendix reveals that the most notable feature of the producer fixed effects is that they are statistically significant and positive for all big film producer studios at the extensive margin and statically insignificant at the intensive margin. This indicates that big film producers export relatively more films than smaller independent producers, probably because they have well-established global distribution networks that facilitate trade. However, a higher propensity to export does not translate into a higher propensity to generate box office revenue.

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<sup>15</sup> Correlations calculated for statistically significant coefficients only. Coefficients are shown in Table 13 in Appendix.



**Table 10** Comparing the drivers of film trade in VoD and cinema

Variables	Overall		VoD	
	(1)	(2)	(3)	(4)
	Cinema	VoD	VoD, US films	VoD, EU films
Domestic market share	0.0977*** (0.002)	0.0589*** (0.006)	0.0875*** (0.012)	0.0522*** (0.007)
Home bias	1.0606*** (0.020)	0.9854*** (0.047)		1.1664*** (0.050)
Common language	0.4010*** (0.024)	0.6962*** (0.041)	-1.0064*** (0.071)	0.4995*** (0.057)
Log film budget	0.0650*** (0.003)	0.0651*** (0.008)	0.0313** (0.015)	0.0756*** (0.010)
Cultural distance	-0.0559*** (0.008)	-0.0937*** (0.016)	-0.4385*** (0.025)	-0.0314* (0.017)
Constant	-3.4373*** (0.081)	-1.2608*** (0.263)	-0.0988 (0.446)	-1.2048*** (0.307)
Country FE	Yes	Yes	Yes	Yes
Origin FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	No	No
Producer FE	Yes	Yes	Yes	Yes
Genre FE	Yes	Yes	Yes	Yes
Observations	864,975	25,589	12,440	12,803

Robust standard errors in parentheses. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . The dependent variable is a dummy indicating whether the film is available or not in cinema/VoD channel

### 3.3 Are the drivers of digital film trade different?

Table 10 shows the comparison of the observed cross-border trade patterns for films in offline cinema and online VoD distribution in the EU. The VoD data in this sample were collected mostly from national VoD platforms and cover very few multi-country or global VoD distribution platforms. They are often associated with local film producers, cable TV companies and TV chains. Local films therefore dominate the sample composition and result in higher home bias. Since we do not have consumer demand data for VoD we can only compare the supply side in each distribution channel. The regression results in Table 10 use a Probit equation where the dependent variable is the probability that a film from given country of origin is available in another country of destination. Here we include domestic film trade because we step outside the Heckman two-stage model that we used above. We can include internal flows to estimate the home bias effect. We compare the drivers of cross-border availability between cinema and digital distribution (columns 1–2) and between US- and EU-produced films in the digital distribution circuit (columns 3–4).

When comparing cinema and VoD we find that domestic market shares have a somewhat stronger impact on offline cross-border film trade, compared to online. Common language and budget remain important incentives to trade. When we compare the propensity to travel online for US and EU films (columns 3 and 4) we observe that cultural distance is a major obstacle for US films to enter the EU VoD market. The negative sign on the common language variable for US films is

somewhat counterintuitive. It would imply that US films travel more easily to non-English-language-speaking countries in the EU—which is hard to explain. US producers benefit more from co-production than EU productions. All these results indicate that US films have no inherent advantages in getting into the EU online market.

## 4 Conclusions

In this paper we explore new data sources on multilateral trade in films among EU countries and with the USA in offline cinema and in online video-on-demand (VoD) distribution. We find that the EU film market is highly fragmented, with overall cross-border availability around 15% only. Cross-border availability is higher in online distribution (20%), but still remains far below availability in other media like music or e-books. US films are far more widely available in the EU than EU films in the EU market. US films account for 45% of the supply of film titles and 67% of box office revenue in the EU. EU films account for 34% of the supply of titles and 29% of revenue. There is premium consumer demand for US films compared to EU films.

Film production is a high fixed cost industry that favours production for larger markets in order to benefit from economies of scale, including in export markets. We explore different aspects of the cultural discount hypothesis by means of a standard Helpman and Krugman (1985) trade model with economies of scale and a two-stage Heckman (1979) estimation procedure. We estimate the relative contribution of country-level and film-level drivers and impediments to international film trade at the extensive and intensive margins of trade. Cultural distance between country pairs, success in the home market and the size of the film budget show the expected results at the extensive margin of trade, except for US–EU film exports. US films have a lower propensity to get into export markets, relative to their success in the home market. Bigger film budgets help them into export markets, but the marginal return per USD invested is lower compared to EU films in the EU market. We find supportive evidence for the large- versus small-country fixed cost trade hypothesis. Large economies export relatively more films. Consumer demand for imported films is relatively smaller in large EU economies, except for films imported from the USA that are only marginally affected. While we are unable to measure the cultural discount at film title level, genre effects show that the propensity to travel across borders varies by genre, but is inversely related to consumer demand for these genres. This points towards a mismatch between supply and demand.

Trade patterns in online film distribution are not fundamentally different. As online distribution occurs downstream from theatrical release, online distributors can benefit from cinema market experience to make a better selection of films. This results in a lower impact of domestic market shares on online trade patterns.

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### Appendix 1

See Table 11.

**Table 11** Data sources

Variable	Definition	Source
Log admissions	Logarithm of number of admissions of film $k$ in country $j$ in year $t$	Lumière, European Audiovisual Observatory
Domestic market share	Market share of domestic film $k$ at home (admissions)	Authors' own calculation from Lumière data
Home bias	Indicator variable for the same origin and destination country	Authors' own calculation from CEPII
Log film budget	Logarithm of budget of film $k$	IMDb
Cultural distance	Cultural distance between origin and destination countries	Hofstede (2001)
Log #co-producer countries	Logarithm of the number of countries participating in the production of film $k$ .	IMDb
Genre dummies	Indicator for different genres of a movie	IMDb

## Appendix 2

See Tables 12, 13 and 14.

**Table 12** Coefficients from destination country fixed effects

Variables	All films		US films in EU		EU films in EU	
	(1)	(2)	(3)	(4)	(5)	(6)
	Probability of a film being exported	Log number of admissions	Probability of a film being exported	Log number of admissions	Probability of a film being exported	Log number of admissions
BEL	0.120***	-0.188	-0.223***	2.640***	-0.010	0.232
BGR	0.157***	-2.578***	-1.080***	7.446***	-0.191***	-1.137***
CZE	0.414***	-3.483***	0.209***	-1.973***	0.294***	-2.452***
DEU	0.263***	0.720***	0.246***	0.967***	0.000	1.770***
DNK	0.401***	-3.711***	0.459***	-4.243***	0.195***	-2.298***
ESP	0.649***	-2.868***	0.584***	-2.448***	0.393***	-1.302***
EST	0.024	-2.290***	-0.684***	3.463***	-0.143***	-1.501***
FIN	0.134***	-2.417***	0.431***	-4.792***	-0.055	-1.072***
FRA	0.245***	0.728***	0.141***	1.537***	0.079*	1.816***
GBR	0.177***	1.175***	0.936***	-4.435***	-0.331***	1.789***
GRC	-0.588***	0.982***	-1.152***	5.633***	-0.492***	0.573
HRV	-0.644***	0.871**	-1.406***	7.298***	-0.740***	0.602
HUN	0.029	-0.157	-0.022	0.436***	-0.134***	0.096
ITA	0.399***	-1.794***	0.509***	-2.670***	0.179***	-0.515**
LTU	-0.416***	-0.247	-1.372***	7.737***	-0.598***	0.072
LUX	-0.543***	-1.249***	-0.311***	-2.699***	-0.602***	-1.284***
LVA	-0.150***	-1.668***	-1.103***	6.076***	-0.265***	-1.165***
NLD	0.424***	-2.755***	0.344***	-2.354***	0.361***	-1.755***
POL	0.174***	-0.476***	-0.070***	1.357***	0.037	0.771***
PRT	0.067**	-1.454***	-0.955***	6.624***	0.013	-0.845***
ROM	0.370***	-3.529***	-0.978***	7.331***	0.009	-2.071***
SVK	0.064**	-2.443***	-1.317***	8.323***	0.051	-1.823***
SVN	0.020	-2.797***	-1.034***	5.546***	-0.074	-1.810***
SWE	0.264***	-2.053***			0.127***	-1.235***

Robust standard errors are not reported for the sake of brevity (available under request)

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Coefficients from regressions in Table 9. Reference omitted country: Austria

**Table 13** Coefficients from genre fixed effects

Variables	All films		US films in EU		EU films in EU	
	(1)	(2)	(3)	(4)	(5)	(6)
	Probability of a film being exported	Log number of admissions	Probability of a film being exported	Log number of admissions	Probability of a film being exported	Log number of admissions
Action	-0.036***	0.089*	-0.037***	0.089	0.009	0.147
Animation	0.261***	-0.453***	0.250***	-0.490***	0.366***	-1.029***
Comedy	-0.092***	0.111**	-0.102***	0.156*	-0.051***	0.121
Crime	0.022**	-0.018	0.009	-0.010	0.085***	-0.204
Documentary	-0.135***	0.797***	-0.317***	1.125**	0.066	0.801**
Drama	0.047***	-0.326***	0.009	-0.256***	0.173***	-0.552***
Family	-0.037***	-0.210***	-0.007	-0.302***	-0.083***	-0.269
Fantasy	0.051***	0.136***	0.032***	0.149**	0.189***	-0.041
Horror	-0.019	0.342***	-0.002	0.361***	-0.156***	-0.118
Music	-0.023	-0.190**	-0.067***	-0.165	0.058**	-0.224
Musical	0.016	-0.230**	0.013	-0.108	0.110**	-1.381***
Romance	0.028***	0.062	-0.007	0.174***	0.122***	-0.364***
Thriller	-0.020**	0.124**	-0.027***	0.132**	0.023	0.116
Western	-0.079**	0.503**	-0.059*	0.442**	-0.391	0.760

Robust standard errors are not reported for the sake of brevity (available upon request)

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Coefficients from regressions in Table 9

**Table 14** Coefficients from producer fixed effects

Variables	All films		US films in EU		EU films in EU	
	(1)	(2)	(3)	(4)	(5)	(6)
	Prob-ability of a film being exported	Log number of admis-sions	Prob-ability of a film being exported	Log number of admis-sions	Prob-ability of a film being exported	Log number of admissions
Disney	0.125***	-0.173	0.033*	-0.012	0.211***	-0.690**
DreamWorks	0.177***	-0.144	0.119***	-0.064	0.173***	-0.157
Fox	0.103***	-0.119	0.024	-0.034	0.361***	-0.086
MGM	0.057***	-0.226**	-0.009	-0.175	0.175***	0.119
Paramount	0.025*	-0.135	-0.040**	-0.057	0.153***	-0.025
Sony	0.057***	-0.074	-0.016	0.072	0.192***	-0.488*
Universal	0.047***	-0.120	-0.014	-0.070	0.091***	0.005
Warner	0.061***	-0.230**	-0.016	-0.139	0.176***	-0.162

Robust standard errors are not reported for the sake of brevity (available upon request)

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Coefficients from regressions in Table 9. Reference omitted producer: independent films

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