International Trade in Motion Picture Services

Gordon H. Hanson
University of California, San Diego
and National Bureau of Economic Research

Chong Xiang
Purdue University

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Abstract. In this paper, we present data on U.S. trade in motion pictures and examine the determinants of U.S. motion-picture exports to Europe. Publicly available data on trade flows in motion pictures, and other information services, appear to be of dubious quality. In Europe, U.N. Comtrade data on motion-picture trade vastly understate box office revenues earned by foreign films compiled from private industry sources. The motion picture industry is an attractive case to study because bilateral trade in the industry is easily measured at the point of consumption (movie cinemas, video rental stores, pay-TV operators). In European countries, U.S. movies account for 70% of box-office revenues, with the remaining share divided between domestic and non-U.S. foreign films. We use data from Screendigest.com to estimate a modified gravity model for trade in motion-picture services, the results for which indicate how market size and trade costs affect trade in the industry.

1. Introduction

In the last dozen years, empirical research in international trade has blossomed. There are now extensive bodies of work on testing the Heckscher-Ohlin trade model (Davis and Weinstein, 2002), examining the impact of globalization on wages and productivity (Feenstra and Hanson, 2002; Tybout, 2002), and estimating how trade flows respond to trade costs (Anderson and van Wincoop, 2004), among other topics. These strands of literature, however, are almost entirely about international trade in manufactures. Due in part to a paucity of data on service trade flows, relatively few papers address international trade in services (e.g., Freund and Weinhold, 2002, Amiti and Wei, 2005, and Marvasti and Canterberry, 2005). Indicatively, Feenstra's (2004) recent graduate text on international trade includes no references to research on trade involving service industries.

Yet, for the United States and other advanced countries it is services in which their export strength increasingly lies. The 2004 *Economic Report of the President* touts information services (internet publishing and service provision, motion pictures, printed media, radio and TV programming, software, sound recordings, telecommunications) and professional services (accounting, advertising, architecture, consulting, engineering, law, R&D services) as sectors with the highest recent growth in U.S. net exports. In 2002, U.S. exports and foreign sales of information services were $90 billion, relative to total service exports of $295 billion and manufacturing exports of $627 billion (Siwek, 2004). In 2003, information services were 5% of U.S. GDP (relative to 14% for manufacturing), and exports of U.S. motion pictures accounted for 73% of box-office revenues in Europe (Siwek, 2005).

Why are services such an important part of the U.S. tradables production? One possibility is that the U.S. has a comparative advantage in tradable services, due to the country's abundant supply of workers (either native or foreign born) with advanced degrees (computer scientists, engineers, lawyers, MBAs) or specialized skills (actors, musicians, recording technicians, screenwriters), which information and professional services use intensively. Reductions in trade costs – associated with improvements in information technology or falling cultural barriers to trade – may have accentuated the U.S. comparative advantage in services. A second possibility is that scale economies may give service providers an incentive to locate in the large U.S. market (Rauch and Trindade, 2006). For many information services, average costs decline sharply in output. Where these services are provided in a specific language or cultural context, large markets may be the optimal site for global production (Krugman, 1980; Helpman and Krugman, 1985). So far, empirical literature has found evidence that large markets affect trade only in manufacturing (Feenstra, Markusen, and Rose, 1998; Davis and Weinstein, 1999 and 2003; Head and Ries, 2001; Hanson and Xiang, 2004).

In this paper, we present data on U.S. trade in motion pictures and examine the determinants of U.S. motion-picture exports using a modified version of the gravity model. Our focus on motion pictures is warranted by the importance of information services to the U.S. economy and their role in current debates about trade policy. Information services embody large amounts of intellectual property, whose accumulation appears to be important for economic growth but whose ownership rights are often difficult to enforce across national borders (McCalman, 2004). Beyond the threat of

piracy, many governments aggressively restrict imports of motion pictures and sound recordings, ostensibly to preserve domestic production of cultural goods (Janeba, 2004).

In section 2, we derive a gravity model of trade in which a country's imports of U.S. motion-picture services relative to its expenditure on domestically produced motion-picture services depends on the country's size relative to the U.S., proximity to the U.S. in terms of geography and culture, and other trade costs. We measure cultural trade costs using indicators of linguistic distance between countries in Dyen et al. (1992), Melitz (2002), and Chiswick and Miller (2004), and policy trade barriers using data on the motion-picture industry collected in Marvasti et al. (2005).

Given limited public data, empirical research on trade in services requires one to assemble information from private sources. In section 3, we describe available data on U.S. exports of motion pictures. The publicly available data on motion-picture trade flows appear to be of dubious quality.[1] The U.N. Comtrade database reports trade in motion pictures in terms of the value of *cinematographic film exposed or developed*, which is a commodity rather than a service. Importers appear to have considerable discretion in reporting the value of physical film prints, as Comtrade trade flows are up to two orders of magnitude smaller than foreign box office revenues for U.S. films compiled by Screendigest.com, a private industry source. What makes motion pictures an attractive case to study is that bilateral trade in the industry is easily measured at the point of consumption (movie cinemas, video rental stores, pay-TV operators), which facilitates their collection by private consultancies. We use data from Screendigest.com, as reported in Hancock and Jones (2003), to estimate a gravity model of trade for the

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[1] The difficultly of measuring economic activity in services has been studied in much other work. On measurement issues related to services, see Hooper and Richardson (1991), Griliches (1992), Baldwin, Lipsey and Richardson (1998), and Berndt and Hulten (2007).

motion-picture industry, the results for which we report in section 4. The estimates indicate how market size and trade costs affect trade in motion pictures.

Though information services are among the most dynamic sectors in the U.S. economy, they have been the subject of little research by international economists. Key to new research efforts will be the collection of data on service trade flows. Since service trade rarely passes through ports, airports, or land borders, it is difficult to detect using standard government methods for measuring imports and exports. A further problem is that the channels through which firms export or import services change continually over time. In the early 1990s, most foreign revenue on U.S. motion pictures was generated at the box office. By the late 1990s, videos, DVDs, and pay-TV had become important sources of foreign film distribution. Going forward, the internet may become the dominant mode for film distribution. Given rapid change in the distribution of services, and the slow speed with which government data collection strategies tend to change, private-industry sources are likely to be the most useful data source for research on trade in services in the near term.

2. Trade Theory and Trade in Information Services

We base our model of information services on Hanson and Xiang (2004), which extends the monopolistic-competition model of trade (e.g., Helpman and Krugman, 1985) to a continuum of industries. The setup has a large country and a small country, each with one production factor, labor (though the extension to a many-factor setting is straightforward). There are many industries, some of which are information services (movies, music) and others of which are manufactures (cars, clothes). Production of each

good or service is subject to increasing returns to scale. Consumers have identical Cobb-Douglas preferences. Each industry consists of many Dixit-Stiglitz-type varieties (action movies, comedies), the number of which is endogenous. For industry m, let n_m denote the number of varieties and σ_m denote the elasticity of substitution between varieties, where $\sigma_m > 1$. Each manufacturing industry is subject to an iceberg transport cost, $\tau_m > 1$.

Information services are subject to a cultural discount and perhaps a policy trade barrier (in the form of a tariff or quantity restriction). For a consumer, one unit of a domestic service brings as much satisfaction as $1/\delta$ units of a foreign service, where $0 < \delta < 1$. We expect δ to be higher the more similar are two countries' culture and language. Domestic and foreign varieties of an information service are symmetric in consumption. For each information service i, $\sigma_i > 1$ is the elasticity of substitution between varieties.

Given increasing returns to scale and CES preferences, in equilibrium each service firm and each manufacturing firm is monopolistically competitive and sets a price that is a constant markup over marginal cost. Prices for a given variety of a good or service produced in a given country vary across destination markets according to trade costs.

Based on this framework, let S_{iuk} and S_{ikk} be total sales of information service i by country u (the United States) to country k and by country k to itself. Exploiting the CES structure of preferences, we obtain the following expression for relative sales:

$$\frac{S_{iuk}}{S_{ikk}} = \frac{E_{ik} n_{iu} \left(\delta_{iuk}\right)^{1-\sigma_i} \left(p_{iuk} / P_{ik}\right)^{1-\sigma_i}}{E_{ik} n_{ik} \left(p_{ikk} / P_{ik}\right)^{1-\sigma_i}} = \frac{n_{iu}}{n_{ik}} \left(\frac{w_{iu}}{w_{ik}}\right)^{1-\sigma_i} \left(\delta_{iuk}\right)^{1-\sigma_i} \left(t_{iuk}\right)^{1-\sigma_i}, \qquad (1)$$

where E_{ik} is expenditure by country k on service i, P_{ik} the CES price index in country k for service i, and p_{iuk} is the delivered price (including customs, insurance, and freight

charges) in country k of service i produced by country u, w_{iu} is marginal production cost in service i and country u, and t_{iuk} is the ad valorem trade cost on exports from country u to country k. The second equality follows from solving for price in terms of marginal cost. Expressing sales in relative terms removes the CES price index and domestic expenditure from the expression, as shown in the second equality. In the estimation, we will associate the cultural discount (δ_{iuk}) with linguistic distance and ad valorem trade costs (t_{iuk}) with geographic distance, import tariffs, and other policy trade barriers.

One can implement (1) empirically by taking a first-order Taylor approximation of the equation that determines the relative number of product varieties produced in the two countries, the derivation of which we do not show in the informal discussion in this paper. For information services, the relative number of product varieties is increasing in relative country size, given certain assumptions. Thus, we can replace the relative number of varieties in (1) with a measure of relative country size, Y_u/Y_k.

The main empirical exercise is to estimate the effect of market size and the effects of trade costs on information services, using the following specification:

$$\ln \frac{S_{luk}}{S_{lkk}} = \beta_0 + \beta_1 \ln \frac{Y_u}{Y_k} + \beta_2 \ln GD_{uk} + \beta_3 \ln LD_{uk} + \beta_4 \ln T_{luk} + \beta_5 \ln \frac{W_u}{W_k} + \varepsilon_{iuk}, \quad (2)$$

where u is the United States, k is the importing country, Y_u/Y_k is the relative size of countries u and k, GD_{uk} is geographic distance between u and k, LD_{uk} is linguistic distance between u and k, T_{luk} is k's ad valorem tariff on imports of product i from country u, W_u/W_k is relative production costs in countries u and k, and ε_{iuk} is a disturbance term associated with unobserved trade costs between country pair uk. Again, by examining relative sales of U.S. and domestic films, we remove expenditure on motion pictures as a determinant of trade flows in (2). In theory, the only role that relative

country size plays in determining relative sales is through its impact on the relative size of the motion-picture industry in the two countries. A positive coefficient on relative income would indicate that large countries are a relatively attractive site for motion-picture production.

In estimating (2), we confront several important econometric and measurement issues. These include measuring cultural trade costs and policy trade barriers, allowing for the endogeneity of policy trade barriers, and incorporating the threat of piracy as a source of trade frictions. Each of these is an important issue. In this paper, we will focus on the first problem of measuring trade costs and leave accounting for their endogeneity to future work. The empirical exercise in this paper should be seen as a preliminary exploration of whether trade in information services obeys the laws of gravity.

3. Data and Empirical Application

In this section, we present data on international trade on motion pictures. We begin by discussing relevant previous research on the motion-picture industry, proceed to examine data sources on international trade in motion-picture services and on trade costs that may be relevant for motion pictures, and conclude by using data from private industry sources to describe U.S. exports of motion pictures to Europe.

3.1 Previous Literature on Trade in Motion Pictures

What has previous research discovered about trade in motion pictures? There appears to be tremendous heterogeneity in the performance of movies. De Vany and Walls (1999, 2004) and Walls (2005) find that the distributions of production cost, box-office revenue and profits (box-office revenue minus production cost) have heavy right

tails. For example, the mean of production costs is the 62nd percentile of the distribution, the mean of box-office revenues is the 71st percentile, and 78% of movies lose money while 6% of movies account for 80% of total profits. Perhaps in response to the uncertainty in movie revenues, Goettler and Leslie (2005) find that studios are more likely to co-finance movies that account for a large fraction of their total annual production budget. De Vany and Eckert (1991) and De Vany and Walls (1996) emphasize that the difficulties with forecasting movie demand necessitate the use of short-term, contingent contracts between distributors and exhibitors. Filson et al. (2005) argue that these contracts have evolved to help distributors and exhibitors share risks and overcome measurement problems, rather than to resolve information problems.

The attraction of individual films to consumers appears to be short-lived. De Vany and Walls (1999) show that movies earn 66% of their box-office revenues during their first 3 weeks of showing. De Vany and Walls (1997) show that a movie has less than a 25% chance of lasting 7 weeks or more in the top-50 chart and less than a 15% chance of lasting 10 weeks or more. In a similar vein, Elberse and Eliashberg (2003) find that the U.S. movies with stronger domestic market performance tend to have higher opening-week box-office revenues when they are released in the foreign markets (where this correlation becomes weaker the longer the time lag between the movies' U.S. releases and foreign releases).

There is increasing interest in the protection of intellectual property in motion pictures, either domestically or internationally. Byers et al. (2004) study successful movie downloads from peer-to-peer file sharing networks. Of the successful downloads, 60% appeared on the peer-to-peer networks prior to the movies' DVD release dates. Of

the movies that had been released on DVD as of the time of their study, only 5% first appeared after their DVD release date on a network. Together, these facts suggest consumer DVD copying is minor compared with insider leaks of DVDs. Turning to trade, McCalman (2004) finds that while Hollywood studios are more likely to use licensing in countries with moderate protection of intellectual property rights (IPR), they tend to use more integrated governance structures in countries with both high and low IPR protection. McCalman (2005) finds that while moderate IPR protection encourages the spread of U.S. movies, either very weak or very strong IPR protections decrease the speed with which U.S. movies are released abroad.

3.2 Data on Trade in Motion-Picture Services

Data on international trade in motion pictures or other information services are very difficult to obtain. The U.S. Bureau of Economic Analysis (BEA) publishes limited bilateral trade flows for the film industry. BEA surveys of U.S. multinational firms provide some industry data on service trade flows (Kozlow and Borga, 2004), but only for U.S. parent firms that own subsidiaries located abroad. The BEA Quarterly Survey of Transactions in Selected Services and Intangible Assets with Foreign Persons does give data on foreign receipts from film and television tape rentals, but does not list data on foreign box-office revenues earned by U.S. motion pictures.

The U.N.'s Comtrade lists motion-picture trade as a *commodity*, Cinematographic Film Exposed or Developed (SITC 883), which is the reported value of *physical* shipments of exposed film across borders. The value of physical film shipments appears to vastly understate film revenues. For instance, Comtrade reports 2000 U.S. exposed film exports of $0.5 million to France, $0.5 million to Germany, and $6.5 million to the

U.K., while Screendigest.com reports 2000 box-office revenues for U.S. films of $513 million in France, $615 million in Germany, and $429 million in the U.K. (Hancock and Jones, 2003).

We evaluate the demand for U.S. films, other foreign films, and domestically made films using data on box-office revenues by country and year. Box-office revenues are equivalent to the c.i.f. (customs, insurance, freight) value of motion-picture services consumed in cinemas, plus retail markups. These revenues include import duties, transport costs, and other trade costs incurred in delivering the service to the consumer, as well as sales taxes and exhibition fees collected by cinemas. Box-office revenues are consistent with the trade-cost-inclusive measure of sales in (1). Individuals may consume motion-picture services through cinemas (for new movie releases) or through video rentals, video purchases, or pay TV (for previous movie releases).[2] Distributors tend to release movies to cinemas first and to retail outlets and pay-TV operators later in time, suggesting for a given film these services do not compete contemporaneously. Recently, studios have experimented with releasing films in the U.S. market in cinemas and in video format simultaneously, but this practice appears to be rare in foreign markets. As of yet, the provision of motion-picture services through the internet accounts for a very small share of global film revenues. In this paper, we limit our analysis to motion-picture revenues earned through cinema exhibition (box-office revenues).

Data on box-office revenues for the period 1995-2004 are available from Screendigest.com. For this paper, we use data on cinema exhibition and distribution in 19 European countries from Hancock and Jones (2003). In each country and year,

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[2] Data on DVD/video sales and rentals are very difficult to get. For example, Screendigest.com charges £5,000 for access to its Video and DVD Global Intelligence database. We are still in the process of acquiring such data.

Screendigest.com reports the number of films screened, total film attendance, and total box-office revenues for films imported from the United States, films imported from other major producing countries, and films produced domestically. The company also reports attendance and revenue for each of the 10 top-grossing films by country and year and other national market data. Screendigest.com compiles these data from government agencies, national film bodies, film exhibitor and distributor associations, and company spokespeople.

An important issue in using data on box-office revenues is how to classify the nationality of a motion picture. Screendigest.com defines the origin country for a film by the location of the company that produces the film. Production companies (e.g., 20th Century Fox in the United States) oversee the writing or purchase of screenplays and musical scores; casting; costume and set design; animation, filming, sound recording, and editing; marketing and distribution; and financing.[3]

To consider how data on trade in motion pictures from Comtrade and Screendigest.com compare, Figure 1a plots the value of total film imports reported by Comtrade and box-office revenues for foreign films reported by Screendigest.com for 19 European countries for the period 1992-2002; Figure 1b shows a similar plot for film imports from the United States and box-office revenues for U.S. films in Europe. For either total imports or imports from the United States, box-office revenues greatly exceed film imports reported by Comtrade. The magnitude of the differences are perhaps more apparent in Table 1, which shows the Comtrade value of film imports and the Screendigest.com value of box-office revenues for foreign films, by year for Europe.

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[3] Independent exhibition companies tend to oversee the screening of movies to consumers in destination markets.

Over the sample period, the average ratio of the former to the latter is 46.2. Table 2 shows averages over 1992-2002 by country for Comtrade film imports and Screendigest.com foreign film box-office revenues. There appears to be little systematic relationship between the two series. Over the sample period, the average ratio of box-office revenues to film imports varies from a low of 20.7 in Austria to a high of 155.8 in Italy. It appears that Comtrade data on film imports (at least for Europe) give no meaningful indication of foreign sales of motion-picture services.

3.3 U.S. Exports of Motion Pictures

The data we use for our analysis is from Hancock and Jones (2003), which gives information on U.S. exports of motion pictures to Europe. While the United States is by far and away the dominant player in the European film industry, there is substantial variation across countries in the share of the market held by U.S. studios. It is this variation that we exploit in the gravity estimation in the following section.

Figure 2 shows total box-office revenues and average ticket prices in the 19 European countries. Revenues grow modestly over the sample period, showing considerable volatility. The surge in revenues in 1998 is associated with the movie, *Titanic*, which at the time was the highest grossing movie in history. Ticket prices fall over the sample period, due in part to a rising share in European film revenues of lower-priced markets in central and eastern Europe. The importance of high-grossing films is further evident in Figure 3, which shows the share of the top-10 films in total box-office revenues. The top-10 share fluctuates considerably, reaching its height in 1998 with *Titanic*, with an average of the period of 0.48.

For Europe as a whole, the United States is the most important source of motion pictures. Figure 4 shows the share of box-office revenues of U.S. films, domestically made films, and other foreign films. Over the sample period, the U.S. revenue share averages 0.69 and is quite stable. Revenue shares for domestic films and films from third countries are roughly equal. The dominance of U.S. studios is due largely to a relatively small number of high-grossing films. This is seen in Figure 5, which shows the average number of films released in Europe by origin country or region. While the U.S. share of box-office revenues is over twice that for domestic and non-U.S. foreign films combined, the number of U.S. film releases is slightly smaller than the sum of domestic and non-U.S. foreign releases. Domestic and non-U.S. foreign releases tend to have small gross revenues.

Countries in Europe vary in the size of their domestic motion-picture industries. Figure 6 shows the ratio of local box office revenues for U.S. films to local box office revenues for domestically produced films by European country averaged over 1995-2002, which is the period for which data on every country is available. The log of this ratio is the dependent variable in equation (2). Relative U.S. film revenues range from over 50 times domestic film revenues in Belgium and Ireland to less than 5 times in France. Differences in the size of national movie industries in part reflect differences in country size. Relative U.S. film revenues are strongly positively correlated with the ratio of US GDP to national GDP, with the log correlation between relative film revenues and relative GDP a highly significant 0.45. Differences in trade costs vis-à-vis the United States may also affect the size of national movie industries. As we discuss next,

countries in Europe vary both in their cultural proximity to the U.S. and in the protection they afford their domestic motion-picture industries.

3.4 Trade Costs in Motion Pictures

Before turning to the estimation, we need to identify data on trade costs relevant to motion pictures. We measure cultural trade costs between the United States and its trading partners using indicators of the linguistic distance between English and other countries' primary languages.[4] Distances between languages capture the extent to which two countries share a common linguistic heritage, which may indicate how easily cultural ideas flow between them. Linguists group languages according to family trees. English belongs to the Indo-European language family, whose speech varieties have been examined extensively. In a classic study, Dyen et al. (1992) measure the similarity between 95 Indo-European speech varieties. They create a percentage cognate matrix, which identifies for each pair of languages the fraction of words for 200 basic meanings (e.g., all, and, father, ice) that can be traced back to a common ancestral word. In Europe, the Dyen index for English ranges from a high of 0.60 for Dutch (indicating that 60% of English and Dutch words for the 200 basic meanings share a common ancestral word) to 0.23 for Czech.[5]

As an additional indicator of linguistic distance, we use the relative ease with which U.S. citizens learn foreign languages. After receiving a foreign job posting, employees of the U.S. Department of State (DOS) undergo 24 weeks of foreign-language training, at the end of which they are tested on their proficiency. Chiswick and Miller

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[4] Two countries in our sample, Belgium and Switzerland, do not have a single dominant language. For these countries, we calculate linguistic distance as the weighted average of the distance between English and their primary languages, using data in Melitz (2002) and Gordon (2005) to calculate language weights.
[5] For other work on trade using the Dyen index, see Ginsburgh, Ortuno-Ortin, and Weber (2005).

(2004) use the average scores of DOS test takers by language in the early 1990s as a metric of the distance between English and 43 other languages. The DOS index encapsulates both linguistic differences between English and other languages and the exposure of U.S. citizens to other cultures. U.S. citizens have an easier time learning Spanish (average score of 2.25) than Japanese (average score of 1) in part because Spanish is more similar to English and in part because U.S. citizens have been more exposed to Spanish.[6] A disadvantage of the DOS measure is that language tests are not randomly assigned. DOS employees may be posted to particular countries based in part on their perceived ability to learn a language. Thus, test takers may be selected into a specific exam based on their unobserved ability, which could compress variation in DOS exam scores. The correlation between the Dyen and DOS indices is 0.65.

To measure policy barriers on motion-picture trade, we use a country-level trade barrier index (TBI) constructed by Marvasti et al. (2005) for 33 countries in the early 1990s. Their index is the average across six dummy variables for trade barriers in motion pictures. These dummies capture the presence of tariffs on film imports, quantitative restrictions on film imports, levies on imported video sales, subsidies to domestic film producers, overall trade barriers on service imports, and obstacles in enforcing property rights. In Europe, France and Italy have the most restrictive barriers on motion pictures, followed closely by Spain. The Netherlands, Norway and Sweden have the least restrictive barriers. Belgium, Germany, Switzerland, and the United Kingdom have intermediate levels of trade barriers. Marvasti et al. (2005) find that their trade barrier index is *positively* correlated with imports of U.S. motion pictures. However, they use a gravity specification that does not control for multilateral resistance, contrary to the

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[6] The highest average score is 3 for both Afrikaans and Swedish.

estimation strategy suggested by Anderson and van Wincoop (2004). Using a theoretically grounded gravity specification, as in (2), we find a negative correlation between trade levels and trade costs in motion pictures.

4. Gravity Estimation Results

Table 3 reports estimates of equation (2). The dependent variable is the log ratio of box-office revenues of U.S. films to box-office revenues of domestic films by country. The independent variables are the log ratio of U.S. to domestic GDP; the log ratio of U.S. to domestic average annual earnings for skilled labor in manufacturing (from the UNIDO Industrial Database); log geographic distance to the United States; the log trade barrier index from Marvasti and Canterbury (2005) and a dummy variable for whether the country has no TBI data; the log Dyen index and a dummy variable for whether a country's primary language is non-Indo-European (for which the Dyen index is undefined); and the log Department of State language exam index from Chiswick and Miller (2004) and a dummy variable for whether a country's primary language is English (for which the DOS index is undefined). The specification also includes year dummies, which are unreported. The sample is the 19 European countries included in Hancock and Jones (2003) over the period 1992 to 2002. Since there are only 19 countries and the six trade-cost variables do not vary across time, it is not feasible to include all trade cost measures in the same regression. For some trade cost measures, the results are sensitive to which other trade costs are included as regressors.

Relative U.S. film revenues are increasing in relative U.S. GDP.[7] The U.S. has a more dominant position in the motion-picture industries of smaller countries. These results suggest that larger countries have an advantage as a production location in motion pictures, consistent with results on market-size effects in the theoretical models in Krugman (1980) and Helpman and Krugman (1985) and gravity results for differentiated manufacturing industries in Feenstra, Markusen, and Rose (1998) and Hanson and Xiang (2004). Given fixed costs in producing motion pictures and trade costs (associated with language, culture, and trade policy) in delivering motion-picture services, studios appear to have an incentive to situate production in large countries. As a result, the dominance of U.S. studios is weakest in the larger European markets, including France, Germany, Italy, Spain, and the United Kingdom, which is apparent in Figure 6.

U.S. film exports are smaller in countries where U.S. wages are relatively high. This is consistent with higher production costs deterring U.S. exports. Trade costs appear to affect the ability of U.S. studios to penetrate foreign markets. Relative U.S. film revenues are decreasing in each of the trade cost measures.

The estimated coefficient on the trade barrier index is negative in two specifications, as expected, but precisely estimated in only one case. There is an obvious concern about the endogeneity of policy trade barriers. Countries whose unobserved characteristics are associated with weaker domestic film industries may be more likely to impose import protection for motion pictures, which would tend to introduce positive bias in the coefficient estimate on the trade barrier index. A further problem is that we do not observe trade barriers for all countries in the sample. Controlling for the endogeneity

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[7] The coefficients on GDP are not directly comparable to standard gravity model estimates (which are closer to one), since our dependent variable is not log trade but log trade relative to log domestic consumption.

of trade barriers and expanding the coverage of this measure to include additional countries are important tasks for further research.

The coefficient on the Dyen index, which is the most precisely estimated trade-cost parameter, indicates that, all else equal, moving from an English-speaking country (Dyen index of 1) to a Czech- speaking country (Dyen index of 0.23) would reduce U.S. film revenues relative to domestic film revenues by 72 log points, based on results in column (3), which is a large effect. Relative U.S. film revenues are also substantially lower in non-Indo-European-language countries, which in our sample include Finland, Hungary, and Norway. Languages that belong to the same family share common ancestral origins in their speech varieties. Countries whose languages belong to different language families may have relatively few historical links between their cultures, which could tend to dampen trade in cultural goods such as motion pictures.

The coefficient on the DOS language index is negative, again indicating that trade is lower between countries that are more linguistically distant from the United States, but is quite sensitive to which other regressors included in the estimation.

5. Summary

In this project, we develop a theoretical framework to examine international trade in information services and apply this framework to an empirical study of trade in motion pictures. Despite the growing importance of services, in general, and information services, in particular, for U.S. trade, the export performance of these sectors has been the subject of little empirical research.

The intellectual merit of our research comes from identifying the extent to which the size of the U.S. market has contributed to the global concentration of the motion-picture industry in the U.S. and using newly available measures of linguistic distance to estimate the impact of cultural trade barriers on trade in motion pictures. Market size, language, and trade are each important determinants of U.S. motion picture exports.

To date, the poor quality of published data on trade in services has hampered research on the sector's role in the global economy. However, poor data quality does not mean the U.S. current account is mismeasured. Foreign revenues earned by U.S. motion pictures still appear in the current account, either as exports or as investment income (resulting from license agreements, royalties, or foreign sales by affiliates of U.S. multinationals).

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Table 1: Imports of Motion Pictures in Europe
(millions of U.S. dollars)

Year	Total Film Imports (Comtrade)	Total Box Office Revenues for Foreign Films (Screendigest.com)
1992	140.9	3,756.2
1993	99.9	3,520.3
1994	96.0	3,902.5
1995	103.1	4,226.9
1996	109.8	4,502.5
1997	92.5	4,612.5
1998	90.5	5,062.5
1999	93.3	4,891.5
2000	91.2	4,409.3
2001	78.0	4,868.7
2002	95.8	5,245.2

Notes: Column 2 reports total imports of SITC 8830 from Comtrade for 19 countries in Europe; Column 3 reports total box office revenues for foreign films in these countries (as reported by Hancock and Jones, 2003). The 19 countries are Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Spain Sweden, Switzerland, and the UK.

Table 2: Imports of Motion Pictures by Country
(millions of U.S. dollars)

Country	Mean Film Imports (Comtrade)	Mean Box Office Revenues for Foreign Films (Screendigest.com)
Austria	4.1	85.5
Belgium	2.4	110.8
Czech Republic	0.6	15.5
Denmark	1.0	70.8
Finland	1.2	42.2
France	34.1	880.3
Germany	6.4	812.3
Greece	1.3	50.3
Hungary	1.0	23.5
Ireland	0.4	51.7
Italy	3.3	518.9
Netherlands	1.5	118.5
Norway	2.4	70.9
Poland	1.8	51.9
Portugal	1.9	49.5
Spain	13.9	425.7
Sweden	1.9	119.8
Switzerland	11.9	141.7
United Kingdom	9.7	822.9

Notes: Column 2 reports the average value of imports for SITC 8830 from Comtrade across the years 1992- 2002; Column 3 reports average box-office revenue for foreign films from Sceendigest.com across the years 1992-2002.

Table 3: Gravity Model Estimation Results for U.S. Exports of Motion-Picture Services

	(1)	(2)	(3)	(4)	(5)	(6)
$\ln Y_{us}/Y_k$	0.450	0.552	0.456	0.483	0.790	0.812
	(0.073)	(0.114)	(0.092)	(0.072)	(0.132)	(0.110)
$\ln W_{us}/W_k$	-0.324	-0.175	-0.23	-0.480	-0.007	-0.452
	(0.128)	(0.133)	(0.139)	(0.157)	(0.140)	(0.144)
$\ln$ Distance	-1.526	-0.523	-0.412	-2.077	1.202	-2.119
	(0.893)	(1.161)	(1.037)	(0.988)	(1.448)	(1.207)
$\ln$ TBI		-0.268			0.774	-0.878
		(0.360)			(0.435)	(0.289)
No TBI		-1.123			0.336	-3.458
		(0.7020)			(0.7700)	(0.6860)
$\ln$ Dyen			-0.493		-0.882	
			(0.162)		(0.234)	
Non Indo-Euro			-0.634		-1.106	
			(0.256)		(0.281)	
$\ln$ DOS				-1.309		-5.534
				(0.662)		(0.880)
English				-0.799		-4.515
				(0.691)		(0.829)
R^2	0.235	0.271	0.271	0.261	0.337	0.423
N	171	171	171	171	171	171

Notes to Table 3: The dependent variable is the log ratio of box-office revenues of U.S. films to box-office revenues of domestic films. The independent variables are the log ratio of U.S. to domestic GDP ($\ln Y_{us}/Y_k$); the log ratio of U.S. to domestic average annual earnings for skilled labor in manufacturing ($\ln W_{us}/W_k$); log geographic distance to the United States (ln Distance); the log trade barrier index from Marvasti and Canterbury (2005) and a dummy variable for whether the country has no TBI data (ln TBI, No TBI); the log Dyen index and a dummy variable for whether a country's primary language is non-Indo-European (ln Dyen, Non Indo-Euro); the log Department of State language exam index from Chiswick and Miller (2004) and a dummy variable for whether a country's primary language is English (ln DOS, English). The specification also includes year dummies, which are unreported. The sample is the 19 European countries (see Table 1) over the period 1992 to 2002.

Film Imports from Comtrade vs. Box Office Revenues of Foreign Films in Europe
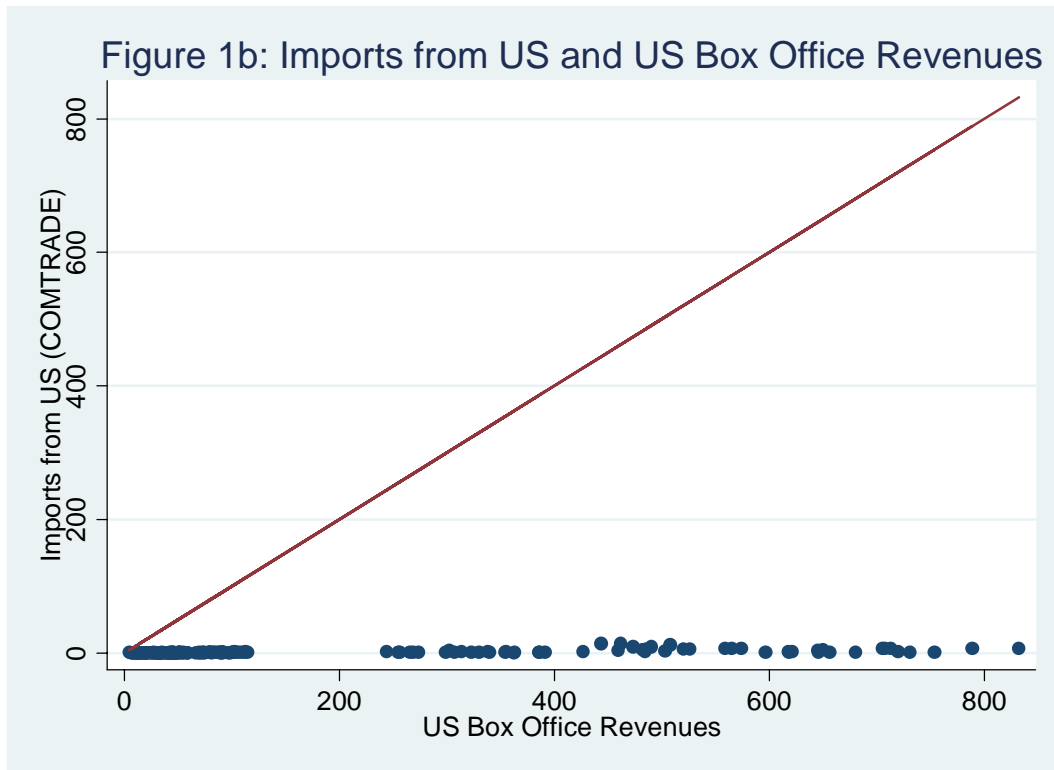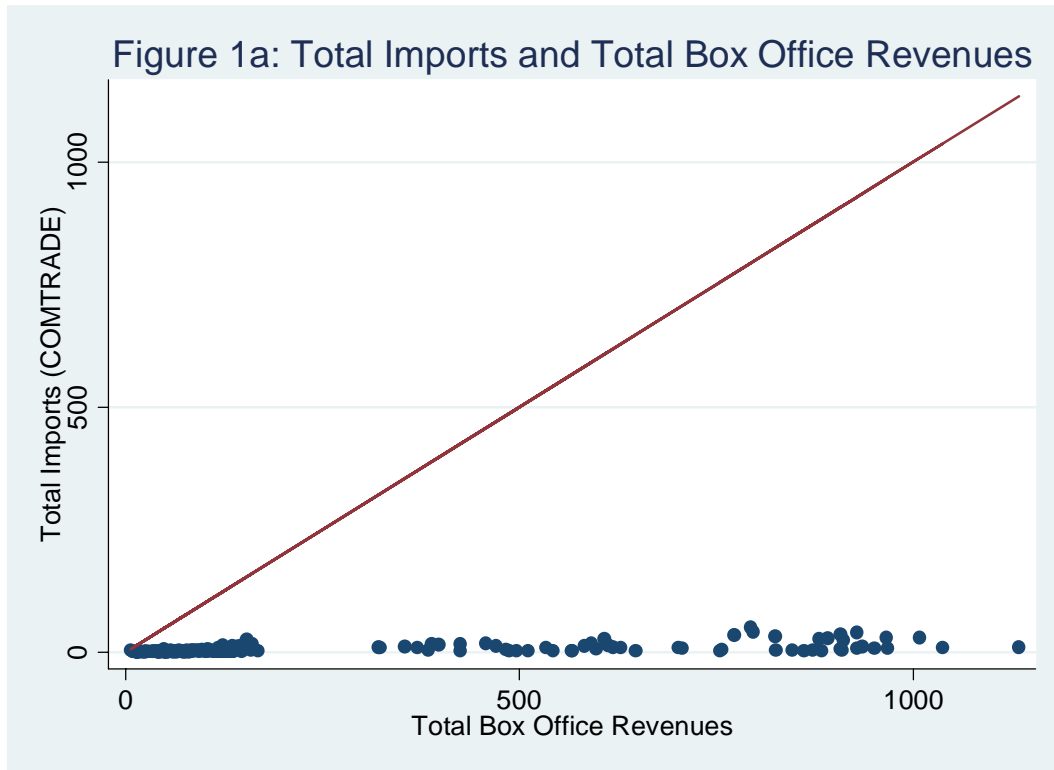

Figure 1a: Total Imports and Total Box Office Revenues

Figure 1b: Imports from US and US Box Office Revenues

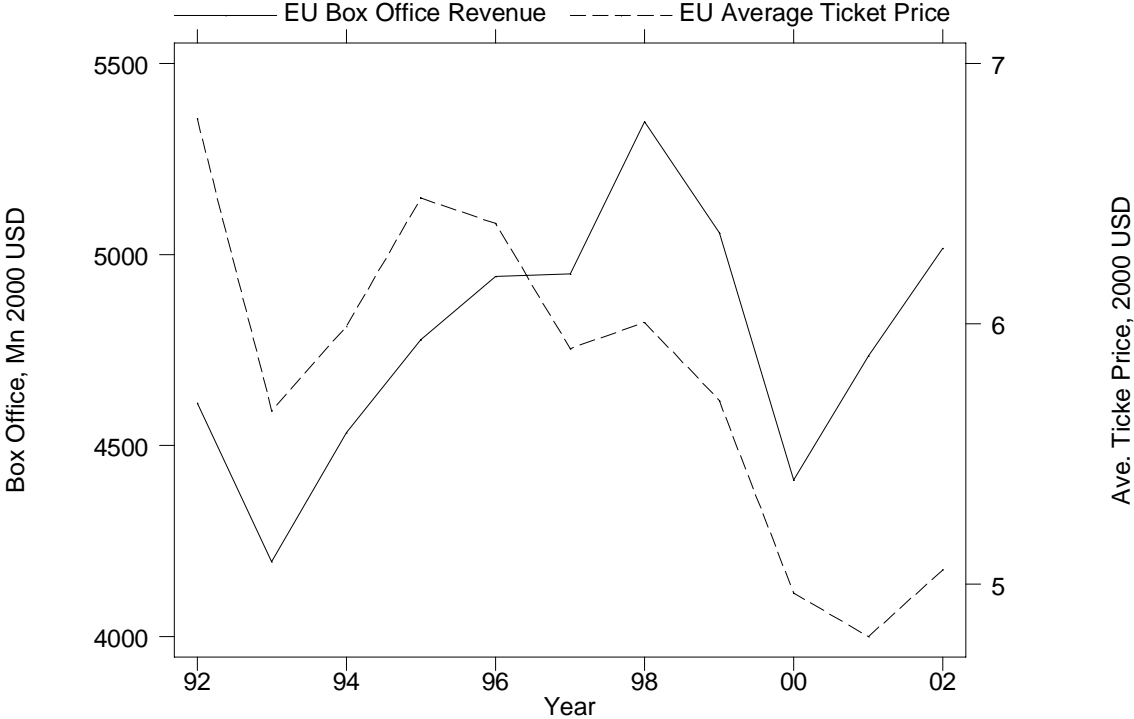**Figure 2: Box Office Revenues in Europe**

Figure 3: Share of High Grossing Films in European Box Office Revenues
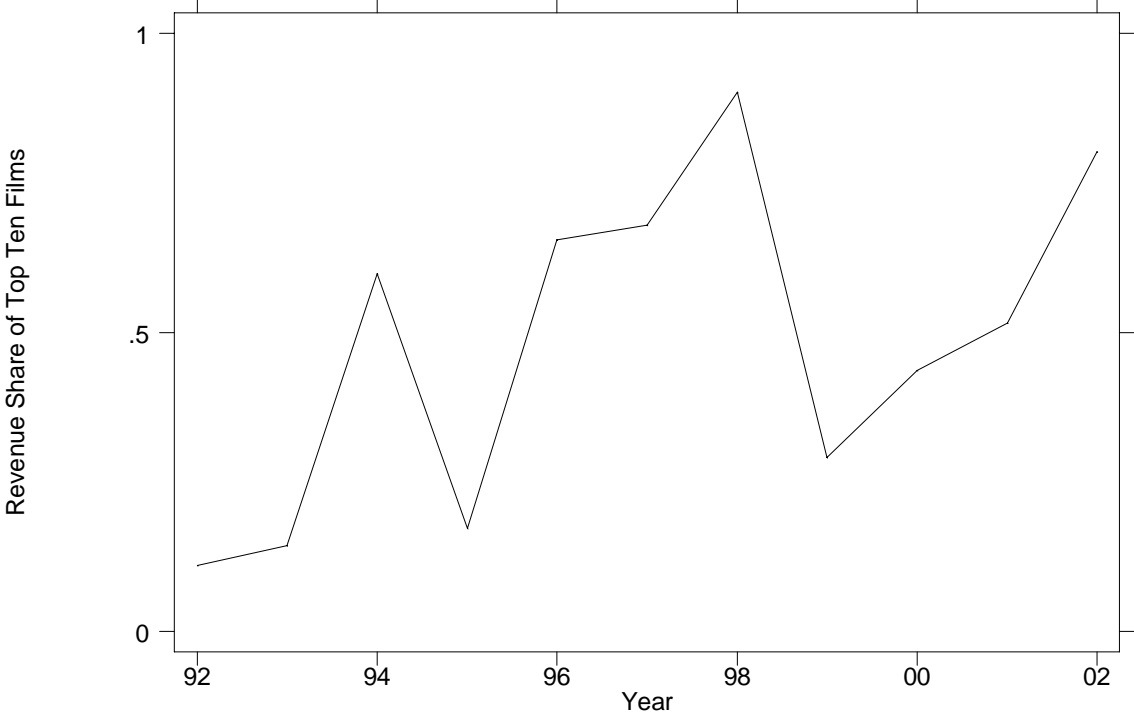
Figure 4: U.S. Share of Box Office Revenues in Europe
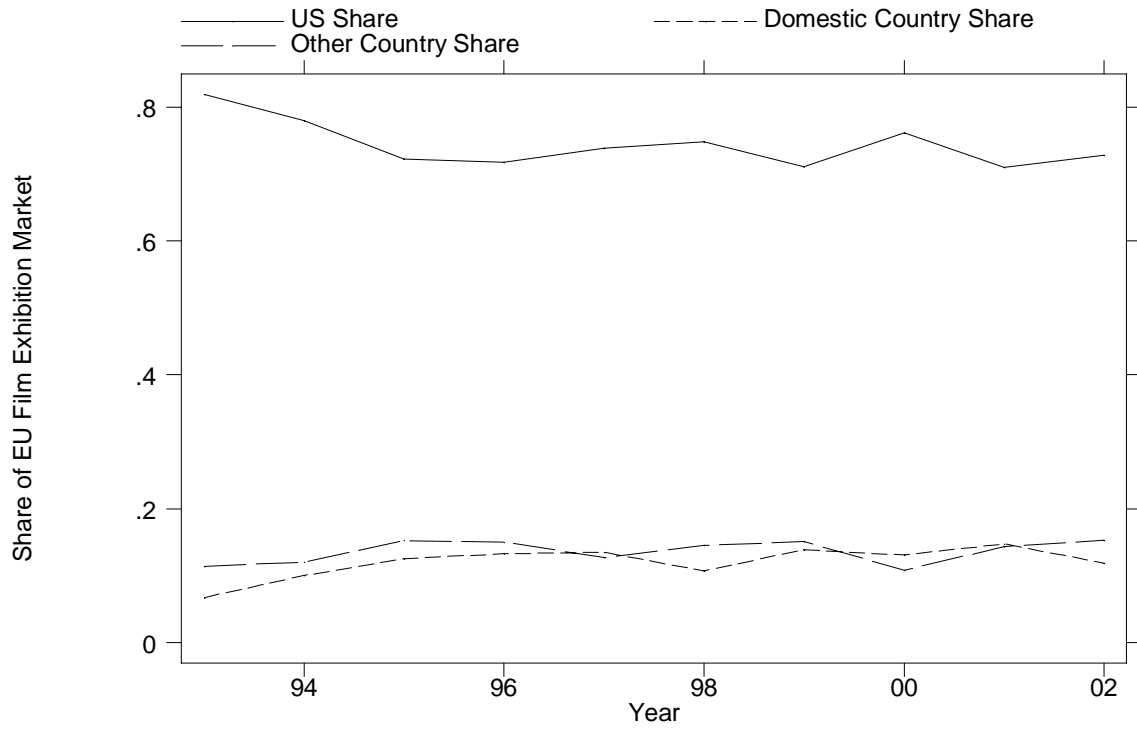
Figure 5: Number of Films Released in Europe

_____ US Films   _ _ _ _ Domestic Films
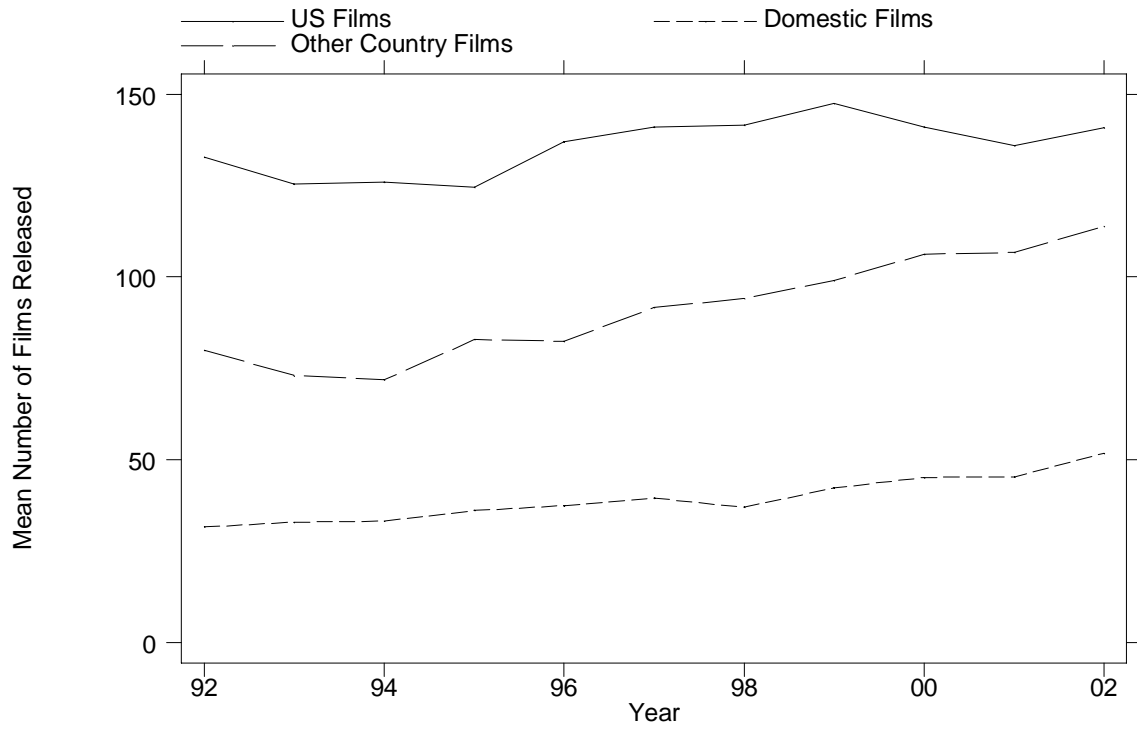
_ _ _ _ Other Country Films

Mean Number of Films Released

Year

Figure 6: Revenues of U.S. and Domestic Films in Europe, 1995-2002

Country	Revenue of US Films/Revenue of Domestic Films
Austria	~15
Belgium	~52
Czech Republic	~5
Denmark	~4
Finland	~11
France	~2
Germany	~8
Greece	~16
Hungary	~46
Ireland	~51
Italy	~3
Netherlands	~20
Norway	~9
Poland	~7
Portugal	~28
Spain	~7
Sweden	~4
Switzerland	~39
United Kingdom	~10