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# Foreign direct investment and intellectual property rights: evidence from Hollywood's global distribution of movies and videos

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## Abstract

Traditional thinking about intellectual property rights (IPR) suggests that as a country strengthens its IPR standards, firms will move their governance structures away from equity based institutions such as foreign direct investment (FDI) towards more market-based relations such as licensing agreements. This hypothesis is explored by examining the behavior of Hollywood studios in both the feature film and video markets in 40 foreign countries. The analysis reveals that the behavior of Hollywood studios is more complex than this: although moderate IPRs are associated with a high degree of licensing, both high and low standards of IPR encourage more integrated governance structures.

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## 1. Introduction

The protection of intellectual property rights (IPR) has emerged as one of the most important considerations of contemporary international economic diplomacy. As firms have become increasingly dependent on copyrights, trademarks and patents to protect control of their goods and services in world markets, diplomatic efforts have sought to strengthen the protections available through a range of initiatives. The implications of

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these initiatives are a fundamental concern of many countries, especially those required to adopt a set of IPR standards that are higher than they would unilaterally desire.

Central among these concerns is the impact of IPR reform on foreign direct investment (FDI). Sorting out this issue is subtler than one might first imagine, as FDI is only one option that a firm has for serving a foreign market. Depending on the technological characteristics of the product, a firm may have the option of serving an overseas market through exports, FDI or some form of licensing agreement. Therefore, the question of the relationship between FDI and IPR is fundamentally a question about how a multinational firm organizes its governance structure. Theoretical analyses of the various options have examined a rich set of circumstances chiefly from the perspective of contract theory.<sup>1</sup> This literature predicts that the relationship between governance structure and IPR is determined by a number of competing forces. While no general model exists that encapsulates all the forces, it appears that some broad conclusions can be drawn. In particular, models that generate a negative association between FDI and IPR emphasize contract enforcement concerns, with this mechanism likely to be most pronounced when the initial level of IPR is low (Ethier and Markusen, 1996; Markusen, 1995).<sup>2</sup> In contrast, models that focus on difficulty of contract design suggest that the incentive to conduct FDI is positively related to IPR (Chung, 1999). Ultimately, the relative contribution of the factors is an empirical question.

To date, empirical work has found evidence that, at an aggregate level, the flow of royalties from licensing is more responsive to IPR than FDI flows, with both increasing in the standard of IPR (Smith, 2001).<sup>3</sup> This has been interpreted as support for the hypothesis that as IPRs are increased, licensing is likely to be preferred to FDI. However, the degree of conflict between theoretical models and empirical findings is difficult to judge given that theoretical models operate at firm level while empirical evidence is based on country level data.<sup>4</sup> Furthermore, the theoretical models are concerned with the choice of mode of service rather than size of investment.<sup>5</sup> Hence, it is difficult for an analysis based on aggregate flows of royalties and foreign investment to compare the relative impact of IPR on these options of governance structure.<sup>6</sup> Another difficulty is that the use of country level data obscures the degree to which different sectors are sensitive to IPR, a prominent stylized fact (Mansfield, 1994).

This paper addresses these issues directly by matching the unit of analysis of the data to the unit of analysis of the theory.<sup>7</sup> In particular, the paper examines the governance

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<sup>1</sup> An early contribution that examines the implications of internalization decision is by Ethier (1986). For an overview of the literature see Markusen (1995), Caves (1996) and Maskus (2000).

<sup>2</sup> Also see Markusen (2001).

<sup>3</sup> Lee and Mansfield (1996) also found that the volume of FDI flows is positively correlated with the strength of IPR.

<sup>4</sup> The benefits of using disaggregated data to analyze location decision of multinationals are clear from Blonigen (2001).

<sup>5</sup> For an analysis of FDI that treats both the theory and the empirics at an aggregate level see Carr et al. (2001).

<sup>6</sup> See comments contained in Yang and Maskus (2001).

<sup>7</sup> Smarzynska (in press) also explores the relationship between IPR and FDI using firm level data. However, her focus is on FDI in Eastern Europe and her dataset does not have information on alternative modes of market service such as licensing or exports.

structures of major Hollywood studios in 40 foreign markets. The data describe the governance structures in both the distribution of feature films and their subsequent distribution on video. One advantage of analyzing the behavior of major Hollywood studios is that it highlights one aspect of the theory. Due to the technological characteristics of its output, the chief issue facing Hollywood studios is the internalization question (FDI or license) rather than the location question (export or produce abroad). So, the main decision that a studio has to make is whether its presence in a foreign market is most profitable in the guise of an affiliate or an agent. Focusing on this one aspect makes the empirical analysis much clearer and delineates the impact of IPR on internalization from its impact on the location decision.<sup>8</sup>

Given the high upfront costs and the relatively low cost of duplication, the success of Hollywood relies not only on the ability to protect its intellectual property both within the US but also in foreign markets. Indeed, foreign markets now account for a greater share of revenue than the domestic US market, a situation that has contributed to the audio-visual sector being ranked as the second largest exporter for the US.<sup>9</sup> The global success that Hollywood has enjoyed also means it is often cast in the role of villain in debates over IPR standards; a dominant player seeking to further drive home its advantage by requesting that countries raise their standards of protection. This tension mirrors the pattern of IPR negotiations in general, and so provides a valuable and accessible template for exploring the implications of IPR reform more broadly.

The variation in standards of IPR around the world offers one potential way of studying the association between IPR and governance structure. Based on this variation, the empirical analysis confirms the non-monotonic relationship suggested by the theory. In particular, increasing IPR from a relatively low base tends to increase the attractiveness of licensing relative to FDI. However, beyond a point, further increases in IPR are associated with an increase in the likelihood of FDI. In addition to being consistent with the theory, empirical results suggest that IPR can have a pronounced impact on the governance structure of a multinational firm. Reforms that see IPR increased from a low level to a medium level are likely to result in 18–40% of the relationships converted from FDI to licensing agreements. Similarly, reforms that raise IPR from medium levels to high levels are predicted to change 20–60% of the relationships from licensing agreements to FDI. These results are large and suggest that IPR reform may have profound effects on the international organization of firms and the resources they control.

Finally, an important general point emerges from a comparative analysis of the feature film and video markets. While these markets are characterized by a similar general behavior, analysis reveals that there are in fact pronounced differences between these markets in how responsive studios are to changes in IPR. So even within industries the responsiveness of firm behavior to IPR is likely to be critically dependent on both the nature of the product and the degree of competition it encounters. These results augur

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<sup>8</sup> See Maskus and Penubarti (1995) and Smith (1999) for studies that examine the relationship between IPR and trade flows.

<sup>9</sup> This is a claim that is routinely made, see for instance the discussion of Peter Sutherland (Director General of the GATT at the time) in relation to the Uruguay Round negotiations (Sutherland, 1993). For an attempt to establish the validity of the claim see Acheson and Maule (1999).

against any simple prediction about the implications of IPR reform for FDI, instead suggesting that the nature and magnitude of the impact of IPR reform will depend not only on the characteristics of the product but also on the initial standard of IPR.

In order to establish these results, this paper is structured as follows. Section 1.1 reviews the theory and formulates a number of hypotheses to be tested. Section 1.2 describes the data set and sets out the econometric methodology. Section 1.3 presents the results of empirical analysis.

### *1.1. Internalization and IPR: review of the theory*

To date, empirical work on the relationship between internalization decision and IPR has put emphasis on contractual enforcement (see [Smith, 2001](#); [Yang and Maskus, 2001](#); [Ferrantino, 1993](#)). The main conjecture examined in these studies is that stronger IPR leads to enhanced ability to write and enforce contracts, thereby making licensing a relatively attractive option compared to internalization. Such a relationship is most clearly demonstrated by [Markusen \(1995\)](#), who examines an environment where there is no protection of intellectual property rights. In this environment, Markusen shows that when the mode of market service is restricted to either licensing or FDI and the pure knowledge capital component of technology is strong, then licensing cannot be part of an equilibrium. Therefore, low standards of IPR are likely to be associated with FDI being chosen as the governance structure.<sup>10</sup>

In contrast, [Chung \(1999\)](#) constructs a framework that generates a different prediction; FDI is more likely the higher the standards of IPR. However, a key difference is that he examines an environment where property rights are sufficiently secure that they can be assigned between parties. The setting is one of relationship specific investments and incomplete contracts. Following the logic of [Grossman and Hart \(1986\)](#), residual rights should be allocated to the party undertaking the investment that contributes most to the value of the relationship. However, the identity of this party depends critically on IPR. If IPR is weak, then modifications by the source country firm to the product that makes it more appropriate for the local market have little value since these are easily duplicated by competitors (“pirates”). In this case, the relationship specific investment of the local firm is the most important value of the relationship. To provide the local firm with the greatest incentive to undertake these relationship specific investments, the residual rights should be assigned to them. Hence, weak IPRs are associated with licensing agreements. As the standards of IPR are increased, the value of market specific modifications undertaken by the source firm becomes more valuable, and hence the optimal assignment of residual rights moves from the host country firm to source country firm.

While the predictions of [Markusen \(1995\)](#) and [Chung \(1999\)](#) differ, they are not necessarily in conflict. The analysis of [Markusen \(1995\)](#) assumes that there are no IPRs; therefore, the mechanism that he emphasizes is most likely to operate for countries with low IPR. In contrast, [Chung \(1999\)](#) assumes that while IPR can be transferred within a

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<sup>10</sup> For example, a Hollywood studio may be averse to entering a licensing agreement with a local distributor since they are concerned about the local distributor pirating the film through duplication or unauthorized public exhibitions. In this situation, serving the market through an affiliate may be the only viable option.

contractual relationship, the value of the rights is diminished by the actions of some third party. Broadly, this leads to the conjecture that the factors enunciated by [Markusen \(1995\)](#) are most prominent when IPRs are low and the considerations detailed by [Chung \(1999\)](#) are likely to be most prominent at high levels of IPR. At intermediate levels of IPR, both sets of forces are likely to operate. This suggests that the relationship between IPR and FDI is likely to be non-linear and potentially U shaped.

Two additional predictions can be taken from the data, both generated by the model of [Horstmann and Markusen \(1987\)](#), who also consider the choice between entering a foreign market through either licensing or FDI. The first is that FDI is more likely to be chosen as entry mode the larger the market size. The second is that the greater the substitutability between the product of the multinational and the local version of the product, the more likely is licensing to be chosen as the mode of market entry. These predictions suggest that controlling for market size and other country characteristics will be important in the empirical analysis.

The predictions of the theory reviewed in this section can be summarized as follows:

- (i) possible U-shaped relationship between the probability of FDI and IPR
- (ii) the probability of FDI is increasing in market size
- (iii) the probability of FDI is decreasing in the degree substitution between the product of the multinational and the local version of the product/pirated version.

### *1.2. Econometric specification and data*

Broadly, the movie industry can be broken down into three activities; production, distribution and exhibition. The focus of this study is on the most profitable component of the movie industry, distribution. While independent producers are responsible for the production of more films than major Hollywood studios, the “majors” are the only organizations that have a global network for the distribution of a movie. How the structure of this network is affected by IPR is the central focus of this paper.

The distributor of a movie is responsible for all aspects of promotion and marketing of a film. This can range from a simple poster/trailer campaign to a complex cross-promotional extravaganza that includes spin-off products; clothing, games, food and a TV series. In a foreign market, aside from devising an appropriate promotional campaign, additional considerations such as the dubbing, subtitling or editing the film for content also come into play. The effort that goes into promoting a movie is substantial, with the promotional budget typically being 50% of the production budget ([Miller et al., 2001](#)). The international success of Hollywood is apparent in the size of its revenues, which were estimated to be US\$15 billion<sup>11</sup> in 2002 ([Groves, 2003](#)). Of this revenue, the theatrical box office is responsible for roughly a quarter, and videos account for another 25%, with the remaining 50% from television. The critical role of the distributor in generating these revenues underscores the importance of the decision regarding governance structure.

To determine the factors that influence this decision, the empirical analysis is based on the governance structure of the operation of major Hollywood studios in 40 foreign

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<sup>11</sup> This figure excludes US revenues.

markets in 1997. Table 1 provides a list of the countries examined. Country coverage is limited primarily by data availability, with this data drawn from *Screen Digest* (1998). The only obvious regional omission is Africa, whose countries are under-represented in the dataset. For purposes of this study, the major Hollywood studios are: Disney, Sony, 20th Century Fox, Warner Brothers, Polygram and UIP. Of this list, only UIP would be

Table 1  
Share of major Hollywood studios serving a country through FDI in 1997

IPR	Country	Feature film	Video
4.57	Austria	0.83	0.33
4.38	Netherlands	1.00	1.00
4.24	Sweden	0.83	0.67
4.20	Korea	0.83	0.83
4.19	Finland	0.50	0.17
4.19	Italy	0.83	1.00
4.05	Denmark	0.83	0.50
4.05	France	1.00	0.67
4.05	Spain	0.83	1.00
3.94	Japan	0.83	0.83
3.91	Switzerland	1.00	0.50
3.90	Belgium	1.00	1.00
3.90	Norway	0.50	0.67
3.90	Singapore	0.83	0.33
3.86	Australia	1.00	1.00
3.86	Germany	1.00	1.00
3.86	New Zealand	0.50	0.50
3.57	Canada	0.83	1.00
3.57	South Africa	0.17	0.17
3.57	United Kingdom	0.83	1.00
3.37	Hungary	0.17	0.17
3.32	Ireland	0.83	0.50
3.19	Argentina	0.83	0.17
3.19	Czech Republic	0.17	0.33
3.19	Slovak Republic	0.17	0.33
3.07	Chile	0.50	0.67
3.05	Brazil	0.83	0.17
3.04	Russia	0.00	0.33
2.98	Portugal	0.33	0.50
2.90	Poland	0.17	0.33
2.90	Venezuela	0.00	0.17
2.86	Mexico	0.67	0.67
2.85	Malaysia	0.83	0.17
2.67	Philippines	0.50	0.17
2.65	Greece	0.50	0.33
2.57	Colombia	0.50	0.17
2.57	Hong Kong	0.67	0.33
2.24	Thailand	0.83	0.17
1.51	India	0.67	0.17
1.24	Indonesia	0.33	0.50
3.34	Average	0.64	0.51
0.74	Standard deviation	0.30	0.31

unfamiliar. UIP is an international distribution company that is equally owned by the other three major Hollywood studios, Paramount, MGM/UA and Universal. The unit of analysis is a studio's mode of market service in a country. Finally, the data record the governance structure in two market segments, feature film distribution and video distribution. The data are coded as follows:

$$y = 1 \quad \text{if foreign affiliate}$$

$$y = 0 \quad \text{if licensing agreement.}$$

While the value of feature film and video markets is approximately equal, the governance structures adopted are generally different. Both require separate investments and a different set of skills. Film distribution involves negotiations with exhibitors over when and how long a film will be screened. These negotiations are complicated by the uncertainty surrounding the success of a film. Hence, a distributor and an exhibitor are in constant communication regarding box office receipts and the potential run of a film. Video distribution has two elements, a wholesale sector and a rental sector. Distribution in this setting concerns issues such as shelf space and other promotional activities. In addition, a wider selection of material is released on video than is released theatrically. The distinction between these two activities means that they require separate investment of resources. Consequently, even though a studio may serve a foreign market through an affiliate in relation to feature films, this does not imply that the studio will also serve the video market through an affiliate. Table 1 gives an indication of the differences between these two markets and provides an initial indication of the consistency of the data with the theory. In particular, hypothesis (iii) predicts that internalization is decreasing in the degree of substitution between the product of the multinational and the local version. Interpreting the local version of the product as pirated versions of a Hollywood movie (which are typically in the form of a video) suggests that licensing should be more prevalent in the video segment of the market. This hypothesis is consistent with information presented in Table 1.<sup>12</sup>

Table 2 provides a more disaggregated look at the two markets, with a studio choosing the same governance structure for the distribution of films and videos two thirds of the time.<sup>13</sup> Furthermore, Table 3 reports that the correlation between film FDI and video FDI is 0.28. While the distributions of films and videos are distinct activities, the information in

<sup>12</sup> Formally, the null that there is a higher proportion of FDI undertaken in the video market than the film market can be rejected at the 1% level of significance.

<sup>13</sup> Another issue is whether decisions about governance structure are made on a film/country basis or a studio/country basis. While the dataset does not contain this level of detail, some idea can be gained from the information published in *Variety*. This trade magazine publishes the top 10 films along with the local distributors for a number of countries (in 1997, I located information for Australia, Hong Kong, India, Japan, Malaysia, Singapore, Belgium, Czech Republic, France, Germany, Italy, Netherlands, Brazil, Sweden). This information revealed that many of the same films that were successful in the US were also successful in internationally, although there were a number of exceptions (e.g. even though *Speed 2* was a flop in the US, it was the 5th highest grossing film in Japan in 1997). Of the 140 films that made the top 10 for these countries, 104 were Hollywood movies. All of these 104 movies were distributed according to data on mode of market service that was used in the paper. This suggests that distribution decisions are made at the studio/country level.

Table 2  
Governance structure contingency table

		Video		Total
		FDI	Licensing	
Film	FDI	95	58	153
	Licensing	28	59	87
	Total	123	117	240

both of these tables suggests that the two markets are likely to have common factors determining the optimal form of governance structure. While some of these factors are observed, some will also be unobserved. To account for the potential correlation between disturbances of the feature film model and the video model, a bivariate probit structure is assumed:<sup>14</sup>

$$y_f^* = \beta'x + \epsilon_f, \quad y_f = 1 \text{ if } y_f^* > 0, 0 \text{ otherwise,}$$

$$y_v^* = \beta'x + \epsilon_v, \quad y_v = 1 \text{ if } y_v^* > 0, 0 \text{ otherwise,}$$

$$E[\epsilon_f] = E[\epsilon_v] = 0,$$

$$\text{Var}[\epsilon_f] = \text{Var}[\epsilon_v] = 1,$$

$$\text{Cov}[\epsilon_f, \epsilon_v] = \rho.$$

To examine the theoretical predictions, data on the standards of IPR and market size are employed, along with a number of other control variables. The measure of IPR is described by [Ginarte and Park \(1997\)](#) and has been extended to 1995.<sup>15,16</sup> In relation to IPR, the predictions can be broken down into two hypotheses. The first relates to access to institutions that define intellectual property rights, with more secure institutions associated with a greater willingness to conduct commerce through contracts and licenses. The second prediction is that despite access to secure property rights, the need to provide incentives to undertake relationship specific investments calls for residual rights to be allocated to the source firm when IPRs are high.

<sup>14</sup> See [Greene \(2000\)](#) for a discussion of the bivariate probit model.

<sup>15</sup> I would like to thank Walter Park for making this unpublished series available.

<sup>16</sup> Unfortunately, there is not an index of copyright strength like the one that [Ginarte and Park](#) have constructed for patent protection. However, if there were such an index, it would share many of the same components, most notably enforcement measures and provisions for loss of protection (also, memberships of international agreements that relate to patents are likely to be highly correlated with membership of international agreements covering copyright). These aspects of protection cover three of the five components of the [Ginarte and Park](#) index, which suggests that patent and copyright protections are highly correlated. This claim is given some support through the high correlation of video piracy rates and the [Ginarte and Park](#) index. Using piracy rates reported by the International Intellectual Property Alliance for 1997, the correlation with the [Ginarte and Park](#) index is  $-0.76$ . This is consistent with the notion that patent and copyright protections are highly correlated.

Table 3  
Summary measures

	Mean	Standard deviation	Min	Max
GDP per capita	16,308	8,156	2,247	28,433
Population (mil)	65	156	3.7	997
Growth	2.6	3.2	−7.2	10.7
Domestic production	64	128	2	787

  

Correlation matrix						
	Film FDI	Video FDI	IPR	GDP p. c.	Population	Growth
Video FDI	0.29	1.00				
IPR	0.27	0.32	1.00			
GDP per capita	0.32	0.36	0.64	1.00		
Population	0.01	0.01	−0.47	−0.62	1.00	
Growth	0.19	0.11	0.14	0.20	−0.08	1.00
Domestic production	0.21	0.15	−0.03	0.01	0.54	0.27

A simple way to formulate a test of these predictions is to include a quadratic term in the model. Since the motive to increase licensing due to enhanced access to institutions is likely to be most pronounced when IPR is low, the linear component should be negative. In contrast, the need to undertake FDI to provide correct incentives in the face of relationship specific investments when IPRs are high suggests that the coefficient on the quadratic term should be positive. These two predictions form the basis of the hypotheses to be tested in both the feature film and video distribution markets.

The final prediction examined is that internalization is increasing in market size. In this study, market size is described by both population and GDP per capita, which are taken from the World Development Indicators for 1997. Table 3 provides an overview of these measures along with a number of other control variables.

While the above variables capture motivations that are clearly represented in theoretical work, a number of control variables are included (with a full list of variables and sources contained in Appendix A). The first set of control variables reflects differences in tastes that are likely to influence the profitability of Hollywood movies and videos. In particular, if a country is an English-speaking country, then Hollywood productions are likely to be more culturally accessible in these countries. In addition, the target demographic of Hollywood is typically a young audience, so demographic considerations are also likely to affect the way that a studio perceives the attractiveness of a market. The degree of competition that Hollywood faces in a country from domestic productions is also likely to be an important factor conditioning a studio's approach to a particular market. In a broad sense, all of these control variables reflect considerations of market size emphasized by Horstmann and Markusen (1987). However, they also reflect other considerations as well. For example, the number of domestic productions is also likely to reflect the degree of government support that exists within a country for cultural products. This suggests that these variables should only be interpreted as control variables rather than having a specific theoretical interpretation. In light of this, the robustness of the results will be examined by sequentially omitting these control variables.

Table 4

Bivariate probit model of Hollywood's FDI decision in foreign markets (standard errors are adjusted for clustering by country)

Variable	Film	Video
IPR	-2.65*** (1.09)	-3.28** (1.54)
IPR <sup>a</sup>	0.40*** (0.167)	0.42** (0.25)
ln(GDP per capita)	2.77*** (0.55)	2.99*** (0.69)
ln(Population)	0.50*** (0.21)	1.20*** (0.24)
Growth rate	0.10** (0.05)	0.07* (0.05)
Share of population < 14	8.61** (4.00)	-9.45** (4.87)
English-speaking country	-0.38 (0.35)	0.52 (0.32)
Domestic film production	0.07 (0.16)	-0.68*** (0.17)
ln(distance)	0.55** (0.26)	-0.17 (0.67)
Studio dummies <sup>b</sup>		
Disney	-0.78** (0.40)	-0.58** (0.29)
UIP <sup>a</sup>	0.36 (0.39)	11.21*** (0.97)
Polygram	-2.38*** (0.46)	-0.66* (0.39)
Sony	-0.20 (0.31)	-0.82*** (0.31)
20th Century Fox	-0.31 (0.35)	-1.24*** (0.31)
Region dummies <sup>c</sup>		
Asia	1.21 (0.48)	0.75 (1.09)
Americas	0.40*** (0.49)	0.14 (0.49)
Constant	-29.9** (6.29)	-20.8** (8.98)
$\rho$	0.0015	
<i>N</i>	240	240

<sup>a</sup> UIP is a joint venture in foreign markets equally owned by Paramount, MGM/UA and Universal.

<sup>b</sup> Warner Brothers is the excluded studio.

<sup>c</sup> Europe is the excluded region.

\* Statistically significant at the 10% level.

\*\* Statistically significant at the 5% level.

\*\*\* Statistically significant at the 1% level.

### 1.3. Empirical results

Table 4 contains the maximum likelihood estimates of the bivariate probit model, where the standard errors have been corrected for correlation between observations with the same destination country. It should be kept in mind that the estimates from the bivariate probit model generally do not carry the same interpretation as the standard probit model since a joint likelihood function is maximized. However, since the estimate of  $\rho$  is close to zero, the parameters have an interpretation that is very similar to single-equation estimates.<sup>17</sup>

The hypothesis that internalization is increasing in the size of the market when measured in terms of either population or GDP per capita finds support in the data for both markets. Not only do the estimated coefficients have the correct signs, but they are

<sup>17</sup> Note that such an estimate of  $\rho$  need not imply that the FDI decisions relating to the distribution of films and videos are independent. In fact, the correlation between FDI in films and FDI in videos is 0.28 (see Table 3). It says that the omitted variables that are likely to influence these decisions are uncorrelated.

also significant at the 1% level. This evidence strongly supports the prediction of the Horstmann–Markusen model with respect to market size.

The more nuanced prediction about the association between internalization and IPR is also consistent with the data. In particular, the null hypothesis that the linear component is positive can be rejected at the 1% level of significance for the feature film market and the 5% level for the video market. Similarly, the null hypothesis that the coefficient on the quadratic term is negative can be rejected at the 1% level of significance for the film market and 5% for the video market. These results offer strong support for the operation of the types of mechanisms that have been emphasized in the theoretical literature. Furthermore, the combination of predictions from various models and how they are likely to operate at different levels of IPR represents a set of hypotheses that heretofore have not been explored. The strength of these empirical findings suggests that the development of a more general theoretical model of the relationship between internalization and IPR would be very useful and may lead to additional insights.

Given the presence of non-monotonicity in the data, it is of interest to assess the relative importance of linear and quadratic components. Since the measure of IPR ranges from 0 to 5, a natural question to ask is whether the minimum occurs within this range. Solving for the minimum reveals that it occurs at an IPR level of approximately 3.3 in the film market and 3.9 in the video market. This ordering seems intuitive since issues of piracy are likely to be more pronounced in the video market and therefore make this market more reliant on IPR. It also suggests that even in markets as closely related as feature film and video, small technological differences (such as vulnerability to piracy) can translate into differences in responsiveness to IPR reform. Moreover, since both of these are interior solutions, this suggests that IPR reform can potentially have differential impacts depending on the previous policies of a country.

Of the remaining variables that have been included as controls, a number stand out as particularly interesting. Prominent in this group is the impact of domestic production in each country on the internalization decision. The most intriguing feature of this control is that it is revealed to have the opposite impact in the two markets: in the feature film market, it is associated with a positive coefficient, while in the video market, it is negative. However, the coefficient is only significantly different from zero for the video market. One possible explanation of these relationships is that many domestic productions get only a limited theatrical release, with the video market being the primary outlet for these productions.

Another control variable that displays an interesting sign pattern is associated with the share of the population under 14. In the feature film market, the coefficient on this variable is positive and significant at the 5% level. In contrast, the coefficient on the share of population under 14 is negative and significant at the 5% level for the video market. One possible explanation is that teenagers behave differently in each segment of the market. A large teenage audience may be good news for the feature film market, since the range of entertainment options outside of the home for teenagers is limited. Therefore, more teenagers translate into a larger market for feature films. However, the same logic is unlikely to hold in the video market. The image of a cash strapped but tech savvy teenager making pirated copies of videos to distribute among friends is a familiar one. The end result is that a large fraction of the population under 14 may not translate into a large

market for videos. While intuitive, these stories do not rule out other possible explanations of these interesting results.

Of the remaining control variables, economic growth, distance, the identity of your neighbors and the identity of the studio all play statistically significant roles in the internalization decision in the feature film market. The video market also displays similar behavior with the exception that distance and region are not statistically significant factors.

### 1.3.1. Sensitivity analysis

While the role of IPR and market size is clear from theoretical models, a number of the other control variables are included on a more ad hoc basis. While the motivation for the inclusion of each variable is outlined above, the nature of these relationships is nevertheless relatively speculative. Consequently, it is important to examine key results in relation to the omission of these variables in the estimated equation. These sensitivity results are contained in Table 5. The left column lists the variables that have either been excluded or included to examine the robustness of the relationship between IPR and FDI. The first five rows omit, in turn, the regional dummies, the language dummy, share of population less than 14 years old, distance and domestic film production. As is evident from parameter estimates on IPR and IPR<sup>2</sup>, results show little sensitivity to the omission of these more extraneous variables.

While a number of control variables have been included, it is still possible that the coefficients on the IPR terms are correlated with some omitted variable, generating a

Table 5  
Sensitivity analysis

	Film		Video	
	Coefficient on IPR	Coefficient on IPR <sup>2</sup>	Coefficient on IPR	Coefficient on IPR <sup>2</sup>
<i>Omitted variables</i>				
Regional dummies	-2.44**	0.34**	-2.71*	0.33*
English language country	-2.84***	0.42***	-2.86**	0.35*
Share of population < 14	-2.46**	0.40**	-1.89**	0.32*
Distance	-2.38**	0.37**	-3.36**	0.42*
Domestic production	-2.55**	0.38**	-2.65*	0.41*
<i>Additional variables</i>				
% High School	-2.78***	0.45***	-3.37**	0.43*
Corruption	-2.72**	0.41**	-2.98*	0.33*
New index derived by interacting IPR and corruption (0–5 scale)	-2.87***	0.44***	-2.81*	0.37*
<i>Interdependence of FDI</i>				
Film FDI dependent on video FDI	-2.57***	0.39***		
Video FDI dependent on film FDI			-3.38**	0.43**

\* Statistically significant at the 10% level.

\*\* Statistically significant at the 5% level.

\*\*\* Statistically significant at the 1% level.

spurious result. One possibility is that a lack of skills in a country may make licensing infeasible. To capture this possibility, a measure of human capital (the fraction of the population that has completed high school) is included in the model. While the coefficient on human capital is negative and significant in both equations, the results are similar to the baseline model, and are reported in the sixth row of [Table 5](#).

Another issue that has the potential to undermine results is the index used to measure intellectual property rights. This measure is composed of laws on the books rather than how effectively these laws are implemented. Hence, it is important to determine if the results are sensitive to the inclusion of a measure of rule of law/corruption. A number of such measures are available, and [Table 5](#) reports results for the corruption perceptions index (CPI).<sup>18</sup> This measure of corruption is a joint initiative of Transparency International and Göttingen University and is updated once a year, with the objective of summarizing all survey information generated by the most reliable sources.<sup>19</sup> The sensitivity of the parameter estimates is examined by entering this measure of corruption both as a separate variable<sup>20</sup> and by interacting it with the IPR measure. Both exercises produce results that are similar to the baseline model.

A final possibility is that results may be spurious since they neglect any direct relationship between how a country is serviced in each segment of the market. For example, the decision to setup an affiliate to handle film distribution may increase the likelihood that an affiliate is also setup to handle video distribution. The ninth and tenth rows of [Table 5](#) capture both this possibility and the converse case. In both exercises, the inclusion of the form of governance structure in the other market segment was insignificant.<sup>21</sup> Once again, the results are similar to the baseline case. The results of these sensitivity exercises (both excluding and including a range of variables) suggest that the non-monotonic relationship between IPR and internationalization is a robust finding for these markets.

### 1.3.2. Model fit

While the role of individual factors in the two markets is interesting to analyze, it is important to assess how well the model fits the data. One measure is a comparison of the actual proportion of FDI arrangements to the predicted proportion.<sup>22</sup> For the film market, FDI is actually chosen 64% of the time, while the model predicts that it would be chosen

<sup>18</sup> <http://www.gwdg.de/~uwvw/rank-97.htm>.

<sup>19</sup> The index is a “poll of polls”. It has been prepared using seven sources, including two surveys from the Institute for Management Development in Lausanne, Switzerland (World Competitiveness Yearbook); one from the Political and Economic Risk Consultancy in Hong Kong (Asian Intelligence Issue #482); one by Gallup International (50th Anniversary Survey); two assessments by DRI/McGraw-Hill (Global Risk Service) and the Political Risk Services, East Syracuse, New York (International Country Risk Guide); plus finally a survey conducted at Göttingen University.

<sup>20</sup> When the CPI index enters as an independent variable, it is not significant in either the feature film or video equations.

<sup>21</sup> One concern might be that these results are due to the endogenous nature of governance structure. However, following the procedure described by [Wooldridge \(2002\)](#), the hypothesis that the FDI outcome in the other sector is exogenous cannot be rejected.

<sup>22</sup> The 0.5 convention is followed for determining which outcome is predicted. Therefore, if the predicted probability for an observation is greater than 0.5, the predicted outcome is recorded as FDI.

66% of the time. In case of the video market, FDI is actually chosen 51% of the time, while it is predicted 46% of the time. The model seems to fit the data extremely well, with the difference between the actual and predicted proportions being less than 5 percentage points in either market.

While the aggregate proportions are interesting, it may still be the case that they mask a substantial number of individual errors. To gain more insight into how the model performs on an observation-by-observation basis, we can examine the percentage of the predictions that are correct. One comparison to keep in mind when reviewing the evidence is to ask how well a naive model that only contains a constant would perform. Such a model would always predict FDI in both markets. The naive model is correct 64% of the time in the feature film market and 51% of the time in the video market. Keeping these benchmarks in mind, FDI is correctly predicted 89% of the time in the feature film market, while FDI is correctly predicted 79% of the time in the video market. Even with a lower bound of 64% and 51%, respectively, these numbers suggest a high degree of accuracy. The impressive fit of the model really stands out in the predictions for licensing. The naive model has a 0% success rate for these activities. By comparison, the model employed correctly predicts licensing in the feature film market 74% of the time, while licensing in the video market is correctly predicted 89% of the time. These results suggest that the model fits the data with a high degree of accuracy.

### *1.3.3. Implications of IPR reform*

Given the good fit of the model, it is worth exploring counterfactual experiments to gain some insight into the impact of IPR reform on the governance structure of multinationals. These counterfactual experiments also help identify the marginal effects of IPR on the likelihood of internalization. Two types of experiments will be considered. The first adopts the structure of a classical treatment effect and asks the question: What would be the impact on a multinational's governance structure if all countries had the same standards and all countries increased their standards from X to Y. The potential standards considered in these counterfactual experiments are: low standards (IPR = 1.5, e.g. India, Indonesia, Thailand), medium standards (IPR = 3, e.g. Argentina, Ireland, Hungary) and high standards (IPR = 4.5, e.g. Austria, Netherlands, Sweden).

The results for the classical treatment effects suggest that the standards of IPR can have a substantial impact on the internalization decisions of multinationals. For reforms that raise standards from low to medium, of the studios that chose FDI under low IPR, 18% changes to licensing under a medium IPR regime in the feature film market. In this setting, the predicted change is even more pronounced in the video market, with 39% of the studios that chose FDI under a low IPR regime changing to licensing under a medium IPR regime. In contrast, for reforms that raise standards from medium to high, of the studios that chose licensing under medium IPR, 20% changes to FDI under a high IPR regime in the video market. Similarly, of the studios that chose licensing under medium IPR, 61% changes to FDI under a high IPR regime in the film market. These impacts are substantial, and suggest that the marginal impact of IPR on the internalization decision can be very large.

While classical treatment effects give some insight into the marginal effects of IPR on internalization, as a measure of the real world impact of reform they suffer from an

obvious deficiency—namely the assumption that all countries adopt either low standards together, medium standards together or high standards together. Therefore, using classical treatment effects to gain a sense of the likely impact of reform embodied in say the WTO's TRIPs agreement will result in an exaggerated picture of the likely outcome. In contrast, a more appropriate counterfactual experiment would involve status quo treatment effects. In this counterfactual setting, a country is only assumed to adopt a reform if it requires a standard higher than their current standard. Consequently, countries will be required to undertake different degrees of reform.

The status quo treatment effects were computed for the adoption of high IPR standards. As would be expected, the impact of IPR reform is smaller than predicted under the classical treatment assumptions. Nevertheless, the impacts can be substantial. Of the relationships affected by reform, over 11% of the governance structures is changed in the video market. In contrast, in the feature film market, of the relationships affected by reform, over 21% of the governance structures is changed. This suggests that not only can IPR reforms potentially have a large effect on the governance structure of multinationals, but also that the nature of the product is likely to be of critical importance in determining the size of this effect.

## **2. Conclusion**

A central issue in recent debates over IPR reform is the potential impact on foreign direct investment. Previous empirical studies have put emphasis on a potentially negative relationship between IPR and FDI, a relationship that has been attributed to firms preferring to use market-based licensing agreements if intellectual property rights are sufficiently secure. However, these studies have relied on aggregate data, a limitation that makes it difficult to draw inferences about firm level behavior. Unlike the previous literature, this study uses firm level data, which enable a more exact match between theory and data. This match is particularly critical in this setting. While theory does provide some guidance in thinking about the implications of IPR reform for the optimal choice of mode for foreign market service, ambiguities do arise. Given the nature of these ambiguities, the relationship between IPR and FDI is likely to vary with the characteristics of the industry. Therefore, aggregating over industries is likely to obscure much of the subtle detail, confounding efforts to interpret the results. By studying firm behavior in a particular industry, this paper is uniquely placed to shed light on the subtleties of the relationship between IPR and FDI.

In relation to these subtleties, the behavior of major Hollywood studios is particularly interesting. Not only is Hollywood one of the major export earners for the United States, but is also critically dependent on the protection of intellectual property rights for its success. Analysis of this industry reveals that nuances suggested by theoretical models are present in the data. In particular, as suggested by theory, a non-monotonic relationship between IPR and FDI characterizes the behavior of Hollywood studios abroad: while Hollywood studios are likely to service a foreign market through an affiliate if the standards are either low or high, they are more likely to enter into a licensing agreement if a country offers a moderate degree of IPR protection. This pattern characterizes

Hollywood's behavior in both feature film distribution and video distribution markets. Further support is added to these results as a number of ancillary predictions of the theory relating to market size and the potential threat from pirates also find strong support in the data.

The robustness of these results allows an important general point to emerge from a comparative analysis of the feature film and video markets. Even though these markets are characterized by a similar general behavior, there are marked differences between these markets in how responsive studios are to changes in IPR. Thus, even within industries, the responsiveness of firm behavior to IPR is likely to be critically dependent on both the nature of the product and the degree of competition it encounters. These results argue against any simple prediction about the implications of IPR reform for FDI, suggesting instead that the nature and magnitude of the impact of IPR reform will depend not only on the characteristics of an industry but also on the initial standard of IPR.

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### **Appendix A. Data and sources**

Governance structure by studio in 1997

Source: [Screen Digest \(1998\)](#)

IPR: Ginarte and Park index for 1995

Source: Walter Park (unpublished)

GDP per capita

Source: World Development Indicators

Growth of GDP per capita

Source: World Development Indicators

Population shares

Source: derived from World Development Indicators

Domestic Film Production in 1997

Source: [Screen Digest \(1999\)](#)

Fraction of Population that has completed secondary education in 1995

Source: <http://post.economics.harvard.edu/faculty/barro/data.html>

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