The Interplay of Formal, Informal and Relational Contracts: Evidence from Movies.

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Abstract

This paper empirically examines the interplay of formal, informal and relational contracting in the context of the Spanish movie exhibition industry. To do so, I adapt the model of subjective pay performance in Baker, Gibbons and Murphy (1994) to a business to business framework tailored to the institutional detail of this industry, and derive testable implications regarding the use of formal contracts, ex-post renegotiation, movie run extension and learning. I test these implications to using a unique data set from a Spanish movie exhibitor that contains detailed information on the use of formal contracts and ex-post contractual adjustments. My findings show that distributors are more likely to use formal contracts for movies of higher expected value since these are the movies for which exhibitors face stronger reneging temptations. Conditional on using a formal contract, I find that ex-post renegotiation is more likely to occur when the movie demand realization lies below expectations, and that larger negative deviations from expectations result in larger renegotiation spreads. I also find that movies are more likely to have their run extended if demand realizations are above expectations and I provide evidence of learning that theaters use to optimally decide when to stop the movie run. Finally, I provide an upper bound estimate for the gains of using informal contracts such that it almost doubles the run length of movies and the box office revenues collected by a movie in a theater.

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1 Introduction

Despite the large literature on formal, complete and renegotiation-proof contracting, experience and anecdotal evidence indicates that in practive writing such type of contracts is not easy and most of the time lawyers and managers fail to do so when the scenario in place displays some degree of complexity. For this reason, economists have studied optimal contract design and developed a large literature on the optimal governance of transactions between two parties (either under employment relationship or between firms). Since it is well-known that most transactions are governed by informal agreements between parties (see early evidence from Macaulay (1963) and Asanuma (1989)) the study of the nature and sustainability of informal contracts has gained interest over the last two decades. Bull (1987) and Klein (1996), among others, have shown that informal agreements were sustainable as long as contractual parties were able to leverage the value of future interactions to address current incentive problems defining those types of agreements as relational contracts.

Following these papers, many others have extended this literature while explaining how formal and informal contracts interact with each other as well as how relational contracting shapes vertical integration decisions. In particular, Baker, Gibbons and Murphy (1994), (2002) and (2006) studied the use of informal agreements and relational contracts within and across firms, Joskow (1987) and (1988) studied the use of long-term contracts in the coal industry, and Kenney and Klein (2000) study the use of bundling in the movie industry as a way to enforce informal agreements. Despite these and others not mentioned here, there is still much to understand on how formal, informal and relational contracts interact with each other and govern business relationships in different industries since each industry is driven by different institutional factors. It is the goal of this paper to broaden our understanding of the interplay between formal, informal and relational contracts.

To do so, this paper empirically documents and examines the use of formal, informal and relational contracts in the Spanish movie exhibition industry. I argue that the ability of using informal agreements with movie distributors allows exhibitors to enhance efficiency and maximize profits and welfare by choosing optimally when to stop the run of a movie in a given theater even under the presence of contractual incompleteness. The empirical analysis here sheds light on how distributors and exhibitors, and firms in general, use their reputation and relational contracts in combination with simple contracts in complex business relationships.

Distributors and exhibitor in this scenario follow a contractual mechanism that resembles the mechanism in the ex-post settling up literature described by Goldberg (1977) or Joskow and MacAvoy (1975). Formal contracts are used as guidelines and the parties adjust contractual

terms ex-post when necessary. This differs from other adjustment mechanisms in the literature in that it is not driven by incentive compatibility constraints, but participation constraints as in Oyer (2004) and Oyer and Schaefer (2004). Therefore, this mechanism differs from the usual renegotiation studied in the literature where incentives are the main focus and raises the question of "what is the role of incentive contracts with no incentive effects" (see Oyer (2004)).

Using anecdotal evidence, this paper presents a set of stylized facts that I explain by adapting the model of subjective pay performance in Baker, Gibbons and Murphy (1994) to a business to business framework. Then I extend the benchmark model to allow for learning as a key factor for the use of the informal contracts and ex-post adjustments in this scenario. I derive testable implications from the model and take them to the data. This is the main contribution of this paper since, to the best of my knowledge, this is among the few studies that empirically examines the choice of governance (formal versus informal contracting) and ex-post contractual adjustment within a framework of contractual incompleteness that accounts for the likely future business interactions between firms.

For this purpose, I use a unique data set from a Spanish movie exhibitor. Distributors use revenue sharing contracts when they rent movies to exhibitors. In the data set, I observe whether firms use a formal contract and the initial and final revenue sharing term applied for each weekly transaction. Since the formal contracts specify a sharing term for every week that the movie stays on screen, the data set contains variation in renegotiation outcomes across movies, theaters and weeks. I exploit this variation to study the determinants of the use of formal contracting (as opposed ot informal contracting) and the causes of ex-post renegotiation in this industry. The data set contains information on contractual choice and contract renegotiation outcomes for 5,204 movie runs for 371 movies distributed by 21 different distributors and screened by a major Spanish exhibitor in its 16 theaters from January 2001 to June 2002. This constitutes an extensive data set of 18,592 weekly observations of which roughly 20% belong to informal contracts and roughly half of the observations under formal contracts are renegotiated. This rare and rich variation in contracting governance choice and ex-post renegotiation allows me to empirically examine the testable implications derived from the theoretical framework in the paper and shed light on the questions of why and how distributors use formal contracts and informal agreements when leaning on the value of future business.

My findings suggest that distributors are more likely to use formal contracts for movies of higher expected value since these are the movies for which exhibitors face stronger reneging temptations. When using formal contracts, the reneging hazards are transferred to the distributor and so renegotiation takes week by week to minimize her reneging temptation for this type of movies.

Conditional on using a formal contract, I find that formal contracts are more likely to be renegotiated when the movie demand realization lies below expectations, and that larger deviations from expectations result in larger differences between ex-ante and ex-post contract terms. Similarly, I also find that formal contracts are also more likely to have their run extended if demand realizations are above expectations. Finally, I provide evidence that exhibitors update their expectations on movie box office revenues during the movie run. All of these findings are robust across different specifications. I argue that these results are evidence that this combination of formal and informal contracts are the most flexible mechanism available that allows exhibitors to learn about the movie box office revenue during its run and therefore terminate movie runs optimally while exhausting the trade gains from each transaction.

In the last section of the paper, I provide back of the envelope calculations for what the gains of interacting formal and informal contracts are taking as counterfactual the case when the observed formal contracts did not allow renegotiation nor run extension. In this case, I show that the use of informal contracting almost doubles the run length of movies and the box office revenue collected by each movie in each theater. Since exhibition contracts tend to include more favorable terms to exhibitors in the later weeks of the run, the increase in exhibitor revenues is estimated to be substantially larger. This result is qualitatively robust across movies using informal contracts and hybrids between formal and informal contracts, as well as across movie groups without a US release and with a US release and different levels of US box office revenues.

This paper is not the only empirical study on contractual renegotiation in the economics literature. As a matter of fact, there has been a number of recent studies that empirically examine renegotiation in contracts such as Cai, Li and Zhou (2003) in the Chinese banking industry, Filson, Switzer and Besocke (2004) in the US movie industry or Benmelech and Bergman (2008) in the airline industry. In addition to these, this paper here also relates to previous own work where I have used the observed renegotiation outcomes to answer different research questions. In particular, Gil (2007) shows that vertically integrated distributors are more likely to distribute movies that ex-post adjust terms more often when showing in independent theaters and therefore arguing that vertical integration decisions may be saving on expected transaction costs. Gil and Oudot (2008) compare renegotiation practices between French defense procurement and Spanish movie exhibition and show that in both scenarios (as different as they may seem) renegotiation practices are affected by the importance of competition for contracts, product complexity and governing institutions. Finally, Gil and Lafontaine (2009) examine the role of revenue sharing contracts in the movie industry and disregard risk sharing as an explanation for the use of revenue sharing contracts because the structure of the renegotiation mechanism that takes place almost eliminates

all risk faced by the exhibitor.

The contribution of this paper differs from those of others and my own previous work in two ways. First, it contributes further to the understanding of vertical relations and contracting practices in the movie industry (Dana and Spier (2001), Mortimer (2002)) and industries where uncertainty is pervasive. Second, this paper focuses on the use of formal versus informal contracts while most of the literature in contractual renegotiation (if not all of the papers in it, and to the best of my knowledge) focuses on renegotiation of formal contracts. The evidence presented here is consistent with firms and economic agents choosing endogenously the governance of their transactions and therefore choosing the degree of contractual incompleteness exhibited in their formal contracts (if any). In the scenario studied here, I argue that contractual incompleteness emerges optimally because firms can use ex-post renegotiation and the value of their relational contracts to maximize the use of new relevant information to the transaction.

The paper is structured as follows. Next section offers a literature review and defines the contribution of this paper to the existing literature. In section 3 I describe the institutional details and contractual structure that governs the Spanish movie exhibition industry. Section 4 presents a theoretical framework that I addapt directly from Baker, Gibbons and Murphy (1994) and which is able to replicate the main stylized facts detailed in the institutional detail section. This model has empirical implications that I present in section 4 and that I take to the data that I present in section 5. Section 6 explores the testable implications of the model. Section 7 provides a back of the envelope calculation of the benefits of using informal and formal contracts altogether and section 8 concludes.

2 Literature Review

This paper contributes to two separate literatures. The first literature is the contract renegotiation and informal contracting literature which studies ex-post adjustments to formal contracts from a theoretical perspective. The second literature is one that empirically documents evidence on informal contracts. This empirical evidence has proved useful both to support the implications of the theory and to foster further theoretical research.

2.1 Renegotiation and Informal Contracting Literature

The traditional contract theory literature has focused mainly in the study of optimal formal contracts. These formal agreements were designed in ways such that no ex-post adjusment to the

original contract could result in a pareto improvement to both parties, and therefore implicitly minimize the role of informal agreements in contracting.

Despite the extant of such literature, a related literature exploring the role of ex-post adjustments to formal contracts emerged. This literature meant to fill the gap between the findings of the renegotiation-proof contract theory literature and the fact that contractual renegotiations are routinely observed in the real world (see Macaulay (1963) and Asanuma (1989) for early evidence). Early developments in this literature formalized the role of ex-post adjustments in the ex-ante agreed contract. For example, Hart and Moore (1988) show that in the presence of incomplete contracts allowing contractual parties to renegotiate parts of the original contract by communicating new information arriving in between the time that the original contract is agreed upon and the implementation period may lead to improvements in efficiency. Another example is MacLeod and Malcomson (1993) which studies the consequences of contractual renegotiation for efficient investments in employment contracts. Recently, a few papers have extended this part of the literature through modeling the interaction between contractual completeness and the use of ex-post renegotiation. Examples of these are Hart and Moore (2004, 2007) and Wernerfelt (2006). The latter differs from the former in that he uses the threat of renegotiation as a way to induce the optimal actions from the contracting parties under contractual incompleteness. This result inverses the causal relation assumed in the early literature by Hart and Moore (1988) and others.

A common assumption in the formal contracting and renegotiation literature above is that contracts between firms are to govern a one-time transaction only even if firms understand that they are likely to interact with each other in the future. This is at odds with most of the available anecdotal evidence showing that firms do interact repeatedly and actually leverage the importance of future interactions into their current contractual relations.

An early application of this idea in the literature is Harris and Holmstrom (1982) who show how implicit contracts within a long-term employment relationship can explain the evolution of wages within occupation and age profiles. Following this, other papers by Bull (1987) and Klein (1996) characterized the nature of transactions governed by self-enforcing informal contracts. These papers fostered the interest of many and preceded a series of papers by Baker, Gibbons and Murphy (1994, 2002, 2006) where they study how the value of long-term relationships may help firms address the problems of contractual incompleteness.

My paper contributes to this literature in that it applies ideas from Bull (1987) and Klein (1996) while adapting the model of subjective pay performance in Baker, Gibbons and Murphy (1994) to a business to business scenario. This paper also combines many ingredients from the contracting framework introduced in Baker, Gibbons and Murphy (2006) and Hart and Moore (2007) above.

The evidence that I provide in this paper serves two purposes. On one hand, it validates many of the ideas and results in this literature. On the other hand, it offers results that may not be yet explained by existing theories and therefore should motivate future research on the impact of relational and implicit contracting on economic outcomes.

2.2 Empirical Literature

This paper mainly contributes to the empirical literature on contracting and renegotiation. This literature is rather scarce and has mainly focused on the description of government procurement contracts. This has been so because private firms will rarely share their private agreements with other businesses and even less frequently share the ex-post departures from the initial formal agreements. For this reason, it is hard to find empirical papers on private contracting outside of government procurement. A few examples of papers documenting contracts and their renegotiation in procurement are Goldberg (1976 and 1977) for public utilities in the US, Goldberg and Erickson (1987) for US pertroleum coke industry, Joskow (1987 and 1988) for the US coal industry, Bajari, Houghton and Tadelis (2005) for California Highway procurement, Oudot (2006) for French Defense procurement, Joskow and MacAvoy (1975) for electrical power companies in the US, and Guasch, Laffont and Straub (2003) for procurement contracts in South America.

Despite its scarcity, evidence on informal agreements in the private sector goes back as early as Macaulay (1963) who establishes from personal interviews that the share of transactions not mediated by a formal contract was as high as 75% in 1953. Asanuma (1989) adds to these findings by documenting the nature of vertical relations between manufacturers and suppliers in the Japanese automobile and electrical machinery industries. He finds that manufacturers build long-standing relationships with those suppliers supplying more customized products and how these more solid relations help the contracting process of this more complex products.

This early evidence has been followed by a recent wave of papers documenting renegotiation and informal contracting in a variety of industries such as the US motion picture industry (Hanssen (2000) and Klein and Kenney (2000) for evidence in the 1950s, and Filson, Switzer and Besocke (2005) for evidence of the late 1990s), the construction industry (Chakravarty and MacLeod (2004)), oil drilling (Corts and Singh (2004)), the airline industry (Benmelech and Bergman (2008)), the Chinese banking industry (Cai, Li and Zhou (2003)), drycleaning industry (Gil and Hartmann (2009)) and California construction procurement auctions (Gil and Marion (2009)).

This paper builds on previous own work on the contracting of the Spanish movie industry (Gil (2004) and (2007), Gil and Lafontaine (2009) and Gil and Oudot (2008)) while it contributes to this literature on empirical contracting and renegotiation. It does so by documenting transactions

governed by informal agreements, formal contracts or both and examining the consequences on economic outcomes of relying on these different governance structures. To the best of my knowledge, this is one of the few papers that offers comparison vis a vis of the use of different governance structures and constitutes by itself a contribution to this literature as well as sheds light into some implications derived by the theoretical literature surveyed above.

3 Institutional Details and Contracts in Movies

This section describes the institutional framework of the movie industry, drawing heavily from interviews with managers and previous work (Gil (2004)). The movie industry is divided mainly into three sectors: production, distribution and exhibition. The production sector includes all those agents who produce movies. Producers use distributors to introduce movies into the theater market. Finally, exhibitors run theaters and place movies on their screens to attract the audience that will generate box office revenue. Since this paper studies the contractual agreements between distributors and exhibitors, I concentrate my analysis on these two sectors.

Distributors maximize revenue across the movies they distribute into the theater and ancillary markets, and they are in charge of promoting these films through advertising and other activities. On the other hand, *exhibitors* maximize total box office revenue of the movies they show, in addition to revenue from other sources such as concessions. *Exhibitors* are in charge of screen space management and some promotional activities such as advertisements inside the theater, previews and site specific promotional activities.

Distributors' and exhibitors' incentives differ in that the distributors maximize box office revenues and revenues from ancillary markets, whereas the exhibitors maximize revenues from box office and concession sales. Notice then that their objective functions are different and that incentive alignment problems grow for movies with audience appeal more difficult to predict.

3.1 Contractual Environment

The timing of the contracting process between distributors and exhibitors is rather complex. Distributors visit exhibitors once or twice a year to show their movie portfolio for the upcoming season. In these visits both parties negotiate and agree on which movies, and the number of copies of each movie, the exhibitor will show upon movie release. The agreement reached at this stage does not define which theaters will show each movies nor the screens within theaters that will show each individual movie. This is so because at the time of this first agreement release weeks of most movies are not yet decided.

Once the release date is decided (and those of competing movies), exhibitors are able to negotiate with each distributor where each copy previously contracted will play. This negotiation process takes place in a movie per movie basis and at least a month before the movie release date. In this second stage of the negotiation process, contractual terms are still not decided. These are decided sometime between a month and a week before the release date and before the distributor sends the physical copy of the movie to the agreed theater. At this time both parties on how they will split the revenues collected at the theater's box office. This agreement is most of the time put down on a physical contract and sent to the exhibitor who will sign it if agrees with the terms. If the terms are not agreeable, the contract is sent back to the distributor. This writes down new terms and sends the contract back until agreement is reached. Other times parties agree informally on the terms and no physical contract is at use.

Distributors and exhibitors use revenue-sharing contracts. Each contract specifies the names of the distributor and exhibitor involved in the transaction, the movie and the theater at stake.[1] Each contract specifies a weekly share of movie box office revenues that the distributor keeps. By default, the exhibitor keeps the remaining amount of revenue. The revenue-sharing terms for the distributors usually decline from 60% to 40% and this decline varies across movies and theaters. Figure 1 presents a typical contract.

The contracts that distributors and exhibitors use do not specify the length of the movie run. The exhibitor decides when to stop showing the movie. In the interviews I learnt that the arrival of new information, such as the releases of theaters close by, affects the optimal movie run length. Therefore it is not optimal ex-ante to commit to a fixed termination date. The arrival of new information is not contractible and constitutes part of the contractual incompleteness.[2]

Although it may be possible to contract on output, it is not possible to contract on the exhibitor's opportunity cost of showing the movie an extra week since that value is not observable nor verifiable. Having a fully contingent contract in this case is very expensive, and probably unfeasible. This constitutes another major source of contractual incompleteness and a main reason why movie termination is not contractible.

Distributors use different sharing terms in their contracts to account for the existing heterogeneity in movies. For instance, contracts of movies expected to have a large share of their revenues

[1] Each contract is screen specific. That means that if a movie is shown in more than one screen in a theater, the distributor and exhibitor must write down a contract per screen used.

[2] If the movie performs below expectations, the exhibitor is clearly worse off. If, on the contrary, the movie performs above expectations, negotiation of the new contract could lead the distributor to act opportunistically. Therefore, it seems that leaving this part of the contract open solves the ex-post opportunistic behavior problems. Some of this new information could come in the form of weather change or externalities between movies and major sport events on TV.

early in their run will contain high distributor's shares at the beginning and experience a decline in later weeks. On the contrary, contracts of movies with larger shares of revenues in later weeks will have low distributor's shares at the beginning and experience moderate declines after that (if any at all). These downward sliding and flat term schemes are designed to provide the exhibitor with the right incentives to continue the movie's run an extra week, and not open with a new movie release.

The simplicity of contracts and the contractual incompleteness surrounding the interactions between distribution and exhibition lead both parties to use other mechanisms not specified explicitly in the contract. In the next section I describe how firms use renegotiation to adjust sharing terms ex-post.

3.2 Renegotiation Mechanism

In this industry, firms adjust revenue sharing terms ex-post. Exhibition managers decide to keep movies on screen up to the point that their share of revenue equals the opportunity cost of holding the movie an extra week. When they decide to keep the movie an extra week, they have in mind already the probability of renegotiating such terms. Therefore, the moment that a movie is not profitable, even under renegotiation, the exhibition manager decides to stop its run.

During the interviews, I learnt that distribution managers never start the renegotiation process, exhibition managers do. Once managers cut the movie run, they go back to examine the outcomes of the initial contract and the relevant conditions in each one of the weeks. Managers do not have a specific rule for renegotiation, that is, renegotiate if sales go below certain threshold level. Managers claim that setting such a rule would be difficult since the same screen can be under many different effects and commitment to any rule is not credible. Figure 2 serves as an example of this as it shows renegotiation patterns for four different movie runs in my data. It is apparent from this figure that there is no ex-ante designed pattern since all four movies experience renegotiation in different ways.

Managers evaluate revenue quantities, and adjust these through renegotiation of the sharing terms specified in the contract. Even though renegotiation responds to unobservable causes, exhibition managers said during the interviews that they do not take advantage from it. Managers claim that the continuous contact between firms in the market softens perverse incentives since the same distribution firm brings more than one movie every year and no exhibition firm wants to lose the opportunity of opening any potential hit. Therefore, managers describe the process of renegotiation as one where they look at the amount that the initial contract term attributes to the

exhibition firm, and judge whether that amount is "adequate" to the promoting effort exerted by the firm, and maintenance and opportunity costs of the screen.

Exhibitors claim that they are careful not to ask for renegotiation too often or in situations where they may be perceived as greedy. The interview with one of the managers provided insightful anecdotal evidence regarding this. According to this manager, a distribution firm denied renegotiation to an exhibition firm, and the latter responded to this by denying business during a certain amount of time. This retaliation period was not infinite though, and soon the distributor and exhibitor made business together again. These episodes are the exception of these vertical relations rather than the rule.

4 Theoretical Framework

This section presents a theoretical framework that follows closely the model in Baker, Gibbons and Murphy (1994) on subjective pay performance. This framework presented here allows me to analyze the interplay of formal, informal and relational contracts in the Spanish movie exhibition industry between a distributor and an exhibitor. I divide this section into two differentiated parts. The first part introduces a two period model mainly useful to study the choice of governance and the role of informal agreements in the movie exhibition industry. The second part relaxes the two-period assumption and examines the role of ex-post contract renegotiation and learning in this setting.

Assume that a distributor owns a movie i and an exhibitor owns a theater j and that both are risk neutral for simplicity. Assume as well that there are perfect complementarities between a movie and a theater such that neither a theater nor a movie are able to generate revenue by themselves. Therefore, an exhibitor and a distributor need to contract with each other in order to generate some revenue.

4.1 A Model of Formal and Informal Contracting

Let me assume for now that a movie runs obsolete after two periods and yields no revenue in a third period. In period 0, the movie is a finished product and the distributor cannot take any action that will enhance movie revenues.[3] On the other hand, the exhibitor can take decisions over the screening of the movie that may affect its revenues. The exhibitor must take decisions on actions d_t and q_t in each period t that take value 1 if the exhibitor takes the action and 0 if she

[3] In reality, the distributor is in charge of movie advertising, but most of this advertising (and other promotional activities) take place before the movie release. This validates the assumption here.

does not. The former refers more of a quantitative action (screening a movie or not) and the latter to a qualitative action (how to screen a movie).[4] Moreover, there are complementarities between actions such that d_t needs to equal 1 for q_t to equal 1. Similarly, the complementary extends across periods such that if an exhibitor does not screen a movie "well" in the first period, she cannot do it in the second (the movie loses momentum so to speak). This summarizes in the following way

$d_1 \in \{1, 0\}$

$d_1 q_1 \in \{1, 0\}$

$d_1 d_2 \in \{1, 0\}$

$d_1 q_1 d_2 q_2 \in \{1, 0\}$

I call R_t the movie revenues in period t. If the theater chooses $q_1 = 1$, revenues are uncertain in the first period and distributed uniformly such that $R_1 \tilde{} U[R^L, R^H]$. If the theater chooses $q_1 = 0$ the revenues take a certain value of R^L in the first period. If $d_1 q_1 d_2 q_2 = 1$, revenues in the second period equal $R_2 = \gamma R_1$ where $0 < \gamma < 1$. If $d_1 q_1 d_2 q_2 = 0$, $R_2 = \gamma R^L$. In that sense, γ is the certain decrease rate of revenues from period 1 to period 2.

In terms of cost, the distributor cost per period is constant, certain and equal to k. On the other hand, the exhibitor cost c_t is uncertain in every period t and distributed uniformly such that $c_t \tilde{} U[c^L, c^H]$. This cost of exhibition is made of employment costs and the opportunity cost of showing the current movie as opposed to showing another movie (best alternative movie). The exhibitor only has cost c_t drawn from the uniform distribution if she chooses $d_t q_t = 1$. If the exhibitor chooses $d_t = 1$ and $d_t q_t = 0$, then the theater faces a certain cost of c^L.

Distributor and exhibitor use revenue sharing contracts. These contracts contain an α_t sharing term for every period that specify the share of revenues R_t that the distributor will keep. By default, the exhibitor will keep $(1 - \alpha_t)$ share of the revenues. I take this feature as given and I do not discuss it since others have investigated the role of sharing contracts in movie exhibition (Filson et al. (2005), De Vany (2004) or Gil and Lafontaine (2007)). For the purpose of this paper, the same results would go through if fixed fees were used.

Once defined all the elements relevant to the analysis, I define next the timing of actions in this game. For this purpose, I can divide each period 0, 1 and 2 into two subperiods. The main difference between these two subperiods within each period is that in the first subperiod distributor and/or exhibitor take actions and in the second subperiod the state of the world realizes to the exhibitor. The distributor and exhibitor know all the above in the first subperiod of period 0, and given the expectations of revenues and opportunity cost they decide to contract upon a movie

[4] This distinction follows in spirit that in Hart and Moore (2007) between perfunctory performance and consummate performance. This is to say that ex-post actions are partially contractible as opposed to totally contractible (usual case) or non-contractible at all (Baker, Gibbons and Murphy (2006)).

or not. Once they contracted upon the movie release, in the second subperiod of period 0 the exhibitor observes the realization of revenues R_1 and c_1. Given these realizations, the exhibitor decides in the first subperiod of period 1 upon d_1 and q_1. Similarly, and given the realization of R_1, exhibitor observes the potential realization of R_2 (conditional on d_1, q_1, d_2 and q_2) and c_2 in the second subperiod of period 1 and decide on d_2 and q_2. Finally in period 3 the realizations of c_1 and c_2 become observable to the distributor.

In this scenario and in the case that all actions d_t and q_t, costs k and c_t and revenues R_t were contractible and observable to a third party, distributor and exhibitor could agree on a contract such that $d_t q_t = 1$ if $R_t \geq k + c_t$. Similarly, and assuming that the distributor has all bargaining power, the contract could index payment $(1 - \alpha_t) = \frac{c_t}{R_t}$. With such simple indexed contract the distributor would make sure that the movie plays when it is optimal to play and that both participation constraints are satisfied.

4.1.1 Incomplete Contracts

The scenario above where all decisions are contractible and all relevant factors observable to a third party may not be realistic. For this reason, following institutional details we define the exhibitor opportunity cost c_t as observable to both exhibitor and distributor, but not observable to a third party.[5]

Regarding the contractibility of actions, I assume that d_t is observable to a third party and that q_t is not.[6] Whether a theater shows a movie is easily observable by a third party, but whether the movie is shown in the right screen and offered the right number of shows at the right times is not. This is so because the opportunity cost is not observable to a third party. Given these conditions, distributors must decide on the contracting governance that shall oversee their transaction with exhibitors. In this paper and assuming linear revenue sharing contracts, I consider three types of governance: using only informal contracts, using only formal contracts and combining both formal and informal contracts.

4.1.2 Formal, Informal and Relational Contracts

We depart then from the benchmark scenario where everything is contractible and observable to a third party. In such case, both parties may write down a contract such that $q_t d_t = 1$ as long as

[5] In conversations with industry managers I learnt that c_t is not even observable to distributors sometimes. In those occasions they learn about c_t by talking to different exhibitors.

[6] As commented in a previous footnote, see in Hart and Moore (2007) the difference between perfunctory performance and consummate performance. Baker, Gibbons and Murphy (2006) presents another case where there is partial contractibility of actions ex-post.

$R_t \geq c_t + k$, and specifying payments to the exhibitor such that she keeps a share of the revenues $[1 - \alpha_t] = \frac{c_t}{R_t}$ and payments to the distributor of $\alpha_t R_t$. This contract depends on the observability of c_t to a third party and it is enforceable through the use of large fines. Therefore using the indexed contract is not feasible if q_t and c_t cannot be contracted upon.

Let us consider now formal or informal contracts with and without future interactions between both parties. Let me analyze first the case where the two parties do not take into account future interactions between them. In this case and if they rely exclusively on an informal contract that dictates the same terms as above and they do not consider the value of future interactions, exhibitors will always have an incentive to reneg from the informal agreement and keep a share $1 - \alpha_t^{'}$ higher than $1 - \alpha_t$ above such that $\alpha_t^{'} = \frac{k}{R_t}$.[7] Depending on whether the distributor is able to recoup her cost k, this may take the exhibitor to show the movie longer than the efficient amount of time. If the distributor is always able to recoup her cost k (and the exhibitor knows this) due to court enforcement, the duration of the movie will always be optimal and the exhibitor will decide optimally on d_t and q_t. Knowing this in advance, the distributor will not rely on informal contracts unless both parties will have future interactions and she can leverage the value of those future interactions into the current transaction.[8]

If they rely entirely on a formal contract and they do not consider the value of future interactions, the distributor must write down a contract that the exhibitor will accept given the information available in period 0. Since both are risk neutrals and the distributor holds all bargaining power, the terms will be such that the exhibitor keeps just enough revenue on average to cover her expected costs. This means that the distributor will offer a contract that specifies payments to the exhibitor such that $[1 - \alpha_t^{''}] = \frac{\overline{c_t}}{\overline{R_t}}$ where $\overline{c_t}$ and $\overline{R_t}$ are the expected values of c_t and R_t given the information available in period 0. In this case, the exhibitor will only decide $d_t q_t = 1$ if $[1 - \alpha_t^{''}] R_t \geq c_t$ regardless of whether $R_t \geq c_t + k$. This means that exhibitor will decide often to cut the run of a movie even if there are gains from continuing the movie run.

Finally, let us consider the case when distributor and exhibitor value future interactions between them. Distributor and exhibitor will rely on an entirely informal contract if they can credibly commit to punish deviations from the informal contract using as a threat the potential loss of the value of future interactions. In such case, the exhibitor will have no incentive to reneg from the informal contract as long as the future gains at stake are larger than the short run gains from

[7] Let us assume for simplicity that in case of conflict a judge will rule that the distributor at least gets compensated for her cost k.

[8] This indicates that when $k \approx 0$ the exhibitor may actually decide optimally on the run length of the movie. Despite this, in that case the distributor may not benefit much from the optimality of decisions and therefore may not like using only informal contracts.

reneging. In particular, taking V^e as the discounted exhibitor's gains of future interactions, if it is true that

$$V^e > R_t - c_t - k$$

then the exhibitor will respect the informal agreement and show the movie as long as $R_t \geq c_t + k$ and receive payments of c_t plus a small rent. If $V^e < R_t - c_t - k$, the exhibitor will reneg from the informal agreement.

On the other hand, if the distributor anticipates that the gains of reneging will be higher than the discounted gains of honoring the informal agreement, she will use a formal contract to limit the gains of reneging from the informal agreement and assure a percentage of the revenues for her own. Since using only a formal contract has potential costs (as discussed above), distributors and exhibitors could benefit from the joint use of formal and informal contracts and correct the shortcomings of using either only formal or only informal contracts. Start by assuming that the distributor uses the formal contract specified above such that $[1 - \alpha_t^{''}] = \frac{\overline{c_t}}{R_t}$. Once a formal contract is in use, the use of informal agreements shifts the reputational hazards from exhibitor to distributor side. The goal of the informal agreement is to have the exhibitor show the movie as long as $R_t \geq c_t + k$ (regardless of the terms in the formal contract). This implies that the exhibitor should decide $d_t q_t = 1$ even if a priori $[1 - \alpha_t^{''}]R_t < c_t$. In such case, the exhibitor will only do so if the distributor agrees to compensate the exhibitor accordingly after the exhibitor has taken the action $d_t q_t = 1$ and d_t, q_t and c_t are observable to the distributor in the same way that employers pay bonuses to employees in Baker, Gibbons and Murphy (1994).

Under these conditions, if $[1 - \alpha_t^{''}]R_t < c_t$ then the distributor and exhibitor have an informal agreement where the distributor agrees to adjust $\alpha_t^{''}$ to α_t^* such that $[1 - \alpha_t^*]R_t = c_t$. Therefore, the exhibitor will follow the informal agreement only if she believes that the distributor will compensate her ex-post for showing the movie even if the contract terms are not favorable. Given this mechanism, the bonus to be paid a posteriori will be $b_t = 0$ if $[1 - \alpha_t^{''}]R_t > c_t$ and $b_t = c_t - [1 - \alpha_t^{''}]R_t$ if $[1 - \alpha_t^{''}]R_t < c_t$. If V^d is the discounted distributor's gains of future interactions, then the distributor will honor her part of the informal agreement as long as

$$V^d > b_t.$$

If all these condition hold, the exhibitor will play the movie as long as $R_t \geq c_t + k$ regardless of the existant terms in the formal contract knowing that the distributor will later compensate her for undertaking the a priori costly action $d_t q_t = 1$. Under this hybrid contract that uses both formal and informal elements, the distributor makes sure that the exhibitor show the movie for the

optimal number of periods as long as the informal contract is honored.

4.1.3 Rationalizing Other Peculiarities of the Renegotiation Mechanism

The business-to-business adaptation of the model in Baker, Gibbons and Murphy (1994) that we propose here can also explain other peculiar aspects of how distributors and exhibitors renegotiate with each other. Among other things, this model sheds light on why renegotiation is one-sided with transfers from distributors to exhibitors, why it takes place after the movie has been pulled from the theater and why terms are adjusted in a week-by-week basis.

The model assumes that exhibitors observe c_t before the actions d_t and q_t are decided and before the distributor observes it. Since it is important to link action and pay, one-sided renegotiation from the distributor to the exhibitor should come side-by-side with exhibitor decision-making. The distributor takes longer to observe c_t and would commit mistakes too often affecting the profits of both distributors and exhibitors. For this reason, the distributors may prefer the current system which guarantees covering c_t when initial predictions were too optimistic and offer to compensate the exhibitor with a rent (the "ex-post" bonus) whenever $(1-\alpha_t^{''})R_t > c_t$. Following this same logic, it would not make sense to observe a two-way renegotiation mechanism. Gil and Lafontaine (2007) discuss this alternative in their study of why distributors use revenue sharing contracts and argue that such arrangement would mostly make sense when double moral hazard becomes a potential problem.

A second aspect to consider is why exhibitor and distributor renegotiate in a week per week basis. Doing so strengthens the incentives of exhibitors to take the optimal decision ($d_t q_t = 1$ if $R_t > c_t + k$) week by week and it strengthens the distributor incentives to honor the informal agreement by minimizing the potential size of b_t. By reviewing the compensation week by week, decisions on d_t and q_t depend only on R_t and c_t, and they are not affected by movie performance in previous periods. At the same time, reviewing compensation week by week minimizes the size of the transfer at each bargaining round and therefore helps the distributor committing not to reneg from the implicit agreement (because generally it will be true that $V^d > b_t$).

Finally, the model assumes that distributor only observes the realization of c_t in period 3 and that assumption alone would justify the fact that renegotiation takes place after the movie has been pulled from the screen. Other reasons not modeled here but consistent with the approach is that by renegotiating ex-post the distributor minimizes renegotiation costs by bundling the process all at the end of the movie run.

4.2 Renegotiation and Learning

In the previous subsection, I show how using informal agreements benefits both distributors and exhibitors in that they can learn ex-post the type of movie and apply ex-post a better contract. Since I focus on the role of formal and informal contracts in the previous subsection in a very simple two-period model, the gains from learning may seem rather limited. In this section, I take the role of formal and informal contracts as given and analyze how the informal contract used in this industry helps managers incorporate new information about the potential movie revenue into their decisions. This allows exhibitors take the optimal decisions regarding the movie run stopping time and benefits both distributors and exhibitors.

For this purpose, I first modify the model above by relaxing the two-period assumption and allowing the movie run to go for as long as optimal. Let me know build up into the model used above. A movie i brings revenue R_{ti} in every period t (week since release). Distributors have a prior of the movie revenue potential P_i^{t-1}. This can differ from the actual movie revenue potential P_i that firms can learn over time. The exhibitor (theater) j has also a marginal cost c_{tj} of exhibition and the distributor has a marginal cost k_{ti} of distribution that varies per period. Let me know assume that there is uncertainty in every period about the realization of R_{ti} and c_{tj}. I specify movie revenue R_{ti} and the theater's expectation to be

$$R_{ti} = \gamma_t P_i + \epsilon_{ti}^r$$

and

$$E_{t-1}[R_{ti}] = \gamma_t P_i^{t-1},$$

where ϵ_{ti} is a disturbance iid and $N(0, \sigma^2)$, and γ_t is a parameter specific to each period t and constant across movies. In other words, revenues are unknown to the distributor and the exhibitor because they do not know P_i and ϵ_{ti}, but they know what the revenue change rate between periods $(\frac{\gamma_t}{\gamma_{t+1}})$ is.

Knowing that parties cannot identify c_{tj} and P_i ex-ante, distributors will write contracts with the information that they have available in period 0. Then distributors will write a sharing term s_t per period such that

$$(1 - s_t)E_0[R_{ti}] = E_0[c_{tj}]$$

for every period t and for as many periods as

$$E_0[R_{ti}] \geqslant E_0[c_{tj}] + k_{ti}.$$

Therefore, and following the notation in the model above, exhibitors and distributors will adjust contract terms ex-post when the participation constraint of the exhibitor is not satisfied such that

$$(1 - s_t)R_{ti} < c_{tj}$$

and they will renegotiate the term s_t to a new term s_t^* such that $(1 - s_t^*)R_{ti} = c_{tj}$. Since $R_{ti} = E_{t-1}[R_{ti}] + \epsilon_{ti}^r$ and $c_{tj} = E_0[c_{tj}] + \epsilon_{tj}^c$, the contract will be renegotiated when

$$(1 - s_t)\epsilon_{ti}^r - \epsilon_{tj}^c < E_{t-1}[c_{tj}] - (1 - s_t)E_{t-1}[R_{ti}].$$

As explained in the above two-period model, since distributors use the information available in period 0 to write down the initial s_t, the exhibitor's participation constraint will not satisfy often and this will cause the exhibitor to terminate the movie run earlier than efficiently. Therefore, there exist gains of allowing ex-post adjustments from s_t to s_t^* and continue the movie run.

Once I have specified how the renegotiation mechanism takes place in this second model, let me now consider how learning will work here. Take period 1 for example. The distributor sets s_1 such that

$$(1 - s_1)E_0[R_{1i}] = E_0[c_{1j}]$$

and the revenue expectation in period 1 is proportional to the prior of movie i such that

$$E_0[R_{1i}] = E_0[\gamma_1 P_i] = \gamma_1 E_0[P_i] = \gamma_1 P_i^0.$$

When the exhibitor observes R_{1i}, she knows that R_{1i} consists of two different components

$$R_{1i} = \gamma_1 P_i + \epsilon_{1i}^r$$

where the first component ϵ_{1i}^r is a disturbance $iid\ N(0, \sigma^2)$ and the second component is the revenue amount due to the actual movie audience appeal P_i.

Given this and despite the fact that the exhibitor (and the distributor) is not able to separate these two components, she is able to learn some information from the revenue realization R_{1i} that she can use to decide whether to cut the movie's run. The exhibitor can Bayesian update their prior of the movie audience appeal P_i every period incorporating the new information in the revenue

realization R_{ti}. Applying conjugate distribution theory[9] (Degroot (1970)) to the framework in this paper, I find how much the prior mean changes everytime we observe a new revenue realization. The new prior P_i^t is a linear combination of the previous prior P_i^{t-1} and the new information contained in R_{ti} such that

$$P_i^t = \frac{\mu P_i^{\dagger}(R_{ti}) + \tau P_i^{t-1}}{\mu + \tau},$$

where μ and τ are weights (precisions) for the new draw and the prior distribution respectively, and I call $P_i^{\dagger}(R_{ti}) = \frac{R_{ti}}{\gamma_t}$ (since $E(\epsilon_{ti}^r) = 0$). Given the new prior and the Bayesian updating that just took place, the exhibitor decides to continue the movie's run into the following period if the level of expected revenue is higher than the joint cost of exhibition and distribution such that

$$E_t[R_{t+1,i}] \geqslant E_t[c_{t+1,j}] + k_{ti}.$$

When decomposing the left-hand side of the equation we find

$$E_t[R_{t+1,i}] = E_t[\gamma_{t+1} P_i + \epsilon_{t+1i}] = \gamma_{t+1} P_i^t \geqslant E_t[c_{t+1,j}] + k_{ti}.$$

Substituting in P_i^t for the expression above yields

$$\gamma_{t+1}[\frac{\mu P_i^{\dagger}(R_{ti}) + \tau P_i^{t-1}}{\mu + \tau}] \geqslant E_t[c_{t+1,j}] + k_{ti}.$$

Use expressions above $R_{ti} = E_{t-1}[R_{ti}] + \epsilon_{ti}^r$ and $R_{ti} = \gamma_t P_i^{\dagger}(R_{ti})$ to arrange this last expression and see that

$$\beta \epsilon_{ti}^r \geqslant \frac{\gamma_t}{\gamma_{t+1}}(E_t[c_{t+1,j}] + k_{ti}) - \gamma_t P_i^{t-1},$$

where $\beta = \frac{\mu}{\mu+\tau}$. If this condition is not satisfied, the exhibitor will decide to stop the movie's run. That means that for very low values of ϵ_{ti}^r (and therefore low values of R_{ti}) the exhibitor will adjust downward her beliefs and may decide that there does not exist an allocation of revenue between distributor and exhibitor that makes both distributor and exhibitor better off by continuing the

[9] Conjugate distribution theory (Degroot (1970)) shows that Bayesian updating a normal prior distribution of W of mean μ and precision τ, using random draws X_i (i = 1, ..., n) from a normal distribution for unknown mean and precision r, results in a normal posterior distribution of W with mean μ' and precision nr, where

$$\mu' = \frac{nr\overline{x} + \tau\mu}{nr + \tau},$$

n is the number of draws and $\overline{x} = \sum_{i=1}^{n} x_i$. This result shows that the posterior mean is a weighted average between the prior mean μ and the mean of the random draws ($\overline{x}$).

movie run.

The fact that the distributor and exhibitor do not know P_i (at most they have a prior P_i^0) makes it difficult to contract on movie run length. This is yet another reason why movie exhibition contracts do not specify movie run length and let the exhibitor decide by using new information that arrives every period through ϵ_{ti}^r. This mechanism maximizes efficiency because it uses informal and relational contracts to exhaust the potential gains of trade between the contractual relation in place by extending the movie run until its optimal stopping time.

4.3 Testable Implications

The model above provides two different sets of testable implications. The first set of testable implications have to do with the choice of governance (formal contract or not) and the incidence of renegotiation (use of informal agreement given that a formal contract is on place). The second set of testable implications comes from the second part of the model where the analysis takes upon learning.

The first set of testable implications are the following:

• Under long-lasting distributor-exhibitor relationships, distributors will use formal contracts when higher gains of reneging exist, that is, when they expect movies to bring higher levels of revenues or they anticipate the future value of relationship to decrease. Therefore, *the higher the expected revenues of a movie and the lower the value of future relationships the higher the likelihood that distributors will use a formal contract with a particular exhibitor.*

• Under formal contracts and due to the existing implicit contract, contracts will be renegotiated when movies do worse than expected. Exhibitors will renegotiate when their participation constraint is not satisfied. Although it is not possible to observe changes in the right hand side of the participation constraint, I can measure unexpected changes in box office revenues with respect to expectations. Therefore, the testable implication becomes one such that *negative deviations will increase the probability of renegotiation, and larger negative deviations will cause larger term renegotiations.*

• Under formal contracts and due to the existing implicit contract, contracts will be extended beyond length specified in the contract when movies do better than expected. Therefore, *positive deviations from expectations will extend movie runs.*

The second set of testable implications are the following:

• New information arrives in every period. Exhibitors use this new information to update their decisions on when to terminate the movie run. This means that realizations of demand today bring

information about the realization of demand tomorrow. In our specification above, low realizations of ϵ^r_{ti} drive both renegotiation and termination decisions through learning. Therefore it should be the case that we observe that *a negative deviation from demand expectation today increases the probability of cutting the movie run tomorrow*, and that *the same negative deviation has a weaker effect on movie run stopping decisions than it does on renegotiation* (since $0 < \beta < 1$). Similarly, we should find a correlation between both the renegotiation and termination decisions.

• Finally, different movies will have different βs. Since $\beta = \frac{\mu}{\mu+\tau}$, this means that *movies with less precise prior distributions will be more sensitive to larger negative deviations.*

The last two implications have to do with the decision of continuing the movie's run into the following period, and the learning process involved. Since exhibitors make this decision every period, the timing is consistent with the arrival of new information and the corresponding update in movie audience appeal P_i. The existence of learning drives the decentralization of decisions and its efficiency. Following this, I present the data and I test the implications of this model.

5 The Data

In this paper, I use a unique data set on formal and informal contracts as well as ex-post renegotiation outcomes from a Spanish movie exhibitor.[10] This data set mainly provides information on whether the exhibitor used a formal contract or relied on an informal agreement with the distributor owning the rights over the release of a movie, the shares specified in the formal contract (when used) and whether these shares were ex-post renegotiated as well as the final share agreed upon, and whether the run of the movie was extended beyond the number of weeks formally specified in the movie exhibition contract. In the end, these data provide information about all contractual practices by one major exhibition firm in Spain from January 2001 to June 2002 for all its chain running 26 theaters spread around 16 cities in 11 different provinces. The characteristics of these theaters and markets (cities) vary largely. These theaters vary in size from 1 to 16 screens and their total seat capacity goes from 400 to roughly 4,000 seats. In addition to this, the cities where the theaters are located vary greatly in market size: the smallest town has 8,000 inhabitants whereas the largest has almost 3 millions.

I observe weekly information of initial and final revenue share per movie and theater within the

[10] This data set is part of a much bigger data collection effort that took place during the summer of 2002. Despite visiting and interviewing six different managers from different Film Booking departments, only one of the firms was willing to share records on the informal ex-post adjustments in their contracts mainly due to the confidentiality of these data the informality of this industry's business practices. According to most of the interviewed managers, the contracting practices of the firm disclosing the data used in this paper are representative of those in this industry.

exhibition chain. The data initially consists of 19,531 observations at the week/theater/movie/copy level.[11] I delete 21 observations from the initial data set because they specify screen rentals to firms for private screenings or other types of ceremonies.[12] I also delete 849 observations from the data because they belong to movie runs that started before January 2001 and so I am left with only fully observed movie runs in my data set. Finally, I delete 69 observations that belong to pre-screenings.[13] In the end, the remaining data set is comprised by 18,592 week/theater/movie/copy observations that are grouped into 5204 different theater/movie/copy runs. I divide the remaining movie runs into different groups depending on whether they start after the movie release and whether they use formal contracts.

See Figure 3 for a complete decomposition of this classification. In particular, notice that 4,694 of the 5,204 runs start from the release week of the movie whereas the remaining 510 runs start either after the movie release or are additional copies of a movie that is already playing in a theater. I divide the 4,700 "full" runs in the data into three subgroups depending on their use of formal and informal contracts. In total, there are 3,375 runs that use formal contracts of which 808 runs neither ex-post adjust sharing terms nor extend their run beyond specified. The rest 2,567 runs either contain some ex-post sharing term adjustment or run length extension. Besides the runs using formal contracts, we observe 1,328 runs that do not use a formal contract in their release week. Of these, 125 runs use formal contracts may use formal contracts after release weeks[14] and 1,194 never use formal contracts. I show summary statistics of movie runs and contract terms in Table 1 (run level), Table 2 (weekly level) and Table 3 (theater, movie and distributor characteristics).

In Table 1 I provide summary statistics at the movie run level. Here I show that the average run goes for almost 4 weeks and that 67% of the runs with at least one week with a formal contract get their shared terms renegotiated at least once. Similarly, 21% of the 3,500 runs with run length ex-ante specified in the contract see their runs extended. This figure also breaks summary statistics by whether the run was relying on a formal contract, informal contract or both (first informal and then formal). Notice that movie runs relying only on informal contracts tend to have shorter run lengths. It is uncovering the inner mechanism behind this association that I am after in this paper

[11] By law, each exhibition contract is movie/screen specific and therefore this determines the level of detail in my data set.

[12] This is the equivalent to the "four-wall" contract sometimes used in the US. The firm renting the screen or hall keeps 100% of the revenues (if any).

[13] These are not pre-screenings or sneak previews as we understand them in the US. Even though a release is scheduled for a whole country on a given Friday, local festivities or special circumstances may induce exhibitor start showing the run of a movie one or two days before. Those short-periods of time are never a full week before the official release and certainly are not contracted separately from the official movie run. In my data set, these special cases are coded as run week = 0 as the first week of their run.

[14] This type of run is rarely observed (125 out of 5,204 runs) and so they may be suffering of measurement error. Despite this, we include these in our analysis.

and constitutes the bulk of the empirical analysis above.

In Table 2 I cut the data thinner and provide summary statistics at the theater/movie/week level. In the final data set that I use, 34% of the weekly observations are relying on informal agreements and of the remaining 66% relying on a formal contract 53% see their sharing terms renegotiated. On average the sharing term initially specified on the contract is 52% on average and the final term after renegotiation is 47%. This denotes an average renegotiation spread of 6%. There is substantial variation in both renegotiation and renegotiation spread mainly by movie characteristics and week since release because of learning and endogenously determined movie survival. Figure 4 provides graphical evidence of separaing renegotiation per week and movie type for whether the movie had a US release and its US performance. See in Figure 4.A that average renegotiation and renegotiation spread by week since release across all movies. We note that these averages are mainly constant for the first 8 weeks at 50% and 6 percentage points respectively and experience a sharp drop down to 40% and 3 percentage points in the last few weeks. Figures 4.B and 4.C show that the findings in Figure 4.A are mainly due to a composition effect. In fact these figures show that movies that collected more than 100 million US$ in their US release are very unlikely to have their sharing terms renegotiated and lower renegotiation spreads (if renegotiated) in their first week. This numbers increase shortly after and stay at high levels for as long as the run lasts. This contrasts with the experience of movies with no US release and movies that collected less than 100 million US$ in their US release. These movies start with higher renegotiation and renegotiation spread averages and end up with lower numbers due to learning and survival. This seems to indicate that learning seems to take place at a much faster pace for movies with shakier priors which reflects in movie run lengths and the incidence of renegotiation. Movies with strong priors (US blockbusters) do not reflect as much learning as other types of movies.

In total, this exhibition firm showed 416 movies during this period. I show some summary statistics and characteristics of these movies in Table 3. These movies are distributed by 24 different distributors of different sizes and business background. The movies come from 16 different countries from which USA, Spain, UK and France are the most represented. 61% of the movies were released in the United States previous to their release in Spain. I collected for each movie the total box office revenues in Spain (2.2 million Euros on average), and US box office revenue (46.5 million US$) when available. I also use information at the distributor level such as the number of movies released in 2001-02, 2003 and 2004 by each distributor and their average revenues and admissions as a way to proxy the value of the future relationship of this exhibitor with each one of them. This will prove useful when addresssing the importance of relational contracting in the empirical analysis below.

5.1 Constructing Demand Shocks

I construct three measures of demand shocks: a measure of the deviation from the overall (at the country level) expected performance, a measure of deviation over the average revenues of a movie run and a measure of deviation over the average revenues of a movie during a week.

I call the first type of deviation "Aggregate Deviation". This is a variable that measures whether a movie performed above or below its expectation given the movie information available previous to its Spanish release. To construct this variable, I run OLS of Spanish Box Office on US Box Office for those movies with US release in a sample of all movies released in Spain during the same period. The interviews with industry managers indicated that Spanish and US box office are highly positively correlated and that they use the latter as a good indicator of the movie performance in the Spanish market. I use the residuals of that OLS regression as the deviations from movie expectation at the national level. I also generate a dummy variable "Negative Aggregate Deviation" that takes value 1 if "Aggregate Deviation" takes a negative value and 0 otherwise, that is, if the movie underperformed according to my measure of expectations. Summary statistics of this deviation are in Table 3.

In order to construct the second and third type of deviation, I must first overcome a problem of data availability. I do not observe the revenue of each movie every week in every theater, but I do observe the revenue generated in every theater every week (across all movies showing in that theater and week). Since I observe which movies are playing in each theater in every period, I use variation in movie composition and theater size to disentangle movie revenues from theater revenues.

In order to do this, I use the results from the two-step estimation in Gil (2004) and Gil (2009). There, I use a much larger data set with a larger number of theaters and exhibition firms. I assign a starting box office revenue (A_i) and decrease (or increase) rates (γ_i and β_i) after the opening week that are movie specific such that $BOR_{it} = A_i e^{\gamma_i t + \beta_i t^2}$. My dependent variable is $\ln(BOR_{jt})$ which stands for the logarithm of the box office revenue for theater j in period t. In the first step, I fit equation (1),

$$\ln(BOR_{jt}) = \sum_{i \in j,t} [\ln(A_i) + \gamma_i l_{it} + \beta_i {l_{it}}^2] + \alpha_j + \delta_t + \epsilon_{jt} \quad (1)$$

where l_{it} stands for run length since the movie release of movie i in period t, α_j are theater fixed effects that capture both the impact of physical characteristics and relative success of each theater, and δ_t are period fixed effects. Therefore, $\ln(BOR_{jt})$ equals the sum of logarithms of revenue of

all movies playing in theater j in period t, being each one of them at different run lengths since each movie has its particular release. The parameters A_i, γ_i and β_i are the parameters of interest in this equation.

With these parameters for all movies playing, I compute an estimate of box office revenue amount to any movie i in any period t during its lth week $\widehat{BOR}_{it}$. I interpret this estimated movie box office revenue as a measure of how popular that movie is across theaters and weeks. I then use this measure of popularity to attribute proportional shares of the revenue (that I observe) at the theater level according to their share of popularity. In particular, I attribute a share of the observed revenue to each movie i in each theater j and period t equal to the share of popularity of that movie i in that theater j and that period t by applying the implied revenue common to all theaters and the estimated coefficients $\widehat{A}_i$, $\widehat{\gamma}_i$ and $\widehat{\beta}_i$, such that $s_{ijt} = \frac{\widehat{BOR}_{it}}{\sum_{i \in j,t} \widehat{BOR}_{it}}$.

Once I attribute the revenue across movies according to these shares, I can create my additional measures of demand deviation from expectations at the run and week level. I compute averages of revenue per movie run and week, and call the difference between the observations and the averages "Run Deviation" and "Run and Week Deviation," that is, the difference between BOR_{ijt} and the corresponding average $\overline{BOR}_{it}$ and the difference between BOR_{ij} and the corresponding average $\overline{BOR}_i$ respectively. Again, I generate dummy variables "Negative Run Deviation" and "Negative Week Deviation" that equal 1 if the particular "X' Deviation" takes negative value and 0 otherwise.

Table 1 and Table 2 show summary statistics of these two measures of demand shocks, and their respective dummy variables. Notice the decrease in the number of observations with respect to our initial analysis (down to roughly 15,000 observations). This is so because I only observe box office revenue at the theater level for 56 weeks, instead of the 78 weeks that we observe contracting practices for.

6 Empirical Evidence

Next, I test the empirical implications of the model. In the first subsection, I investigate the forces driving the decision of using formal contracting ex-ante and ex-post renegotiation and test the implications from the model regarding the probability and magnitude of renegotiation. In the second subsection, I investigate the existence of learning and test the implications above that relate the information driving the renegotiation decisions to the information driving the continuation decision of movies' runs.

6.1 Governance: Formal Contract or Not?

In Table 4, I empirically investigate the determinants of using formal written contracts versus relying on informal agreements. To do so, I run OLS regressions of the dependent variable "Any Formal Contract?" that takes value 1 if the movie run has a formal contract and 0 otherwise. I run specifications controlling for movie, run, theater and distributor characteristics first for all 5,204 runs observed in my data from column (1) to column (6).

Columns (1) to (3) show that there is a very strong positive and statistically significant correlation between "US Release" and "US Box Office" and the decision of using a formal contract. This is consistent with the first testable implication from our model. Distributors and exhibitors are more likely to use formal contracts when contracting over movies with higher expected revenues. This is so because the potential gains of reneging from an informal agreement are higher for movies with higher expected revenues and so distributors will use formal contracts to deter reneging from the part of exhibitors.

Since the testable implications also predict that higher values of future relationships lowers the likelihood of using formal contracts, in column (4) I include distributor fixed effects[15] to control for the unobservable (expected) future value of relationships between the 24 distributors and the exhibitor in the data set. Results in this column show that distributor fixed effects explain a big deal of the variation (the R^2 goes from 5% to 54%) and yet I observe that the decision of using formal contracts is correlated within a distributor with US Box Office release. This is direct evidence in support of the testable implications from the model presented above.

Columns (5) and (6) cluster observations at the distributor level (amid results in column (4)) and, despite not using distributor fixed effects, includes variables that proxy for the value of the distributor-exhibitor relationship. Column (5) uses averages of all movies per distributor in the data from 2001 and 2002 to proxy for the value of the relationship. These variables are very correlated with "US Release" and "US Box Office" and therefore it is not surprising to see that the latter do not come up statistically significant. Finally, in column (6) I include distributor performance for 2003 and 2004 as a way to proxy for the expectations of the distributor and exhibitor of the value of their future relationship. Here I find mixed results since the average number of admissions per movie in 2004 is positively correlated with the decision of using formal contracts whereas the average amount of revenues per movie in 2004 is negatively correlated. The former result is at odds with the predictions and the latter supports the prediction in that larger expected value will

[15] Since the data come from one exhibitor only, the inclusion of distributor fixed effects is equivalent to using distributor-exhibitor fixed effects and therefore I control this way for the different values of future distributor-exhibitor specific relationships.

lower the probability of using formal contracts.

Columns (7) to (12) repeat the same exercise in the previous six columns but only using the part of the data for which formal or informal contracts were used. This throws away the 125 runs for which formal contracts were only used after the first week since release and the 510 movie runs for second copies playing in a theater that started after the first week since release. Results in these columns are qualitatively equivalent to those in columns (1) to (6). Only results in column (10), where I include distributor fixed effects, are slightly different since in this case movies within the portfolio of a distributor are more likely to use formal contracts if had a US release (consistent with the prediction) but less likely to use formal contracts if collected higher US box office revenues.

6.2 Renegotiation

I divide this section in two parts that aim to answer two different questions. The first one is when firms ex-post adjust the ex-ante agreed contractual terms. Notice that ex-post contractual adjustment or renegotiation per se has two dimensions here since exhibitors may want to renegotiate the sharing term ex-ante specified and/or they may want to extend the run of the movie in a given theater beyond the number of weeks specified in the contract. In my data, 67% of movie runs with a formal contract are renegotiated at least once week and 21% of them see their run extend beyond the number of weeks previously contracted upon. Here I explore the causes of these two dimensions of renegotiation. The second question is what drives the magnitude of the ex-post sharing term renegotiation. In the data I observe renegotiation spreads, the difference between initial and final sharing term applied, that average 6% but go as high as 49%. Figure 4 shows the average initial and final sharing terms per week since release. The theory above has clear testable implications with respect to these two questions which I test using my data.

6.2.1 Extensive Margin: When to Renegotiate?

The second testable implication above establishes that if the exhibitor participation constraint is binding, we should observe renegotiation of terms. This could happen because the revenue (left-hand side of participation constraint) dropped or because the opportunity cost (right-hand side) rose. I test this implication using "Deviation from Expectations" at the aggregate, run and weekly level. These deviations from expectations represent changes in the left-hand side of the participation constraint while I try to control for changes in the right-hand side of the constraint by using theater and week characteristics.

Table 5 shows results from OLS regressions of average movie renegotiation on US Release dummy

variable, and the interaction of this variable with the total box office revenue of that movie in the US, its "Deviation from Expectation" and a "Negative Deviation?" dummy variable respectively such that

$$Avg\text{Reneg}_i = \alpha_0 + \alpha_1 US\text{Release} + \alpha_2 USBoxOffice + \alpha_3 Deviation + \epsilon_i.$$

I find that movies released in the US are less likely to be renegotiated, that movies that collected higher amounts of revenue in their US run are less likely to be renegotiated, and that movies performing below expectations in the Spanish market are more likely to be renegotiated. Results are robust across specifications. Estimates suggest that movies released in the US are 13 to 30 percentage points less likely to be renegotiated, an increase of one hundred million dollars of box office revenue collected in the US decreases renegotiation probability in 9 to 20 percentage points, a deviation of 10 million euros below expectation increases renegotiation probability by 32 percentage points, and that a negative deviation from expectation increases renegotiation probability on average by roughly 27 percentage points. Notice that these regressions contain only 217 of the 416 movies in the data. This is so because only 217 movies in the sample use at any given point formal contracts that can be in fact renegotiated ex-post.

I now proceed to provide evidence at the run and weekly level and show that the findings are consistent with testable implications and qualitatively similar to results in Table 5. Figure 4 above shows renegotiation averages per week since release for movies without a US release and movies with different levels of US box office revenues. The figure shows that average renegotiation is higher for movies with no US release at first but this converges quickly to the averages of the other groups of movies with US Release. Findings in this figure suggest that movies with more uncertain ex-ante audience appeal (no US release and low US box office revenues) are renegotiated more often during the first few weeks of their run, and that learning and endogenous movie attrition make these differences vanish in the long run.

Table 6a examines renegotiation outcomes at the movie run level using OLS regressions such that

$$\text{Reneg}_{ijt} = \alpha_0 + \alpha_1 US\_\text{Release}_i + \alpha_2 US\_BoxOffice_i + \alpha_3 Deviation_{ij} + \alpha_4 X_{jt} + \epsilon_{ijt},$$

where Reneg_{ijt} takes value 1 if renegotiated and 0 otherwise, $\overline{BoxOffice}_{it}$ is the average revenues of movie i in week t, $Deviation_{ijt}$ is the difference types of deviation from expectations (at the national level and at the run level), and X_{jt} are other controls at the theater, market and week level. Again results are robust across specifications. Results indicate that movies with US release are 20 to 30

percentage points less likely to experience sharing term renegotiation and that movies with higher US box office are more likely to experience renegotiation. These two results come through after holding constant the movie's deviation from expectations at the national and theater level. In this regard, consistent with Table 5, movies with negative deviation from expectations at the national level do worse and I find evidence that movie runs that do worse than other runs for the same movie in different theaters are more likely to be renegotiated (columns (1) and (2)). This latter result goes away once I include FE by theater which indicates that some theaters are more likely than others to perform worse for all movies. Columns (4) to (6) use distributor FE and distributor characteristics joint with clustered standard errors at the distributor level to examine whether the value of the distributor-exhibitor relationship matters for the incidence of renegotiation. Results in previous columns are robust to the inclusion of these variables and, if anything, the specification in column (6) shows that the value of the distributor-exhibitor relationship in the future (back then) years 2003 and 2004 matters for the use of renegotiation while keeping the previous results intact and using distributor clustered errors.

Table 6b examines the determinats of run extension running OLS regressions very similar to those in Table 6a. Not surprisingly, I find that movies with US release are more likely to see their run extended and that movies with negative deviation at the national level are 20 percentage points less likely to see their run extended. Negative deviation at the run level does not have an effect which basically informs us that movies tend to do better or worse than expected in all theaters. An interesting result from this table is the change in coefficient sign found after including distributor FE. Columns (1) to (3) show that movies with higher US box office are less likely to see their run extended and national deviation from expectation may not have an effect. Once I include distributor fixed effects, columns (4) to (6) show that the effect of high US box office revenues is reversed and positively correlated with run extension and negative national deviation is negatively correlated with run extension (as common intuition would predict). See that this change in coefficient sign denotes the fact that across all movies, movies with no US release and low US box office levels include fewer weeks in their contracts and therefore are more likely to see their run extended. Once we control for distributor fixed effects, many distributors that distribute few movies are washed out from the data and we are left with major distributors. These distributors see the runs of their movies with higher US box office revenues extended more often. Moreover, this table provides evidence consistent with the fact that run extension is negatively correlated with negative deviations from expectations and that distributor-exhibitor relationships matter.

In Table 7, I revisit again the question of what determines sharing term renegotiation but this time I use the data at its most decentralized level, by theater, movie, copy and week. I restrict the

sample to all those weekly observations using a formal contract and I run probit for the decision of whether to renegotiate a contract on any given week. The table reports marginal effects so that the interpretation of the results is easier. Results from columns (1) to (6) all show consistently that the probability of renegotiation goes up with lower levels of expected revenues and more negative values of deviations from expectations. In particular, I find that 1,000 Euros less in expected revenues increases the probability of renegotiation by 10 percentage points and that a deviation of 1,000 Euros below expectations increases the probability of renegotiation by 3 percentage points once I control for calendar week and theater fixed effects.

Evidence from column (2) in Table 7 also shows that deviation from expectations at the run and national level are also negatively correlated with the probability of renegotiation in any given week, as well as evidence that movies with US releases are less likely to experience renegotiation overall.

Evidence in this section shows that renegotiation is more likely to occur when movies experience negative deviations from expectations. This finding is robust both at the national, run and weekly level, and across specifications in Tables 5, 6a and 7. I also find evidence that run extensions are correlated with positive deviations. These results are both consistent with the second and third testable implications above.

6.2.2 Intensive Margin: How Much to Renegotiate?

Part of the second testable implication from the theory is that bigger decreases of revenue (left-hand side of the exhibitor participation constraint) or bigger increases of opportunity cost (right-hand side of the exhibitor participation constraint) should be associated with bigger adjustments in the sharing term. I test this implication by examining patterns in the magnitude of the "Run and Week Deviation" and the magnitude of the renegotiation spread observed in the data. If it is true that renegotiation under incomplete contracts works as a mechanism to adjust ex-post participation constraints, then the change in sharing terms will be equivalent to a transference of money from the distributor to the exhibitor. Following this, I call the difference between the initial and final shares the renegotiation spread paid to exhibitors.

In Table 8 I run OLS regressions with the spread as a dependent variable using all observations by estimating the equation

$$\text{Reneg}Spread_{ijt} = \alpha_0 + \alpha_1 \overline{BoxOffice}_{it} + \alpha_2 Deviation_{ijt} + \alpha_3 X_{jt} + \epsilon_{ijt},$$

where $\text{Reneg}Spread_{ijt}$ is the difference between initial share and final share in movie i, theater

j and week t, and all the controls are the same as those in the section above. Results indicate that exhibitors showing movies with lower revenue expectations (lower US revenues) are likely to obtain higher spreads, and that larger deviations from revenue expectations are associated to larger spreads. Columns (1) to (5) run the above specification for all observations with a formal contract and columns (6) to (10) show results for only those observations that were in fact renegotiated. Results are robust across all specifications and show that renegotiation spread is larger the larger the more negative the deviations from expectations are. These results also show that renegotiation spread is also larger the smaller the expected revenue. Both these results suggest that how much to renegotiate is determined by the condition of satisfying the exhibitor's participation constraint ex-post. It is interesting to observe how the spread increases with the number of movies released in every week (column (8)). This suggests that more movies released in a week increases the opportunity cost of showing the current movie in that same week, and therefore increases the renegotiation spread as the theory predicts.

Evidence in this section and the anecdotal evidence provided in the institutional section suggest that renegotiation in this industry is part of a mechanism to adjust ex-post participation constraints. This mechanism is sustained in equilibrium by the long term span of relationships that characterize the movie exhibition industry.

6.3 Learning

The fourth and fifth testable implications have to do with the use of new information in the current period on decisions concerning the run of movies. Exhibition contracts do not specify movie run length. This suggests that during the run of the movie there is new information revealed that helps parties maximize the value of their relationship. Therefore, the same new information that drives the renegotiation decision could be used to decide when to stop the movie run optimally. This implies that renegotiation decisions and the termination decisions are not independent. To analyze this feature of the model and test the hypothesis that agents use the same source of information (deviations from revenue expectations) to decide on both margins, I estimate a bivariate probit model with a likelihood function such that

$$L = \prod_{ijt} \Phi(X_{ijt}\beta^{\text{Reneg}}, X_{ijt}\beta^{\text{Cut}}, \rho^*)$$

where the two dependent variables are Renegotiation (1 if renegotiated and 0 otherwise) and Cut (1 if exhibitor terminates the movie's run in the following period and 0 if she does not), X_{ijt} are the control variables in the two latent equations and ρ^* is the existing correlation (to be estimated)

by the error terms of Reneg* and Cut* (the latent variables). See in Table 9 the results of this estimation.

The model suggests that if there is learning going on, the deviation variable must have explanatory value for the movie run stopping decision, but its effect must be smaller than it is for the renegotiation decision. The results of Table 9 confirm that negative deviations matter for movie run stopping decisions and that matter more for renegotiation decisions than they do for continuation decisions: coefficients compare 0.07 to 0.03 and 0.18 to 0.12. When testing the statistical significance of these differences, χ^2 statistics are 1.90 and 0.33 respectively (statistically significant at 85% and not significant at all respectively). Even though these differences fail to be statistically significant, the results qualitatively validate the model in the paper. Note as well that there is still a 22% to 23% statistically significant correlation between the two decisions (reported in Table 9).[16]

The effects of revenue expectation and deviation from expectation on the renegotiation decision do not vary qualitatively from those found in Tables 5, 6a and 7. Following the model, I test whether current revenue expectation matters. Some nice features out of the results in this table are the different effects that the number of screens and run length have for the two decisions under study here. The number of screens in the movie theater does not affect the renegotiation decisions since renegotiation only occurs if revenue goes below the opportunity cost of the screen in particular, but it does affect the continuation decisions on movie runs because multiplexes switch movies from screen to screen, whereas monoscreen theaters simply switch movies. I find that an increase in the number of screens does not affect renegotiation decision, but decreases the probability of contract termination. I also find that an increase in run length decreases renegotiation probability (less uncertainty at the end of the run of the movie due to the endogenous movie attrition), but increases the probability of contract termination.

The model also suggests that movies with less precise prior distribution will be more sensitive to negative deviations from expectations than movies with more precise prior distribution. To test this implication, I divide the sample into 4 different groups of movies: movies not released in the US (control group), movies released in the US that collected less than 50 million US$ (FilmB), movies that collected between 50 and 100 million US$ (FilmC), and movies that collected over $100 million (FilmD). Results from this specification (Table 9, column (4)) suggest that FilmD and FilmC movies are less sensitive to negative revenue deviations from expectations than movies not released in the US and FilmB movies. See that negative deviations affect similarly the probability of renegotiation for all three types of movies (B, C and D), but it affects less the probability of

[16] The existence of this correlation could mean that there may be other explanations driving the two decisions, or that my measures of revenue expectation and its deviation from expectation are not accurate enough.

stopping the movie run for those movies with stronger priors (C and D movies).

The evidence earlier in the paper in Figures 4.B and 4.C indicated support for the implications of learning that I analyze in this section. Movies with different ex-ante information and different uncertainty levels (US Release and US revenue collection) start their run with different renegotiation probabilities and renegotiation spread paid ex-post. More uncertain movies have always higher renegotiation probabilities and higher premiums than less uncertain movies. Despite this, differences vanish as movie runs continue. This fact is consistent with the idea that as information reveals and uncertainty disappears, exhibitors continue the run of a movie taking into account the new information. This means that the information existing previously to the movie release cannot explain patterns in renegotiation probability and spreads after a few weeks.

The evidence in this last section suggests that exhibitors learn gradually about the demand of a movie and that use this new information to optimally adjust sharing terms (renegotiation) and maximize the value of the contractual relationship by stopping the run of a movie when optimal. This finding is not only important to characterize the maximizing behavior of firms by using all the available information, but also to justify an important characteristic in movie exhibition contracts: movie run length is not specified in the contract. The fact that firms do better by letting exhibitors economize the use of new information than by fixing a contract length is the reason why exhibition contracts are incomplete with respect to the movie run length (even though run length is perfectly observable and verifiable in front of a court of law).

7 The Benefits of Using Informal and Relational Contracts

In this section I present the results of a back of the envelope calculation of the impact of using informal contracts (and relational contracts) in my data in the Spanish movie exhibition industry through the use of a very straightforward back-of-the-envelope calculation. To accomplish this goal, I need to establish a credible counterfactual, that is, a scenario where informal contracting is not available, that will serve as a comparison reference to the actually observed outcome. Here I evaluate the impact of using informal contracts on the length of movie runs and on the revenues generated jointly and separately by the exhibitor and distributor. It is interesting to document how these gains vary along the four groups of movies that I have distinguished along the paper. These four groups are movies not released in the US, movies released in the US that collected less than 50 million USD, movies released in the US that collected between 50 and 100 million USD and movies released in the US that collected above 100 million USD.

In building the counterfactual number we make different assumptions depending on whether

the movie run used a formal contract at all. On one hand, for those movie runs that used a formal contract (3,375 runs) we assume that without informal agreements the exhibitor would never extend the movie run beyond the first week that renegotiation of the sharing term occurs and that the movie run would never extend beyond the number of weeks formally specified in the contract. On the other hand, for those movie runs that never used a formal contract (1,194 runs) we assume that these would never go beyond their first week of release since they need of the informal agreement already in the first week. Finally, for those movie runs that are recorded in our data set as using formal and informal contracts (510 + 125 runs) I account for the likely presence of measurement error and assume that these runs would have not extended beyond the last week of formal contracting or the first week of formal contracting with renegotiation.

See results on the impact on run length in Table 10a. Overall the movie runs in the data, our estimates indicate that on average the combination of formal and informal contracting doubles the run length of movies from 1.9 to 3.9 weeks. This estimate is clearly affected by the extreme assumption that movies with no formal contract whatsoever would be cut after the first week. For this reason, I separate movies into groups and show that movies with a formal contract show a similar estimate from 2.1 to 3.9 weeks. I also separate movies in groups according to their US performance and show that the effect is stronger for movies with no US release and similar for movies with US release and different levels of US performance. In particular, movies that collected less than 50 million US$ would have their run length increase from 1.7 to 3 weeks and run lengths for blockbusters (more than 100 million US$) would go from 2.4 to 5 weeks.

In Table 10b, I repeat this same exercise for the subsample of movies for which I have box office revenues available. The estimates of the impact on run length are qualitatively the same as those in Table 10a. The results in this table are interesting because they provide upper bound estimates of the effect of relying on informal contracting on box office revenues as well as distributor and exhibitor revenues separately. Overall averages show that box office revenues would double from 6,700 to 13,300 euros and that both and that the exhibitor would benefit more than the distributor. This holds across movie types and contractual governances held. This is because the main effect of using informal contracts is seen on run length increases and exhibitors keep higher shares the longer is movie kept on screen.

Finally, even though I estimate the existence and quantify the gains of using informal contracts, the question of whether using informal and formal contracts offers same outcomes remains. For this reason, I offer evidence of the effect of using an informal contract (as opposed to a formal contract) on the probability of stopping a movie run holding constant expected revenues, deviation from expectations, and other theater and week characteristics. Table 11 offers results of running

OLS on the dependent variable CUT that takes value 1 if that week is the last week in a movie run and 0 otherwise. The two independent variables of interest are the dummy variables "Run Use Formal Contract" and "Week Use Formal Contract." These two differ in that a given observation in the data may belong to a movie run that used a formal contract for its first part of the run, but the observation itself may be part of the extension of such run as specified on the contract. In such case, that observation would take value 1 on the former variable and 0 in the latter.

Results in Table 11 show that whether an observation is relying on a formal contract lowers the probability of stopping the run of a movie. See that this result is robust to the inclusion of expected weekly revenues, deviation from expectations and all sort of week and theater characteristics. This finding is also robust to the inclusion of fixed effects of different sorts such as week since release, calendar week, theater and movie copy number. Finally, notice that in column (7) I use movie-week since release fixed effects and still the results holds. This specification is comparing then outcomes of the same movie in the same week since release across theaters and movie copies while using theater and movie copy fixed effects.

Overall the findings in this section indicate that even though there are gains of using informal agreements to sustain the run of movies that are difficult to contract upon ex-ante, the embeded uncertainty in the renegotiation mechanism may deter theaters some times to extend the run length of these movies in the same way that they would if a formal contract would be in place.

8 Concluding Remarks

In this paper, I empirically investigate the use of formal, informal and relational contracting in the Spanish movie exhibition industry. To do so, I document the fact that in this industry distributors and exhibitors contracting over box office revenues may not use a formal contract and when they do they may adjust ex-post the contractual terms set ex-ante by renegotiating sharing terms or the run length of movies in their screens. I argue that firms in this setting are able to use this informal agreements (informal contracts, ex-post renegotiation and endogenous run length termination) when reneging temptations are minimized by the value of future interactions and the choice of contractual governance. They will choose the type of contract that governs their transactions to enhance efficiency in their contractual relationships. The existence of uncertainty ex-ante and learning ex-post as well as the existence of long-term business relationships are crucial ingredients to the interplay between formal and informal contracts observed in the data. I then test for the determinants of the use of formal contracting, of whether sharing term renegotiation and run extensions occur, and whether learning takes place.

I test the implications of my model using a new data set of renegotiated contract terms in the Spanish movie industry. I find that movies with higher revenue expectations, and therefore stronger reneging temptations, are more likely to use formal contracts. I also find evidence that distributor specific characteristics matter for whether formal contracts are used and see this as evidence that the distributor-exhibitor relationship specific value condition the use of formal versus informal contracting. In the second part of the empirical analysis, I show that negative deviations from revenue expectation increase the probability of renegotiation. This is consistent at the aggregate (national), the movie run and weekly level. Similarly, I find that the magnitude of these deviations determines the magnitude of the renegotiation. Besides these, anecdotal evidence from interviews with industry managers supports the model implications that cannot be captured in the data. I take these results as supporting evidence of the theory.

Finally, I investigate the existence of learning across periods. Firms use information valuable for renegotiation purposes to optimally decide when to stop the run of a movie. This is important because the existence of learning across weeks allows firms to realize the benefits from using informal agreements (in combination with formal contracts) over only using formal contracts. This permits them not to commit to a contract of fixed length, and therefore maximize profits from that contractual relationship by updating their decisions every week to the new incoming information. This seems indicative that firms optimally choose to write incomplete contracts on the movie run length not only because of unobservability or unverifiability, but also to maximize the value of the contractual relationship. I provide at the end of the paper a back of the envelope calculation that shows that on average the run length of movies and box office revenues of movie runs doubles thanks to the combination of formal contracts and informal agreements. Because this finding hinges on the fact that I held constant the formal contract at use in the hypothetical case of informal contracts not being available, this result is only an upper bound of what the real impact of the interplay of formal and informal contracts is. Nevertheless, this is still indicative that its effect is very important and in no case negligible.

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Figure 1. Sample Contract

Date

Contract/Confirmation

Distribution Firm Exhibition Firm

Contract #. The two people signing this contract, one as a representative of the distribution firm and the other as a representative of the exhibition firm, agree on the current date to formalize the contract of rights disposal and the handing over of the movie material indicated below. This contract is driven by the conditions specified in the front and the back of it. The two parties signing the contract understand and recognize that all of those conditions are clauses of this contract.

Theater: ---------- City: ----------

Opening Date | Type | Number of Days| Movie Title | Version | Format | Dolby | Duration | Length | Rating | Exhibition License #

Contract Specific Conditions

1st Week Share | 2nd Week Share | 3rd Week Share | 4th Week Share | 5th Week Share | 6th Week Share
Overtime Share Specified if Applicable.

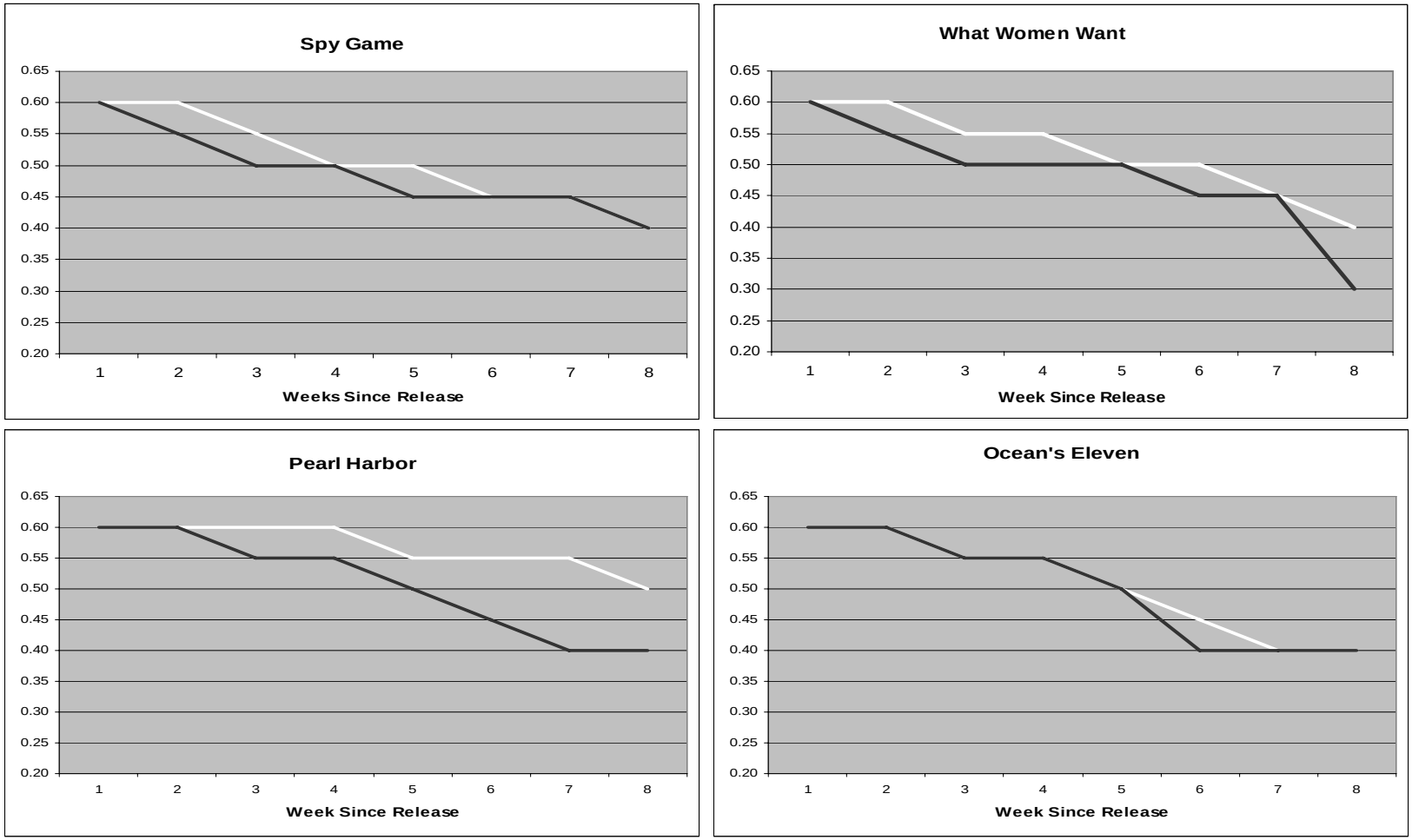
Some Contracts Specify Management, Previews and Advertising Expenses. Others include the number of seats and screen that they want the movie to be showed on, and some extreme cases include the retailing Price

Distributor's Signature Exhibitor's Signature

General Conditions

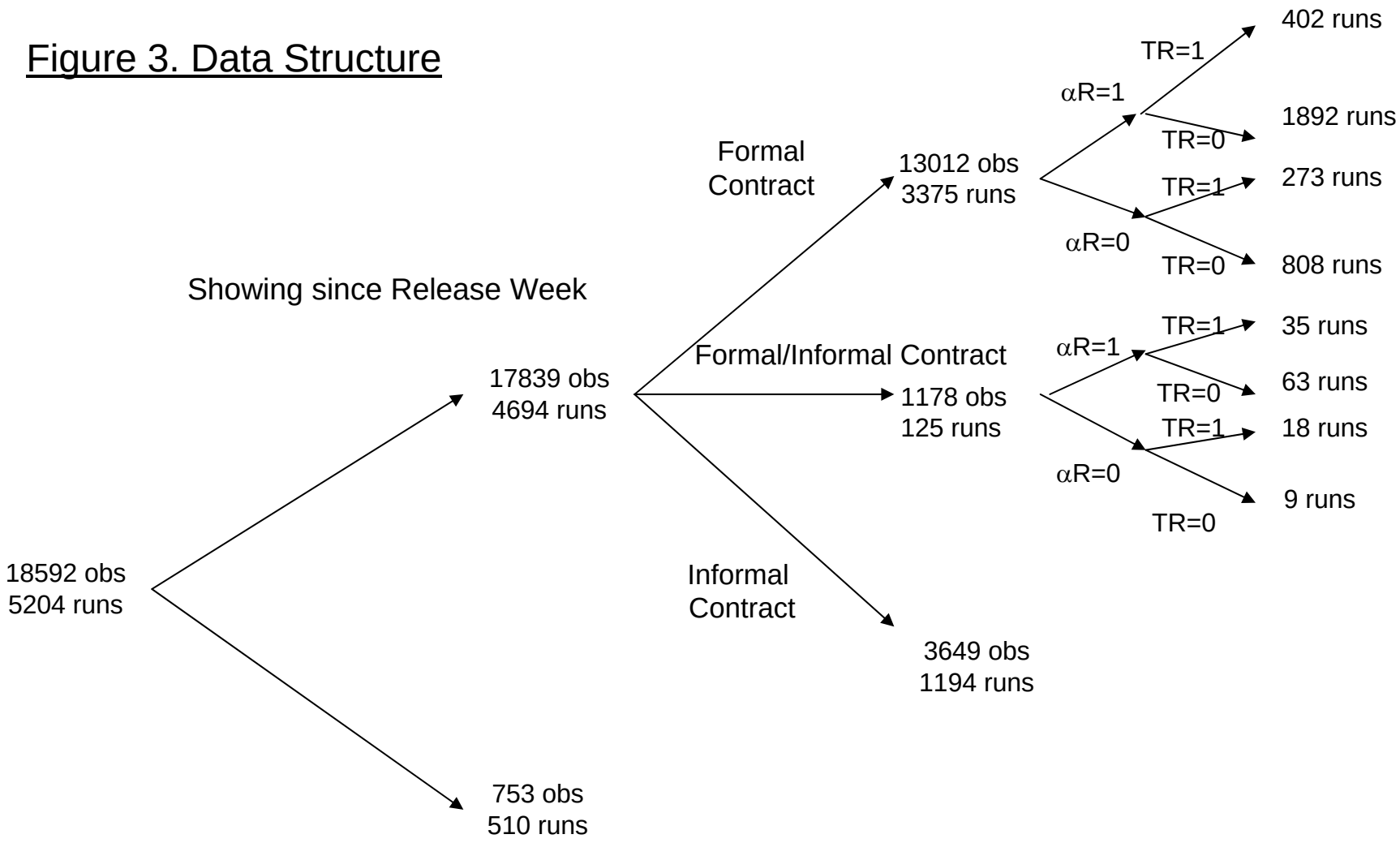
- Goal of the Contract.
- Exhibition Period.
- Movie copy, previews and advertising material.
- Publicity.
- Privacy and Confidentiality.
- Auditing and Monitoring Rights.
- Taxes.
- Movie Title Change.
- Contract Length.
- Means of Payment.
- Special Discount Day.
- Unilateral Contract Termination.
- Court Enforceability.

Figure 2. Example of Renegotiation across Weeks since Release for 4 Different Movies



Note: In these four graphs I compare renegotiation patterns for movie runs of four different well-known movies. The white line shows the initial shares specified in the contract and the black line shows the final share at which distributor and exhibitor split revenues. A gap between the two lines denotes renegotiation occurred. These graphs show that there is now pre-established pattern in renegotiation and that this is driven by ex-post weekly movie performance in its theater. See for example that “Spy Game” and “What Women Want” alternated renegotiation and no renegotiation, whereas “Pearl Harbor” saw their terms renegotiated almost every week and “Ocean’s Eleven” seldom experienced renegotiation.

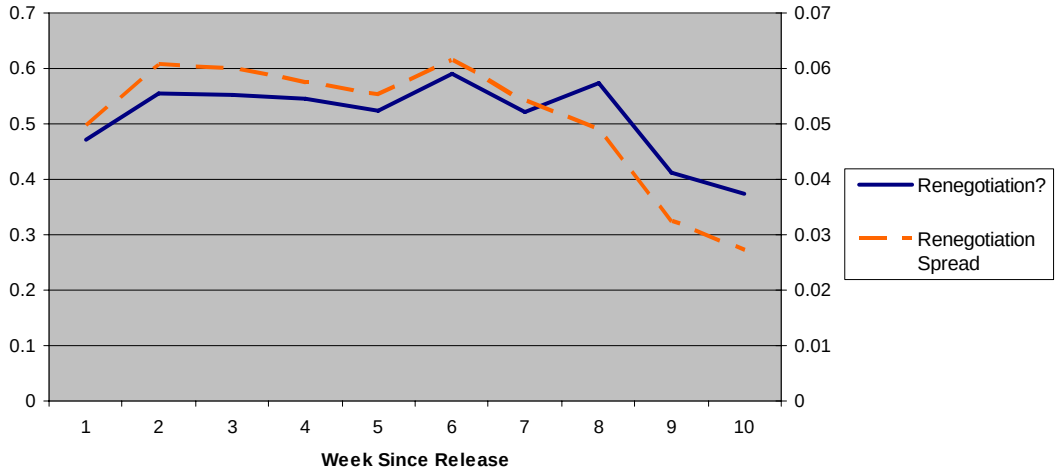
Figure 3. Data Structure



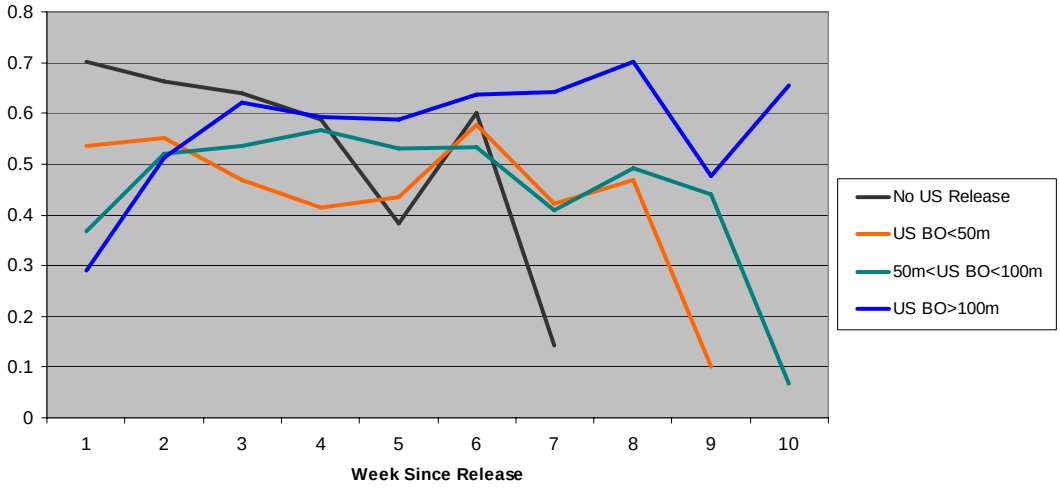
Note:
αR=Share Renegotiation
TR=Run Extension

Figure 4. Renegotiation and Renegotiation Spread across Weeks since Release

A. Renegotiation and Renegotiation Spread Averages across All Movies



B. Renegotiation Averages by Movie Type



C. Renegotiation Spread Averages by Movie Type

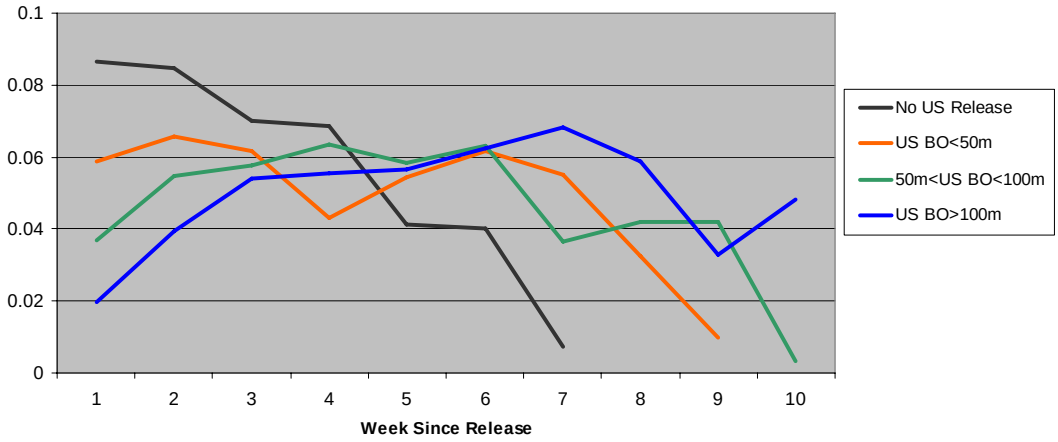


Table 1. Summary Statistics at the Movie Run Level

All Sample

Variable	Count	Mean	Std. Dev.	Min	Max
Share Renegotiation?	3904	0.67	0.47	0	1
Run Extension?	3500	0.21	0.41	0	1
Run Length	5204	3.88	3.17	1	31
Contract Run Length	3904	3.52	2.35	1	23
No Contract Used?	5204	0.25	0.43	0	1
No. Movie Copy	5204	1.34	0.71	1	7
Contract on Release Week?	5204	0.73	0.45	0	1
Deviation from Expectation (€)	3993	51.03	1216.13	-5266.17	6887.87
Negative Deviation?	3993	0.53	0.50	0	1

Informal Contract

Variable	Count	Mean	Std. Dev.	Min	Max
Run Length	1194	3.07	2.31	1	24
No. Movie Copy	1194	1.17	0.57	1	7
Deviation from Expectation (€)	897	15.71	1311.20	-5266.173	6887.87
Negative Deviation?	897	0.54	0.50	0	1

Informal/Formal Contract

Variable	Count	Mean	Std. Dev.	Min	Max
Share Renegotiation?	125	0.80	0.40	0	1
Run Extension?	125	0.42	0.50	0	1
Run Length	125	10.43	5.92	2	27
Contract Run Length	125	7.58	2.74	2	16
No. Movie Copy	125	1.43	0.77	1	5
Deviation from Expectation (€)	103	578.37	1399.94	-1730.092	3996.78
Negative Deviation?	103	0.37	0.48	0	1

Formal Contract

Variable	Count	Mean	Std. Dev.	Min	Max
Share Renegotiation?	3375	0.68	0.47	0	1
Run Extension?	3375	0.20	0.40	0	1
Run Length	3375	3.93	3.09	1	31
Contract Run Length	3375	3.39	2.28	1	23
No. Movie Copy	3375	1.27	0.67	1	7
Deviation from Expectation (€)	2556	33.88	1154.40	-3821.705	4861.64
Negative Deviation?	2556	0.54	0.50	0	1

Additional Copies Contract After Release

Variable	Count	Mean	Std. Dev.	Min	Max
Share Renegotiation?	404	0.54	0.50	0	1
Run Length	510	3.86	2.57	2	24
Contract Run Length	404	3.38	1.46	2	9
No Contract Used?	510	0.21	0.41	0	1
No. Movie Copy	510	2.18	0.60	2	7
Contract on Release Week?	510	0.79	0.41	0	1
Deviation from Expectation (€)	437	99.48	1291.56	-5266.173	4861.64
Negative Deviation?	437	0.53	0.50	0	1

This table offers summary statistics of contract characteristics per movie run for the whole sample.
Then I divide observations in groups for whether the movie run uses formal, informal contract or both.

Table 2. Summary Statistics at the Theater/Movie/Week Level

All Sample

Variable	Count	Mean	Std. Dev.	Min	Max
No Contract Used?	18592	0.34	0.47	0	1
Share Renegotiation?	12446	0.53	0.50	0	1
Run Extension?	13590	0.15	0.35	0	1
Deviation from Expectation (€)	15125	1.44	1371.14	-7518.19	12687.83
Negative Deviation?	15125	0.55	0.50	0	1
Ln(US Box Off Conc Releases)	18592	18.52	1.28	0	19.83
Initial Share	12291	0.52	0.06	0.3	0.6
Final Share	12291	0.47	0.09	0.06	0.6
Renegotiation Spread	12291	0.06	0.07	0	0.49

Informal Contract

Variable	Count	Mean	Std. Dev.	Min	Max
Deviation from Expectation (€)	3009	-53.41	1354.52	-6430.49	9876.49
Negative Deviation?	3009	0.54	0.50	0	1
Ln(US Box Off Conc Releases)	3649	18.42	1.60	0	19.83

Formal/Informal Contract

Variable	Count	Mean	Std. Dev.	Min	Max
No Contract Used?	1178	0.49	0.50	0	1
Share Renegotiation?	600	0.65	0.48	0	1
Run Extension?	578	0.48	0.50	0	1
Deviation from Expectation (€)	1028	225.44	1566.09	-4671.8	10642.97
Negative Deviation?	1028	0.51	0.50	0	1
Ln(US Box Off Conc Releases)	1178	18.60	0.98	11.44	19.82
Initial Share	600	0.51	0.06	0.4	0.6
Final Share	600	0.43	0.10	0.3	0.6
Renegotiation Spread	600	0.08	0.08	0	0.25

Formal Contract

Variable	Count	Mean	Std. Dev.	Min	Max
No Contract Used?	13012	0.14	0.35	0	1
Share Renegotiation?	11288	0.53	0.50	0	1
Run Extension?	13012	0.13	0.34	0	1
Deviation from Expectation (€)	10488	1.49	1354.79	-7518.19	12687.83
Negative Deviation	10488	0.55	0.50	0	1
Ln(US Box Off Conc Releases)	13012	18.53	1.21	0	19.82
Initial Share	11133	0.53	0.06	0.3	0.6
Final Share	11133	0.47	0.08	0.18	0.6
Renegotiation Spread	11133	0.06	0.07	0	0.34

Additional Copies Contract After Release

Variable	Count	Mean	Std. Dev.	Min	Max
No Contract Used?	753	0.26	0.44	0	1
Share Renegotiation?	558	0.49	0.50	0	1
Deviation from Expectation (€)	600	-108.02	1342.49	-6430.49	9798.87
Negative Deviation	600	0.60	0.49	0	1
Ln(US Box Off Conc Releases)	753	18.74	0.95	11.44	19.82
Initial Share	558	0.51	0.06	0.4	0.6
Final Share	558	0.46	0.09	0.06	0.6
Renegotiation Spread	558	0.06	0.07	0	0.49

In this table, I provide summary statistics of variables used in the analysis at the theater/movie/week level.

Table 3. Summary Statistics of Theater, Movie and Distributor Characteristics

Theater Characteristics

Variable	Count	Mean	Std. Dev.	Min	Max
Seats	26	1756.65	823.76	396	3875
Screens	26	7.19	3.51	1	16
Exhibitor Seat Mkt Share	26	0.41	0.32	0.05	1

Movie Characteristics

Variable	Count	Mean	Std. Dev.	Min	Max
US Release	416	0.6105769	0.4882066	0	1
Spanish Box Office (€ m)	416	2245879	4040259	0.002	30.90
US Box Office ($ m)	254	46.50	62.20	0.001	404.00
Deviation from Expectations (€ m)	254	83596.19	2600930	-10.50	21.40
Negative Deviation?	254	0.60	0.49	0	1

Distributor Characteristics

Variable	Count	Mean	Std. Dev.	Min	Max
No. Movies 2001-02	24	22.46	22.46	1	70
Avg. US Box Office 2001-02	24	21.46	25.18	0	72.53
Avg. Spanish Box Office 2001-02	24	1.39	1.16	0.01	3.47
No. Movies 2003	24	36.88	33.47	0	93.00
Avg. Admissions 2003	24	101364.40	129337.20	0	529970.90
Avg. Spanish Box Office 2003	24	469165.60	597296.40	0	2455702
No. Movies 2004	24	38.875	32.0303	0	88
Avg. Admissions 2004	24	94473.53	129897.4	0	442169.7
Avg. Spanish Box Office 2004	24	453173.7	625081.3	0	2119449

This table provides summary statistics for all the variables used at the theater, movie and distributor level.
I obtain the distributor characteristics for 2001-02 collapsing information in this same data set at the distributor level. I obtain the distributor characteristics for 2003 and 2004 from a yearly bulletin published by the Spanish Ministry of Culture. From there, I obtain information on the top 25 biggest distributors in Spain for 2003 and 2004. If a distributor is missing, I attribute a zero.

Table 4. OLS Regressions on the Decision of Whether Using Formal or Informal Contracts for Movie Exhibition Contracting

Dependent Variable:	**Any Formal Contract?**						**Formal Contract Versus Informal Contract**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**	**(12)**
US Release	0.1079	0.1040	0.0983	0.0076	-0.0144	0.0521	0.0936	0.0929	0.0869	0.0225	-0.0095	0.0651
	(0.0176)***	(0.0177)***	(0.0176)***	(0.0126)	(0.0463)	(0.0572)	(0.0184)***	(0.0184)***	(0.0183)***	(0.0129)*	(0.0478)	(0.0547)
US Box Office	0.0005	0.0005	0.0005	0.0002	0.0001	0.0001	0.0005	0.0005	0.0004	-0.0001	-0.0001	-0.0002
	(0.0001)***	(0.0001)***	(0.0001)***	(0.0001)**	(0.0003)	(0.0004)	(0.0001)***	(0.0001)***	(0.0001)***	(0.0001)*	(0.0003)	(0.0002)
Screens	-0.0161	-0.0158					-0.0186	-0.0185				
	(0.0059)***	(0.0059)***					(0.0065)***	(0.0065)***				
Seats	0.0001	0.0001					0.0001	0.0001				
	(0.00002)***	(0.00002)***					(0.00003)***	(0.00003)***				
No. Movie Copy	0.0008						-0.0059					
	(0.0094)						(0.0120)					
No. Movies 2001-02					0.0081						0.0087	
					(0.0025)***						(0.0032)**	
Pctg US Releases 2001-02					1.1529						1.1704	
					(0.3432)***						(0.3804)***	
Pctg Spain Movies 2001-02					1.5019						1.5072	
					(0.4766)***						(0.4791)***	
Avg. US Box Office 2001-02					0.0008						0.0003	
					(0.0025)						(0.0031)	
No. Movies 2003						0.0074						0.0072
						(0.0078)						(0.0078)
Avg. Admissions 2003						-0.0000001						0.00001
						(0.00002)						(0.00002)
Avg. Spanish Box Office 2003						-0.0000004						-0.000002
						(0.000004)						(0.000005)
No. Movies 2004						-0.0008						0.0002
						(0.0078)						(0.0078)
Avg. Admissions 2004						0.0002						0.0002
						(0.00004)***						(0.00005)***
Avg. Spanish Box Office 2004						-0.00003						-0.00003
						(0.00001)***						(0.00001)***
Constant	0.5998	0.5998	0.6315	0.7389	-0.7169	-0.0185	0.5965	0.5887	0.6373	0.7273	-0.7318	-0.0702
	(0.0248)***	(0.0233)***	(0.0148)***	(0.0209)***	(0.3053)**	(0.2052)	(0.0269)***	(0.0248)***	(0.0151)***	(0.0211)***	(0.3129)**	(0.2054)
FE Movie Copy	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
FE Theater	No	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes
FE Distributor	No	No	No	Yes	No	No	No	No	No	Yes	No	No
Cluster Se Distributor	No	No	No	No	Yes	Yes	No	No	No	No	Yes	Yes
Observations	5204	5204	5204	5204	5204	5204	4569	4569	4569	4569	4569	4569
R-squared	0.03	0.03	0.05	0.54	0.38	0.33	0.03	0.03	0.05	0.58	0.39	0.37

Note: In this table, I show OLS regressions of the decision of whether to use formal or informal contracts at the movie run level. Notice that the same movie could be showing in different screens in a theater at the same time and therefore I may observe multiple runs of a movie per theater.
The dependent variable in columns (1) to (6) is whether the run ever uses a formal contract, while in columns (7) to (12) I eliminate those runs that use indiscriminately formal and informal contracts and the dependent variable becomes a dummy variable that takes value 1 if uses formal contract and 0 if informal contract consistently.
Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5. OLS Regressions on Frequency of Renegotiation of Sharing Terms at the Movie Level

Dependent Variable: Frequency of Share Renegotiation?

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
US Release	-0.1351	-0.1459	-0.1459	-0.0647	-0.0858	-0.0858	-0.3097	-0.2731	-0.2731
	(0.0553)**	(0.0556)***	(0.0587)**	(0.0743)	(0.0741)	(0.0539)	(0.0716)***	(0.1006)***	(0.0529)***
US Box Office ($m)	-0.0011	-0.0009	-0.0009	-0.0020	-0.0016	-0.0016	-0.0009	-0.0014	-0.0014
	(0.0003)***	(0.0004)*	(0.0007)	(0.0005)***	(0.0007)**	(0.0006)**	(0.0004)*	(0.0006)**	(0.0005)**
Deviation from Expectation (€m)		-0.0319	-0.0319		-0.0320	-0.0320			
		(0.0106)***	(0.0113)**		(0.0128)**	(0.0089)***			
Negative Deviation?							0.2492	0.2757	0.2757
							(0.0639)***	(0.0852)***	(0.0390)***
Constant	0.8126	0.8126	0.8126	0.7997	0.7973	0.7973	0.8126	0.7958	0.7958
	(0.0358)***	(0.0359)***	(0.0731)***	(0.0456)***	(0.0454)***	(0.0541)***	(0.0359)***	(0.0445)***	(0.0563)***
FE Release Week	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Cluster SE Distributor	No	No	Yes	No	No	Yes	No	No	Yes
Observations	217	217	217	217	217	217	217	217	217
R-squared	0.09	0.13	0.13	0.38	0.4	0.4	0.16	0.43	0.43

Note: The dependent variable in the OLS regressions of this table is "Frequency of Share Renegotiation?" To construct this variable, I looked at the 217 movies in the data that use at any given point a formal contract and I calculate how often the shares in these formal contracts are renegotiated.
Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6a. The Determinants of Share Renegotiation at the Movie Run Level

Dependent Variable:	**Share Renegotiation?**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
US Release	-0.3140	-0.2997	-0.3040	-0.2232	-0.2453	-0.2261
	(0.0254)***	(0.0256)***	(0.0255)***	(0.0222)***	(0.0951)**	(0.0452)***
US Box Office ($m)	0.0012	0.0012	0.0010	0.0006	0.0010	0.0005
	(0.0001)***	(0.0001)***	(0.0001)***	(0.0001)***	(0.0005)*	(0.0004)
Negative Deviation Spain?	0.1628	0.1547	0.1640	0.1904	0.1303	0.1903
	(0.0203)***	(0.0202)***	(0.0201)***	(0.0168)***	(0.0452)**	(0.0467)***
Negative Deviation Run?	0.0408	0.0410	0.0054	-0.0094	0.0059	-0.0073
	(0.0185)**	(0.0184)**	(0.0228)	(0.0197)	(0.0163)	(0.0183)
Screens	0.0050	0.0044				
	(0.0086)	(0.0086)				
Seats	0.00003	0.00003				
	(0.00004)	(0.00004)				
No. Movie Copy	-0.1029					
	(0.0153)***					
Run Length	0.0017	0.0008	0.0043			
	(0.0028)	(0.0027)	(0.0028)			
No. Movies 2001-02					-0.0007	
					(0.0044)	
Pctg Spain Movies 2001-02					-0.1992	
					(0.8761)	
Pctg US Releases 2001-02					-0.9197	
					(0.7858)	
Avg. US Box Office 2001-02					0.0042	
					(0.0040)	
No. Movies 2003						0.0021
						(0.0008)**
Avg. Admissions 2003						0.0002
						(0.00002)***
Avg. Spanish Box Office 2003						-0.00003
						(0.000004)***
No. Movies 2004						-0.0148
						(0.0013)***
Avg. Admissions 2004						-0.0003
						(0.00002)***
Avg. Spanish Box Office 2004						0.0001
						(0.00001)***
Constant	0.7676	0.6325	0.7963	0.8181	1.2847	1.9092
	(0.0421)***	(0.0376)***	(0.0245)***	(0.0331)***	(0.7647)	(0.0932)***
FE Copy	No	Yes	Yes	Yes	Yes	Yes
FE Theater	No	No	Yes	Yes	Yes	Yes
FE Distributor	No	No	No	Yes	No	No
Cluster SE Distributor	No	No	No	No	Yes	Yes
Observations	3001	3001	3001	3001	3001	3001
R-squared	0.08	0.1	0.11	0.34	0.15	0.33

Note: In this table I show results of running OLS regressions on whether share renegotiation occurs within the movie run.

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6b. The Determinants of Run Extension at the Movie Run Level

Dependent Variable:	**Run Extension?**					
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
US Release	0.0349	0.0364	0.0338	0.1427	-0.1914	0.1286
	(0.0206)*	(0.0207)*	(0.0208)	(0.0251)***	(0.0738)	(0.0683)*
US Box Office ($m)	-0.0009	-0.0009	-0.0009	0.0005	0.0008	0.0008
	(0.0001)***	(0.0001)***	(0.0001)***	(0.0001)***	(0.0004)**	(0.0004)*
Negative Deviation Spain?	-0.0039	-0.0059	-0.0054	-0.1809	-0.1927	-0.1864
	(0.0165)	(0.0167)	(0.0167)	(0.0177)***	(0.0602)**	(0.0621)**
Negative Deviation Run?	0.0147	0.0148	0.0090	0.0224	0.0233	0.0213
	(0.0147)	(0.0147)	(0.0182)	(0.0213)	(0.0312)	(0.0305)
Screens	-0.0009	-0.0010				
	(0.0069)	(0.0069)				
Seats	0.00001	0.00001				
	(0.00003)	(0.00003)				
No. Movie Copy	0.0280					
	(0.0120)**					
Run Length	0.0725	0.0723	0.0728			
	(0.0032)***	(0.0032)***	(0.0033)***			
No. Movies 2001-02					-0.0010	
					(0.0018)	
Pctg Spain Movies 2001-02					-0.2833	
					(0.2948)	
Pctg US Releases 2001-02					0.0897	
					(0.2230)	
Avg. US Box Office 2001-02					0.0001	
					(0.0026)	
No. Movies 2003						0.0006
						(0.0014)
Avg. Admissions 2003						0.0001
						(0.00004)
Avg. Spanish Box Office 2003						-0.00001
						(0.00001)
No. Movies 2004						-0.0043
						(0.0013)***
Avg. Admissions 2004						-0.000004
						(0.00002)
Avg. Spanish Box Office 2004						0.000001
						(0.000004)
Constant	-0.0972	-0.0595	-0.0517	0.2318	0.4615	0.5143
	(0.0323)***	(0.0299)**	(0.0196)***	(0.0401)***	(0.1879)**	(0.0711)***
FE Copy	No	Yes	Yes	Yes	Yes	Yes
FE Theater	No	No	Yes	Yes	Yes	Yes
FE Distributor	No	No	No	Yes	No	No
Cluster SE Distributor	No	No	No	No	Yes	Yes
Observations	2659	2659	2659	2659	2659	2659
R-squared	0.34	0.34	0.35	0.16	0.12	0.14

Note: In this table I show results of running OLS regressions on whether movie run is extended beyond the run length included in the formal contract.

Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 7. Marginal Effects on Probit Regressions on Renegotiation Decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Expected Revenue (€K)	-0.0190	-0.0102	-0.0200	-0.0219	-0.1005	-0.0936
	(0.0043)***	(0.0045)**	(0.0045)***	(0.0045)***	(0.0111)***	(0.0115)***
Deviation from Expectation (€K)	-0.0426	-0.0263	-0.0448	-0.0458	-0.0001	-0.0340
	(0.0040)***	(0.0075)***	(0.0044)***	(0.0044)***	(0.0047)***	(0.0069)***
US Release		-0.1944				
		(0.0151)***				
Deviation National Level (€m)		-0.0053				
		(0.0012)***				
Deviation Run Level (€K)		-0.0216				
		(0.0084)**				
Screens			0.0113	0.0116	0.0103	
			(0.0055)**	(0.0056)**	(0.0058)*	
Seats			-0.00003	-0.00003	-0.00002	
			(0.00002)	(0.00002)	(0.00002)	
Exhibitor Seat Mkt Share			0.0230	0.0202	0.0162	-0.0932
			(0.0173)	(0.0174)	(0.0178)	(0.0845)
Ln(US Box Off Conc Releases)			-0.0022	0.000004		
			(0.0044)	(0.0045)		
Week Since Release			0.0118			
			(0.0023)***			
FE Week Since Release	No	No	No	Yes	Yes	Yes
FE Calendar Week	No	No	No	No	Yes	Yes
FE Theater	No	No	No	No	No	Yes
Observations	8768	8768	8768	8760	8760	8760

Note: In this table, I run probit regressions on the decisions to renegotiate a formal contract and provide estimates of the marginal effect according to Stata. The sample then is constrained by observations for which which revenue information is available and appear to be supported by a formal contract.
Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 8. OLS Regressions on Renegotiation Spreads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Expected Revenue (€K)	-0.0041	-0.0040	-0.0045	-0.0130	-0.0123	-0.0053	-0.0054	-0.0057	-0.0152	-0.0150
	(0.0006)***	(0.0006)***	(0.0006)***	(0.0013)***	(0.0013)***	(0.0007)***	(0.0007)***	(0.0007)***	(0.0022)***	(0.0022)***
Deviation from Expectation (€K)	-0.0065	-0.0062	-0.0063	-0.0066	-0.0044	-0.0047	-0.0041	-0.0042	-0.0050	-0.0041
	(0.0005)***	(0.0005)***	(0.0005)***	(0.0005)***	(0.0007)***	(0.0008)***	(0.0008)***	(0.0008)***	(0.0008)***	(0.0011)***
Screens		0.0012	0.0012	0.0010			-0.0004	-0.0004	-0.0002	
		(0.0008)	(0.0008)	(0.0007)			(0.0009)	(0.0009)	(0.0009)	
Seats		-0.00001	-0.000005	-0.000003			-0.000001	-0.000001	-0.000001	
		(0.000003)	(0.000003)	(0.000003)			(0.000004)	(0.000004)	(0.000004)	
Exhibitor Seat Mkt Share		0.0035	0.0031	0.0025	-0.0252		0.0008	0.0008	0.0011	-0.0226
		(0.0024)	(0.0024)	(0.0023)	(0.0106)**		(0.0029)	(0.0029)	(0.0028)	(0.0126)*
Ln(US Box Off Conc Releases)		-0.0001	0.0004				0.0014	0.0020		
		(0.0006)	(0.0007)				(0.0008)*	(0.0008)**		
Week Since Release		-0.0005					-0.0016			
		(0.0003)					(0.0004)***			
Constant	0.0696	0.0714	0.0612	0.0955	0.0607	0.1267	0.1125	0.0966	0.1677	0.2024
	(0.0024)***	(0.0118)***	(0.0120)***	(0.0058)***	(0.0158)***	(0.0029)***	(0.0149)***	(0.0152)***	(0.0092)***	(0.0522)***
FE Week Since Release	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes
FE Calendar Week	No	No	No	Yes	Yes	No	No	No	Yes	Yes
FE Theater	No	No	No	No	Yes	No	No	No	No	Yes
R-squared	0.02	0.02	0.04	0.11	0.12	0.02	0.03	0.04	0.12	0.13
Observations	7749	7749	7749	7749	7749	3873	3873	3873	3873	3873

Note: In this table, I run OLS regressions on the dependent variable Renegotiation Spread. Columns (1) to (5) include all weekly observations that have a formal contrac whereas columns (6) to (10) only include all those observations that are indeed renegotiated. These are also restricted by those observations for which revenue informatio is available. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%

Table 9. Biprobit of Share Renegotiation and Movie Run Stopping Decisions

	(1) Share Renegotiation?	(2) Movie Run Stopping?	(3) Share Renegotiation?	(4) Movie Run Stopping?	(5) Share Renegotiation?	(6) Movie Run Stopping?	(7) Share Renegotiation?	(8) Movie Run Stopping?
Expected Revenue	-0.00004	-0.00008	-0.00004		-0.00003	-0.00008	-0.00003	-0.00006
	(0.00001)***	(0.00001)***	(0.00001)***		(0.00001)***	(0.00001)***	(0.00001)***	(0.00001)***
Revenue				-0.00008				
				(0.00001)***				
Deviation from Expectation	-0.00012	-0.00010	-0.00012	-0.00002				
	(0.00002)***	(0.00002)***	(0.00002)***	(0.00002)				
Negative Deviation?					0.1716	0.1494	0.6207	0.5090
					(0.0679)**	(0.0484)***	(0.0897)***	(0.0815)***
Negative Deviation*Film B							-0.5946	-0.0811
							(0.0699)***	(0.06557)
Negative Deviation*Film C							-0.5554	-0.5168
							(0.0759)***	(0.0603)***
Negative Deviation*Film D							-0.4067	-0.6925
							(0.0769)***	(0.0788)***
Screens	0.0307	-0.0362	0.0307	-0.0362	0.0311	-0.0360	0.0289	-0.0360
	(0.0260)	(0.0161)**	(0.02596)	(0.0161)**	(0.03252)	(0.0209)*	(0.03308)	(0.0199)*
Seats	-0.0001	0.0001	-0.0001	0.0001	-0.0001	0.0001	-0.0001	0.00004
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Exhibitor Seat Mkt Share	0.0566	-0.0195	0.0566	-0.0195	0.1182	0.0270	0.1233	0.0382
	(0.0643)	(0.0465)	(0.0643)	(0.0465)	(0.0851)	(0.0586)	(0.0875)	(0.0659)
Ln(US Box Off Conc Releases)	-0.0210	0.0315	-0.0210	0.0315	-0.0212	0.0315	-0.0197	0.0350
	(0.0111)*	(0.0103)***	(0.0111)*	(0.0103)***	(0.0110)*	(0.0101)***	(0.0114)*	(0.0100)***
Week Since Release	-0.0011	0.0590	-0.0011	0.0590	-0.0006	0.0593	0.0008	0.0816
	(0.0124)	(0.0089)***	(0.0124)	(0.0089)***	(0.0124)	(0.0088)***	(0.0118)	(0.0110)***
No. Movie Copy	-0.1493	0.5068	-0.1493	0.5068	-0.1504	0.5040	-0.1586	0.6003
	(0.0249)***	(0.0546)***	(0.0249)***	(0.0547)***	(0.0243)***	(0.0548)***	(0.0255)***	(0.0647)***
Constant	0.5680	-1.6546	0.5680	-1.6546	0.5044	-1.7132	0.4843	-1.9942
	(0.2635)**	(0.2035)***	(0.2635)**	(0.2035)***	(0.2800)*	(0.1996)***	(0.2832)*	(0.2080)***
Correlation	0.2238		0.2238		0.2316		0.2360	
	(0.0224)***		(0.0224)***		(0.0236)***		(0.0230)***	

Note: All specifications in this table contain 7749 observations. See that we only run this exercise for those weekly observations that rely on a formal contract.
Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10a. Impact of Informal and Relational Contracting on Run Length for the Full Sample

All runs (5,204 obs)

	Mean	Std. Dev.
Counterfactual Run Length	1.93	1.57
Observed Run Length	3.88	3.17

By Contractual Governance:

Formal Contract (3,375 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.05	1.62
Observed Run Length	3.93	3.09

Formal/Informal Contract (125 obs)

	Mean	Std. Dev.
Counterfactual Run Length	4.64	2.22
Observed Run Length	10.43	5.92

Informal Contract (1,194 obs)

	Mean	Std. Dev.
Counterfactual Run Length	1.00	.
Observed Run Length	3.07	2.31

Additional Copies Contract After Release (510 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.69	1.49
Observed Run Length	3.86	2.57

By Movie Type:

No US Release (1,063 obs)

	Mean	Std. Dev.
Counterfactual Run Length	1.35	0.90
Observed Run Length	3.09	2.60

US Release & US Box Off < $50m (1,787 obs)

	Mean	Std. Dev.
Counterfactual Run Length	1.68	1.20
Observed Run Length	3.03	2.09

US Release & $100m > US Box Off > $50m (1,129 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.35	1.83
Observed Run Length	4.81	3.45

US Release & US Box Off > $100m (1,135 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.43	1.97
Observed Run Length	4.95	4.05

Note: In this table I compare observed movie run length with run length under counterfactual when informal contracts and renegotiation are not used. See that I assume counterfactual run length to be 1 if only informal contracting is used.

Table 10b. Impact of Informal and Relational Contracting on Run Length for the Sample with Available Revenues

All runs (3,834 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.04	1.65
Observed Run Length	3.97	3.34
Revenue	13393.18	15814.91
Counterfactual Revenue	6699.51	7872.43
Distributor Revenue	6067.02	6900.82
Counterfactual Distr Revenue	3622.97	4104.44
Exhibitor Revenue	7326.16	9091.73
Counterfactual Exhib Revenue	3076.53	3832.25

By Contractual Governance:

Formal Contract (2,451 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.19	1.70
Observed Run Length	4.01	3.22
Counterfactual Revenue	7685.54	8304.76
Revenue	14198.77	15624.30
Counterfactual Distr Revenue	4159.55	4315.93
Distributor Revenue	6590.93	7002.50
Counterfactual Exhib Revenue	3525.99	4043.22
Exhibitor Revenue	7607.84	8772.64

Formal/Informal Contract (103 obs)

	Mean	Std. Dev.
Counterfactual Run Length	4.63	2.37
Observed Run Length	11.20	6.26
Counterfactual Revenue	23747.27	12485.31
Revenue	46424.46	32597.34
Counterfactual Distr Revenue	12606.40	6186.69
Distributor Revenue	19912.67	11916.17
Counterfactual Exhib Revenue	11140.87	6432.48
Exhibitor Revenue	26511.78	21023.39

Informal Contract (977 obs)

	Mean	Std. Dev.
Counterfactual Run Length	1.00	0.00
Observed Run Length	3.11	2.30
Counterfactual Revenue	3257.26	2139.85
Revenue	10476.97	10256.66
Counterfactual Distr Revenue	1812.51	1231.72
Distributor Revenue	4476.19	4469.04
Counterfactual Exhib Revenue	1444.76	1170.83
Exhibitor Revenue	6000.78	5988.27

Additional Copies Contract After Release (303 obs)

	Mean	Std. Dev.
Counterfactual Run Length	3.25	1.42
Observed Run Length	3.99	2.60
Counterfactual Revenue	4027.48	2668.20
Revenue	5051.23	4517.45
Counterfactual Distr Revenue	2066.50	1405.19
Distributor Revenue	2251.93	1925.31
Counterfactual Exhib Revenue	1960.98	1298.99
Exhibitor Revenue	2799.31	2680.76

By Movie Type:

No US Release (770 obs)

	Mean	Std. Dev.
Counterfactual Run Length	1.34	0.88
Observed Run Length	2.96	2.56
Counterfactual Revenue	4220.44	4341.24
Revenue	10066.70	10886.20
Counterfactual Distr Revenue	2259.36	2121.79
Distributor Revenue	4215.07	4524.82
Counterfactual Exhib Revenue	1961.08	2288.60
Exhibitor Revenue	5851.64	6482.27

US Release & US Box Off < $50m (1,261 obs)

	Mean	Std. Dev.
Counterfactual Run Length	1.78	1.26
Observed Run Length	3.06	2.15
Counterfactual Revenue	5536.90	6143.88
Revenue	9779.11	10553.24
Counterfactual Distr Revenue	2903.68	3093.53
Distributor Revenue	4339.20	4715.98
Counterfactual Exhib Revenue	2633.23	3134.52
Exhibitor Revenue	5439.91	5950.47

US Release & $100m > US Box Off > $50m (957 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.48	1.90
Observed Run Length	4.99	3.47
Counterfactual Revenue	8273.54	8630.14
Revenue	16890.46	17239.02
Counterfactual Distr Revenue	4455.91	4424.43
Distributor Revenue	7724.51	7439.40
Counterfactual Exhib Revenue	3817.63	4257.12
Exhibitor Revenue	9165.95	9988.51

US Release & US Box Off > $100m (846 obs)

	Mean	Std. Dev.
Counterfactual Run Length	2.56	2.05
Observed Run Length	5.12	4.41
Counterfactual Revenue	8908.21	10397.94
Revenue	17851.60	21472.30
Counterfactual Distr Revenue	4994.01	5546.95
Distributor Revenue	8453.03	9231.05
Counterfactual Exhib Revenue	3914.20	4893.36
Exhibitor Revenue	9398.57	12474.49

Note: In this table I compare observed outcomes with outcomes calculated under counterfactual when informal contracts and renegotiation are not used. See that I assume counterfactual run length to be 1 if only informal contracting is used.

Table 11. The Effect of Using Formal Contracts on Movie Run Stopping Decisions

Dependent Variable: Stop Movie Run

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Run Use Formal Contract?	-0.0316	-0.0236	-0.0615	-0.0608	0.0019	0.0060	0.0179
	(0.0144)**	(0.0140)*	(0.0162)***	(0.0163)***	(0.0156)	(0.0153)	(0.0259)
Week Use Formal Contract?	-0.0404	-0.0468	-0.0344	-0.0378	-0.0761	-0.0779	-0.1053
	(0.0126)***	(0.0124)***	(0.0142)**	(0.0143)***	(0.0143)***	(0.0140)***	(0.0192)***
Expected Revenue		-0.00001	-0.00001	-0.00001	-0.00004	-0.00003	
		(0.000003)***	(0.000004)***	(0.000004)***	(0.00001)***	(0.00001)***	
Deviation from Expectation		-0.00003	-0.00002	-0.00002	-0.00003	-0.00002	-0.000004
		(0.000003)***	(0.000004)***	(0.000004)***	(0.000003)***	(0.000004)***	(0.000003)
Screens			-0.0023	-0.0014	-0.0018		
			(0.0047)	(0.0047)	(0.0044)		
Seats			0.0000	0.0000	0.0000		
			(0.0000)	(0.0000)	(0.0000)		
Exhibitor Seat Mkt Share			0.0078	0.0073	-0.0011	0.0136	-0.0093
			(0.0155)	(0.0155)	(0.0140)	(0.0611)	(0.0398)
Ln(US Box Off Conc Releases)			0.0042	0.0028			
			(0.0030)	(0.0030)			
Week Since Release			0.0069				
			(0.0015)***				
No. Movie Copy			0.1864				
			(0.0159)***				
Constant	0.3176	0.3619	0.1163	0.3564	0.3676	0.2901	0.2707
	(0.0071)***	(0.0150)***	(0.0609)*	(0.0596)***	(0.0338)***	(0.0699)***	(0.0455)***
FE No. Movie Copy	No	No	No	Yes	Yes	Yes	Yes
FE Week Since Release	No	No	No	No	Yes	Yes	No
FE Calendar Week	No	No	No	No	Yes	Yes	Yes
FE Theater	No	No	No	No	No	Yes	Yes
FE Movie-Week Since Release	No	No	No	No	No	No	Yes
Observations	13562	13562	13562	13562	13562	13562	13562
R-squared	0	0.01	0.06	0.07	0.15	0.15	0.51

Note: In this table, I show results from OLS regressions where the dependent variable takes value 1 if the movie run is stopped in that period. The two main variables of interest are "Run Use Formal Contract?" and "Week Use Formal Contract?". The former takes value 1 if the movie run uses a formal contract at the beginning of its run and 0 otherwise. The latter takes value 1 if the week observation itself uses a formal contract. Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.