

**SOCIAL NETWORKS AND EXCHANGE:
SELF-CONFIRMING DYNAMICS IN HOLLYWOOD⁺**

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Draft: November 3, 2003

Word count: ~10,800

⁺ We wish to thank Linda Peak and Melissa Wang for their able research assistance, the UCLA Center for Communication Policy for financial support, and Andrew Anslie and Xavier Drèze for data access. The development of this paper benefited from discussions with Misiak Piskorski and Mike Ryall, comments from Bjørn Løvås and Ezra Zuckerman, and remarks by seminar participants at Harvard and Stanford; the usual disclaimer nonetheless applies.

ABSTRACT

Studies have consistently found that social structure influences who transacts with whom, and that actors appear to benefit when exchange occurs embedded within these relations rather than in an unstructured market. Explanations for these results frequently point to their effectiveness in solving problems inherent in the trade of certain products and services, focusing on the ability of these social networks to provide access to private information regarding the quality of the goods or to allow participants to enforce the terms of the exchange agreement. In investigating these dynamics in the interaction between movie producers and distributors, this paper, however, suggests that a type of self-confirming prophecy can also produce such effects: One party frequently offers better terms of trade in transactions embedded within existing social relations, thereby contributing to the apparent benefits of such exchange patterns. In the motion picture industry, not only do distributors show a preference for carrying films involving key personnel with whom they have prior relations, but also they tend to favor these films when making decisions regarding their release – in determining opening dates and the amount of resources devoted to marketing. Empirical estimates of the performance of movies in the U.S. box office reveal that – when models fail to account for these key decisions – distributors appear to benefit from carrying movies affiliated with known parties, suggesting that they have private information regarding the quality of the talent involved. After controlling for marketing effort and seasonality, however, these effects disappear, indicating that, rather than arbitraging price-quality inconsistencies, distributors produce these effects through their own efforts.

INTRODUCTION

One of the best-known findings in economic sociology is that pre-existing social structures play a prominent role in determining who transacts with whom.¹ Evidence for this patterning of exchange appears both in the local and global topologies of trading networks. At the most narrow, dyadic, level, for example, researchers find that individuals and organizations tend to interact repeatedly with the same trading partners even when many alternatives (i.e. substitutes) exist (Gouldner, 1960; Geertz, 1978; Baker, 1990). Meanwhile extensions investigating the structure of the indirect relations surrounding a potential exchange dyad demonstrate that the cohesiveness of these local structures appears to increase the probability of exchange (Simmel, 1908; Portes and Sensenbrenner, 1993; DiMaggio and Louch, 1998). Though developed in a largely distinct line of literature, this logic also underlies the more macro-level (global topology) arguments surrounding the importance of status as a characteristic structuring the market: Central positions in the exchange network attract more potential trading partners (Veblen, 1899; Podolny, 1993; see Gould, 2002, for an analytical treatment), once again suggesting that social structure influences patterns of trade.

A closely related line of empirical research meanwhile demonstrates that these embedded exchanges provide economic benefits to those that engage in them. Uzzi (1996), for instance, finds lower failure rates among garment manufacturers that interact more intensively with a limited set of exchange partners. Stuart (2000) demonstrates that semiconductor firms in alliances with highly innovative partners benefit both in terms of their own rate of innovation and in sales growth. And in the Sydney hotel market, Ingram and Roberts (2000) show that hotels with managers who have more extensive and cohesive networks to rivals enjoy higher utilization rates, a key measure of success in that industry.² Investigating the broader pattern of relations, Podolny (1993) finds that high status investment banks – those occupying axial positions in debt syndication networks – can extract larger margins (fees) on the most attractive deals in the corporate debt market (see also Stuart, Hoang and Hybels, 1999, for an examination of initial public offerings). Though the granularity of the measurement of social structure differs across these settings, all point to a link between position in this structure and rewards.

In seeking to explain these patterns, social scientists have typically highlighted two mechanisms through which social networks might engender more efficient exchange. The first centers on the access to private information that these networks afford prior to a transaction. In cases where potential exchange partners differ substantially in the quality

¹ Though this assertion likely holds true for the broader definition of social structure as well, our usage of the term denotes only its more narrow sense of referring to the pattern of relations linking actors in a social system (Laumann, 1966).

² Evidence for the benefits of embedded exchange has accumulated with particular speed in the literature on organizations. Several studies, for example, find positive relationships between position in corporate directorate interlocks and firm performance (e.g., Mizruchi, 1992; Geletkanycz and Hambrick, 1997), connect repeated transactions between buyers and suppliers to more cooperative behavior and improved performance of buyers (e.g., Heide and Miner, 1992; Zaheer, McEvily and Perrone, 1998), and link the stability of a firm's network of strategic alliance partners to its financial performance, innovativeness and longevity (e.g., Mitchell and Singh, 1996; Powell, Koput and Smith-Doerr, 1996), to name but a few.

of their offerings and actors find it difficult to evaluate this heterogeneity *a priori*, information regarding the likely quality of these alters or their wares through prior experience with them, or through the prior experience of others, may inform the selection of exchange partners (Granovetter, 1985; Podolny, 1993). A second explanation revolves around the ability of social networks to aid in the enforcement of contracts, either through better observation of whether the other party completed their side of the bargain, or induced via the application of more effective threats of punishment in response to non-compliance (Bott, 1957; Coleman, 1990).

Though both of these factors likely explain the frequency of embedded exchange in many important settings, these circumstances need not exist to foment the development of stable, network-based patterns of trade. Indeed, we contend that a type of self-confirming prophecy might also account for this pattern of findings: Not only do actors prefer to exchange with known parties (i.e. those with whom they share prior relations or indirect ties), but also – most likely believing these parties higher quality or more trustworthy – they offer them better terms of trade and invest more in the transaction when they do exchange. Such favorable treatment itself can contribute to the success of their partners. Consider an example: An investor might offer better terms to a businessperson with whom he shares a connection because he feels less uncertain regarding the likely success of the venture. The lower cost of capital implied, however, may well boost the venture's performance, thereby confirming the investor's original expectations – even though the venture would have under-performed if it had obtained market interest rates. By virtue of their actions, market participants thus enact the very results that they expect.³

Despite the fact that prior work has alluded to such a self-confirming dynamic, it has remained in the background in both theoretical and empirical research on the dynamics of exchange. Many discussing the importance of trust in facilitating transactions, for example, note that trust may have little grounding in actual differences in the reliability of potential exchange partners (e.g., Geertz, 1978; Coleman, 1990); nonetheless, efforts to portray trust as a rational basis for action largely dominate the literature. Podolny (1993) similarly defines status only in terms of perceived quality and notes that the structure of exchange relations may impede the alignment of these perceptions with the true underlying values, but nonetheless maintains that status rankings loosely correspond to true quality distinctions among producers. Hence, though admitting its possibility, the literature has largely downplayed it and – to our knowledge – failed to investigate it empirically.⁴

³ The idea of self-confirming dynamics enjoys a long history. Indeed, the concept appears in many classic literary works, particularly tragedies. Merton (1948) first identified the importance of these processes to issues of sociological interest (though he attributes the idea to the earlier – though far less explicit – writings of W.I. Thomas), largely in the context of labeling and stratification. Recent analytic work (e.g., Fudenberg and Levine, 1993; Kalai and Lehrer, 1993; Ryall, 2003; see also Hayek, 1937) has brought this notion to the economic realm and demonstrated the potential for stable 'subjective' equilibrium when observed payoffs correspond to actors' expectations.

⁴ A more robust history of emphasizing the importance of these self-reinforcing processes, however, appears in the sociology of science (Merton's, 1968, work on the 'Matthew effect' in scientific careers). And a strong awareness of the potential for self-confirming dynamics and a research tradition also exists in the sociology of education where experimental manipulation has been used to identify these effects.

In addition to elaborating a theory of how these self-confirming dynamics might persist, this paper also provides evidence that this explanation appears to explain embedded exchange in at least one setting: the motion picture industry. In particular, we examine the relationship between production companies – teams of producers, writers, directors and actors who cooperate to make a film – and distribution companies. Our results show that distribution companies show a strong preference for working repeatedly with the same sets of individuals, and that – without controls for the effort the distributor invests in marketing these films – a strategy of repeated interaction appears to yield higher U.S. box office revenue. If one controls for the actions of the distributor, however, these differences disappear, suggesting that distribution companies produce this result through their own actions. Distributors, moreover, apparently would benefit from allocating their resources more evenly across exchange partners.

The results potentially have a wide range of important applications. At a theoretical level, it reinforces one of the most central ideas in sociology – the distinction between the actor and the position. Particularly among work that attributes the benefits of embedded exchange to search, researchers rely heavily on an exogenously determined distribution of underlying quality as an explanation for the patterns of exchange. These results, on the other hand, suggest that researchers should exercise particular caution when attributing the benefits of social position to qualities of the actors occupying them, as many important aspects of exchange behavior may remain hidden from participants and researchers alike. At a more applied level, these ideas call attention to the importance of unobserved (and endogenous) behaviors across many types of exchange. For example, in internal labor markets, sponsorship networks may engender replication of the demographic characteristics among the upper echelon of employees, creating a ‘glass ceiling’ for those employees excluded from these mentoring relations.

THE ANTECEDENTS OF EMBEDDED EXCHANGE

In the large and growing body of studies demonstrating the importance of social structure in channeling the movement of resources and shaping the patterns of exchange, researchers have focused primarily on two classes of theory to explain their results.⁵ The first highlights the value of access to private information regarding the true quality of a good prior to exchange. A second points to the importance of social networks in

Rosenthal and Jacobson (1968), for example, demonstrate in their classic experiment that randomly assigning students to a ‘gifted’ condition improved their performance in the classroom. More recently, Lovaglia and his colleagues (1998) produced similar effects on standardized test scores by randomly identifying students as ‘high status’ prior to the administration of the exam. The relative paucity of research in economic contexts may reflect the difficulty of obtaining systematic information on the intervening variable: the amount of effort and resources allocated to exchange.

⁵ Though less common in the literature, some explanations – for example, those based on power (e.g., Pfeffer and Salancik, 1978; Markovsky, Willer and Patton, 1988) – draw on alternative explanations for embedded exchange. Power-based accounts, in particular, offer little purchase in this setting: Our research seeks to explain why distributors favor known parties when selecting among films. If certain production companies had substantial power over distributors that might explain their ability to extract favorable terms, but if anything the power asymmetry in this industry runs in the opposite direction (i.e., distributors have more power than film production companies; Cones, 1997; Caves, 2000).

mitigating opportunism when the nature of the transaction opens actors to this agency problem.

PRE-EXCHANGE: ACCESS TO INFORMATION

Much of the work seeking to explain the prevalence of embedded exchange has identified access to private information as a key issue in understanding the value of transacting with a circumscribed set of potential exchange partners. The idea that information diffuses through social networks has a long tradition in sociology, particularly investigating the diffusion of innovations (Ryan and Gross, 1943; Coleman, Katz and Mendel, 1966). Studies emphasizing the importance of access to private information prior to exchange extend this insight to the process of selecting from a menu of potential products or producers: Many types of goods and services vary along a quality dimension. When buyers have difficulty accurately observing this quality *a priori*, atomistic markets fail. Buyers worried about receiving low quality goods only offer bids for the value of these inferior products; sellers of high quality goods, unable to receive fair compensation for them, meanwhile may remove their wares from the market – a situation labeled by Akerlöf (1970) as the ‘lemons’ problem. Access to private information – for example, from personal experience or from other parties that have previously transacted with a vendor – can ameliorate this problem by reducing buyer uncertainty regarding the quality of the goods being offered. Geertz (1978) points to this explanation as a key reason why individuals repeatedly purchase goods from the same vendors in peasant bazaars. And DiMaggio and Louch (1998) find that when uncertainty afflicts the quality of a good, consumers prefer to purchase from suppliers with whom they share mutual contacts since they assume they would have heard about quality problems, if any existed, through their network. Even the growing literature on the importance of ‘structural holes’ points to this issue, highlighting the value of the extensiveness of the reach of an actor’s networks in providing information regarding the availability of exchange opportunities (Burt, 1992).⁶

To a large extent, this logic also underlies the substantial literature highlighting the benefits of status in exchange. Under conditions of uncertainty, actors prefer to exchange with higher status partners. This pattern occurs, according to Podolny (1993), because status itself acts as a signal in the absence of more direct evidence of the underlying quality of goods offered by a producer (Gould, 2002, demonstrates analytically and provides some evidence that these status differences likely exaggerate actual heterogeneity in the quality distribution, but stratification still arises from these underlying quality differentials). Hence, explanations of the rents associated with status frequently attribute them to signals of an actor or good’s quality. Stuart, Hoang and Hybels (1999), for instance, point prominently to such an account in discussing their finding that biotech firms affiliated with higher status partners enjoy both better odds of going public (i.e. selling stock on an exchange) and greater investor demand when they do sell equity. Kim and Laumann (2003) similarly attribute the greater wages earned by

⁶ A structural hole refers to a situation in which an actor has ties to two otherwise unconnected parties. Burt (1992) argues that this relational pattern reduces redundancy in the information that the focal actor receives through his network.

lawyers affiliated with higher status attorneys, particularly early in their careers, to the signaling that these relations provide regarding their (difficult to observe) skill.

Though less commonly identified as a key factor, access to information can also benefit actors subsequent to the selection of a trading partner. Embedded relations facilitate the transfer of highly tacit knowledge, which might allow one or both parties in an exchange to improve their production processes or to innovate more effectively. Studying product development teams in a high tech company, for instance, Hansen (1999) finds that strong ties appear particularly valuable in transferring the dense technological knowledge important to these projects. The value of dense relations between parties also appears in the literature on organizational learning. Darr, Argote and Epple (1995), for example, show that spillovers in learning across pizza franchisees occur only among those belonging to the same owner (see also, Thornton and Thompson, 2001, for evidence from ship building). Strong relations between broadcaster and recipient of knowledge prove particularly important when sharing complex, tacit knowledge that requires bi-directional communication for effective transfer. Hence, the potential value of access to information in embedded exchange extends beyond the selection process.

In the film industry, access to at least two types of information might prove advantageous to distributors. On the one hand, distributors must select among the thousands of projects pitched to them to decide which they will choose to market and distribute to theaters. Though a famous quip claims that “Nobody knows anything” (Goldman, 1984, p. 39), industry participants clearly believe that certain stars draw audiences, that some directors usually deliver good films and that a few producers have good instincts for producing winning pictures (Litwak, 1986). And they act on these beliefs. Better access to information may allow distributors to either pursue likely winners with the hopes of locking up a contract before rivals become aware of the opportunity, or see hidden value in a project comprising participants whose true talent the market has not generally realized (e.g., the undiscovered talent or the rising star). Once an agreement has been made, strong ties might also facilitate the exchange of dense information crucial to targeting the right audience and marketing the picture successfully. Distributors could therefore benefit from transacting repeatedly with the same parties, or with those with whom they have strong indirect connections.

POST-EXCHANGE: ENFORCEMENT OF AGREEMENTS

Embedded relations can also prove useful following an exchange in ensuring its completion according to the terms of the (possibly implicit) contract. When exchange does not occur simultaneously, uncertainty frequently surrounds whether the individual or organization moving last in the sequence of transactions agreed upon will fulfill their obligations (Løvås and Sorenson, 2003).⁷ In these situations, social networks facilitate

⁷ The importance of this uncertainty appears quite starkly in the comparison of finite and infinite period repeated games. In Prisoners’ Dilemma games, for example, rational actors cooperate under a wide variety of conditions in infinite period games. In situations where players know the final period, on the other hand, all players usually defect. The behavioral difference reflects uncertainty on the outcome of the final exchange (and a weak assumption of opportunistic behavior): Players fail to cooperate because they believe that the other party will defect on them in the final round (backward induction then propagates these effects

exchange in several ways. Both prior experience between the parties and secondary connections through other actors allow each participant to develop stronger – though possibly inaccurate – expectations of the behavior of the other (Granovetter, 1985; Sorenson and Stuart, 2001). A more intense relationship, involving both more frequent and more intimate contact, and shared indirect ties also increases the capacity of each actor to monitor the other (Merry, 1984). Moreover, the ability to coordinate sanctioning activity afforded by cohesive network structures raises the expected severity of punishment to actors that might consider renegeing on their agreements (Bott, 1957; Coleman, 1990). Though difficult to disentangle from the effects of pre-exchange selection in many contexts, situations in which the primary risk involves defection – as opposed to unobserved heterogeneity in quality – offer the clearest examples of these mechanisms in practice. Portes and Sensenbrenner's (1993) description of the lending practices among members of ethnic enclaves thus comes to mind: Business owners in these communities lend each other substantial amounts, frequently even without writing contracts, yet defection (default) on these loans occurs infrequently. Baker (1984) also points to social cohesion as an important factor in keeping options traders in the market, maintaining liquidity and reducing volatility.

Though less prominent in the literature on status, reputation may also play a role in ensuring the faithful completion of a contract. To the extent that exchange partners can extract better prices based on their status, these very reputations may hold them hostage to honoring the terms of an agreement lest they lose this advantage. This argument appears most frequently in the game theoretic economics literature examining why rational actors would invest in the establishment of brand names and how this branding activity can solve market failures due to information asymmetry (e.g., Akerlöf, 1970; Kreps and Wilson, 1982; see Charness and Garoupa, 2000, for experimental evidence). This literature, however, differs substantially in its flavor from sociological accounts because it assumes that all actors in a market can observe the faithful completion of an agreement, while the latter, when identifying the potential value of social networks, points precisely to the difficulty of obtaining such information in many cases.

While in many contexts an important factor, this aspect of embedded exchange likely plays a minor role, at most, in the relationships between film production companies and distributors. Distribution contracts typically specify that the owners of the film receive their payments after the distributor has recouped its own expenses (Cones, 1997). Moreover, these agreements pay a percentage of the gross receipts after marketing expenditures to the film production company. This tight alignment of incentives virtually eliminates the incentives for opportunistic behavior (Chisholm, 1997). Though one might still worry about the risk of non-completion, modern contracts routinely require completion risk insurance, mitigating the importance of this hazard (Squire, 1992). Our consideration of the potential advantage of embedded exchange in the movie industry hence focuses on the benefits of information access.

such that rational players never cooperate once they anticipate such defection). Interestingly, work on self-confirming equilibrium in economics began as an investigation of how the equilibrium could deviate from Nash equilibrium in finite period games (e.g., Fudenberg and Levine, 1993).

SELF-CONFIRMING DYNAMICS: EFFORT AND OUTCOMES

Both pre-exchange information and post-exchange monitoring likely explain the propensity for actors to exchange with known parties in a variety of circumstances; nonetheless, embedded exchange might easily persist even if it does not provide an effective solution to market failure. Rather, individuals and organizations might exchange with known parties believing that these parties offer better investments or higher quality goods and services. Further acting on those beliefs, actors offer better terms (e.g., prices) or favor these parties when making decisions regarding the value of an exchange. These agreeable terms themselves, however, then enact the beneficial outcomes expected by their exchange partners.

INSERT FIGURE 1 ABOUT HERE

Figure 1 illustrates the essential logic of the argument. While the left panel depicts the actual causal relations between actions and outcomes, the right shows the simplified version believed and observed by market participants. Without considering the intermediary relationship between social structure and the terms of exchange, actors' observations will confirm their beliefs in the right panel.

Two relationships prove central to producing this effect. First, embedded exchange leads actors to offer better terms to the partners with whom they transact. Several factors might explain such a relationship. Presuming that they have private information regarding the quality of the goods or services that they have selected could lead buyers to offer better terms than the market price, believing that their direct or indirect relations to the seller allow them to arbitrage the lemons problem. Uzzi (1999), for example, finds that bankers offer lower interest rates to small businesses when they have personal connections to the managers of those firms, presumably thinking that their personal relationships give them access to better information on the quality of the credit risk. Less systematic evidence similarly suggests that venture capitalists more likely invest, and invest more, in founding teams with whom they share prior experience or secondary relations (Fried and Hisrich, 1994; see also Sorenson and Stuart, 2001, and Burton, Sørensen and Beckman, 2002). Alternatively, actors might perceive less risk of opportunism when trading with known partners; hence, they would accept lower returns in exchange for this perceived mitigation of risk. Kollock's (1994) experiments illustrate this effect vividly as his participants repeatedly forgo better prices to exchange with known partners under conditions of uncertainty. Meanwhile outside the lab, Guseva and Rona-Tas (2001) find that Russian credit card issuers rely on personal networks to guide their lending practices in the absence of credit rating institutions. Finally, exchange partners may also offer better terms simply because the exchange no longer occurs entirely at a transactional level (Granovetter, 1985). In other words, their interest in the relationship (friendship) itself may lead them to forgo the intense negotiation necessary to extract the maximum value out of the exchange.

Second, these favorable terms must contribute to the expected outcome. Though less commonly investigated, this assumption seems relatively intuitive. Consider the lower interest rates offered by Uzzi's (1999) bankers. These preferred terms reduce the cost of capital and cash flow requirements for the firms receiving them, benefits that may well

reduce the risk of firm failure and with it loan default. The same holds true for equity investments: Venture capitalists by offering more funds to founders improve the likely success of these fledgling firms as well; research shows a positive relationship between the level of venture capital investment and firm growth (Davila, Foster and Gupta, 2001) and the likelihood of a successful IPO (Stuart and Sorenson, 2003). Other types of non-financial investments may also benefit transaction partners.

In the success of films, the key terms of trade likely concern the amount of resources allocated to marketing.⁸ Distributors believing that they have special knowledge regarding the probable success of a project invest more in marketing films when they enjoy a strong tie with the principals involved in the project. Repeated interaction also likely promotes an exaggerated belief in the underlying quality of the participants involved. In either case, distributors have control over two decisions important to the financial success of a film: its release date, and the amount spent on advertising it. Therefore, distributors, believing these films to have better odds of becoming a box office hit, allocate the films with which they have the strongest ties to the most desirable opening dates (e.g., the 4th of July) and expend more resources promoting them. This market support, in turn, can contribute to the success of these films, thereby (in appearance) confirming the distributor's expectations.

At least two factors help maintain the stability of this subjective equilibrium. On the one hand, actors likely see little reason to test the counterfactual. To the extent that the feedback from their perception of the environment matches their expectations, market participants avoid behavior that would produce evidence that could invalidate their view (Ryall, 2003). Such behavior can occur at two levels. Actors refrain from transacting on a regular basis with unknown parties, thereby making it difficult for them to assess the potential benefits of embedded exchange. Even when they do interact, however, with first-time (or less well known) partners they uniformly favor their closest exchange partners when deciding on the terms of trade, eliminating the possibility of falsifying their expectations.

Though even rational actors can fall prey to these dynamics, common psychological biases likely crystallize the stability of these systems. Ambiguity aversion, for example, would lead actors to avoid unknown risks (Ellsberg, 1961). Though the success of any film seems uncertain, Fox and Tversky (1995) argue that comparative ignorance drives ambiguity aversion. In other words, individuals avoid the option about which they know the least. As a bias, ambiguity aversion appears both quite common and surprising difficult to inoculate against. Even professional decision makers appear susceptible. Both options traders and elite decision scientists exhibit ambiguity aversion, despite being perfectly risk-neutral when making choices (e.g., Fox, Rogers and Tversky, 1996). This bias should reinforce actors' failure to test the counterfactual.

⁸ Contracts between production companies and distributors rarely specify either a minimum advertising expenditure level or a specific release period, obligating distributors only to engage in 'reasonable efforts' marketing the films they carry. Hence, these marketing decisions remain almost entirely at the discretion of distributors (Cones, 1997).

Even when access to the counterfactual exists, psychological biases may impede actors' ability to realize that the information conflicts with their expectations. One of the better documented behaviors in the psychology of decision-making finds that humans seek out and allocate undue attention to information that confirms their existing beliefs or expectations, a tendency recognized as early as Bacon (1620). Experimental research has demonstrated that subjects actively avoid information that might disconfirm their beliefs (Wason, 1968). Even when confronted with evidence that should lead them to update their beliefs, subjects frequently interpret somewhat ambiguous information as supportive of their expectations (e.g., Jones and Sugden, 2001). Given these tendencies, it seems likely that actors could maintain their beliefs in the value of transacting with known partners even in the face of occasional evidence to the contrary – especially in a market with as high variance outcomes as film exhibition.

EMPIRICAL CONTEXT: MOTION PICTURE DISTRIBUTION

To examine the potential for these dynamics empirically, we have collected and analyzed data on the U.S. motion picture industry. In particular, our study investigates relationships between production companies, their principals and distributors.

In the film industry, distributors provide an important link between production companies, which assemble and coordinate the resources necessary to create a motion picture, and theaters, which exhibit these films to the movie-going public. Though at one time firms, known as the 'major studios' (20th Century Fox, Metro Goldwyn Mayer, Paramount, RKO and Warner Brothers), integrated across these stages of the value chain, antitrust action led to a 1948 consent decree where the majors agreed to divest their theater holdings (Conant, 1960). During the same time period, competition forced them to end exclusive contracting with talent, greatly reducing the extent of in-house production (Litman, 1998; Caves, 2000). The industry now comprises three sets of firms – production companies, distributors, and theaters – each focusing on a different stage of the process of bringing a new movie to market.

Though technically production companies make films, the principals involved frequently form these companies to make a single film, simply as an accounting convenience. Given the ephemeral nature of these organizations and the frequent recombination of individuals across projects in the industry, we measure the attributes of the production firms by summing the qualities of the principals involved. These principals include producers, who usually assemble the team and arrange financing, writers, responsible for the script or screenplay, directors and actors.

In the modern motion picture, the process of assembling the resources to produce a new film has an archetypal sequence (see, for example, accounts in: Litwak, 1986; Squire, 1992; Caves, 2000). The producer first purchases rights to a story (e.g., a popular novel) a script or a screenplay. Next, the producer (tentatively) hires a director. The director generally assists in the selection and recruitment of the other members of the team, but enjoys a non-binding contract until production actually begins. Together the producer and director, generally with the assistance of a casting agent, select actors to fill the various

roles in the film. Once these individuals have signed on to the project, and the team has secured financing, filming begins.

Production companies can engage in contracts with distributors at various stages in this process. Deals most commonly take one of the following three forms (see Cones, 1997, for details on distribution contracting). In a production, distribution and financing (PDF) agreement, following the assembly of a project (a producer with a script, a director and commitments from key actors), distributors commit to providing funds and distribution for the nascent movie before filming begins.⁹ The negative pick-up, which occurs after production has been completed, involves an advance on movie proceeds by the distributor to cover the production costs, as well as a commitment to distribute the film domestically. The final main type of deal, the acquisition, follows the completion of the picture and involves only an agreement to distribute the film. Only in very rare cases, for example with MGM and the Bond franchise pictures, does a distributor essentially produce the entire film in-house, in essence committing to finance and market a film before the selection of principals.

Two relatively unusual features of this industry make it a prime candidate for determining whether these self-confirming dynamics exist. First and most significantly, we can observe with relative accuracy the most important activities that distributors undertake to the potential benefit of the film's production company, in this case their marketing decisions. Distributors have control over two important factors affecting the success of the movies they carry – the amount of resources devoted to marketing them, and their release dates – both of which can be observed with relative accuracy. Second, as Faulkner and Anderson (1987) note, short-term production systems provide ideal settings for the study of market behavior. In this case, the fluid mixing of principals into different sets of teams usefully allows us to estimate individual-level measures of quality (to some degree), thereby directly testing whether these differences account for selection effects in embedded transactions.

Data Sources

To test these dynamics within the context of the motion picture industry, we have assembled a database of all films ever generating a minimal level of ticket revenue in theatrical exhibition in the United States between 1982 and 2002.¹⁰ The data for each of these films comes primarily from two sources: the Internet Movie Database (imdb.com) and the weekly box office listings reported in *Variety*. For inclusion in the dataset, a film had to appear on the *Variety* listings of top-grossing films for at least one week during the

⁹ Virtually all contracts with producers under development deals, a small number, fall in this category. In these deals, a distributor purchases the option to finance and distribute a producer's films in exchange for a 'salary' (in essence, the option price). Even in these cases though, agreements generally occur after the assembly of a team. We nonetheless return to this issue in the discussion.

¹⁰ The data begin in 1982 because the analysis rests to some extent on the assumption that the number of opening screens reflects marketing expenditures. Prior to the 'wide release' – where films open in the same week across all domestic markets – distributors restricted the opening to a small number of large markets to economize on the cost of prints, regardless of the marketing budget. Distributors began experimenting with the wide release strategy in the early 1970s and adopted it widely by the early 1980s.

observation period. Though one might worry that such a requirement would exclude a large number of films, the *Variety* listings include even films with extremely limited distribution; indeed, as few as 100 ticket sales could qualify a movie for inclusion on the *Variety* lists and nearly 10% of the motion pictures included in the dataset never appeared on more than one screen in the United States.

CHOOSING EXCHANGE PARTNERS

The first step in our analysis involves confirming that social networks do in fact influence the matching of films to distributors. This amounts to an analysis of tie formation (e.g., Podolny, 1994; Sorenson and Stuart, 2001). Following prior studies, we generated a dyadic dataset in which each case represents a possible match between a film and a distributor. To construct such a dataset required us to make a decision regarding the risk set of potential distributors. We took a conservative approach and assumed that any distributor active in a particular year potentially could have carried a film being released in that year. Depending on the year, then, each film had between 25 and 100 potential suitors (the number of distributors has been rising steadily over the study period). As in prior research on the choice of exchange partners, a dichotomous variable, taking a value of one when a tie exists, represents the establishment of an exchange relation (i.e., a distributor choosing to market a particular picture).

To estimate the determinants of tie formation, we use a maximum likelihood conditional logistic regression (Chamberlain, 1980). The conditional logistic calculates the likelihood relative to other cases in the group. Since we group observations by film, it essentially estimates the likelihood of a film being distributed by one company versus another. One could also think of our approach as analogous to a McFadden choice model, since film production companies nearly always maintain exclusive contracts with distributors within a geographic territory (the entire United States falls within a single territory for the purposes of these distribution rights).

Although the estimation technique controls for any film-level attributes, since film-level characteristics do not vary across the set of potential distributors, the models contain two controls for the traits of the distribution companies (Table 1 provides descriptive statistics for all of the models). The first, *distributor capacity*, simply counts the number of films that a distributor carried in the same year as the film's release. The likelihood of being distributed through a particular distributor obviously increases with that distributor's prevalence in the market. Second, we construct a measure of *distributor specialization* – the percentage of films that the distributor carried during the previous three years in the same genre as the film currently being considered.¹¹ Distributors may show particular interest in carrying certain types of films. Descriptive statistics for these and other variables used in the models appear in Table 1.

INSERT TABLES 1 & 2 ABOUT HERE

¹¹ Genre here refers to the classifications assigned by *Variety*. Though we recognize the absence of an objective means of categorizing cultural products (DiMaggio, 1987), we use these classifications only to control for consistency in the projects chosen by distributors. Of course, the social construction of such categories may mean that distributors to some extent enact these mappings through their affiliation.

Table 2 reports the estimates of the conditional logistic regressions. The first model simply provides a baseline. As one would expect, distributors with greater capacity are more likely agree to market films, and distributors with strong specialization in a particular genre show a preference for maintaining their niches. Model 2 introduces measures of the strength of the social connection between the film and its potential distributor. The first variable, *prior tie*, takes a value of one if at least one of the film's principals has worked with the distributor before, or zero otherwise. A second variable, *number of ties*, counts the number of ties in excess of one that the group of principals has had to the distributor. Not only does having any prior connection dramatically increase the odds of a film being carried by a particular distributor, but also each additional prior connection appears to augment this probability. Though the difference between the magnitude of the coefficients between the first and subsequent ties seems to suggest decreasing returns to increasingly intensive connections, the relationship actually appears nearly linear. Figure 2 displays the results of a piece-wise estimation of the number of prior ties to tie likelihood. The first prior connection has a noticeably larger effect, but all subsequent ties contribute roughly the same amount to the likelihood of a future distribution relationship. Model 3 splits the prior ties among the principals, in essence testing whether prior relationships among principals in certain roles play a stronger role in securing distribution contracts. Perhaps not surprising given their role as coordinators of the team and of business relationships, prior relations between the producer and a potential distributor appear much more important than those of other participants in arranging distribution.

INSERT FIGURE 2 ABOUT HERE

EMBEDDED EXCHANGE AND PERFORMANCE

Following prior research, the next step involves determining whether embedded exchange appears to benefit the parties that engage in it. In the film industry, one can usefully investigate the apparent success of each transaction (agreement to market a film) separately. The ability to decompose the results to the level of the individual film affords us two advantages not available in many situations. Isolating effects to the level of the film – the level at which the networks themselves come into play – avoids potential aggregation bias inherent in a distributor-level measure of success. Moreover, the fact that the participants themselves also have access to this information should make it less likely for self-confirming dynamics to arise, hence providing a more conservative test of the thesis.

Dependent variable

The most direct measure of performance in the movie industry comes in the form of box office receipts.¹² For much of the history of the film industry, these revenues represented

¹² In assessing the performance of new motion pictures some argue that researchers should focus on revenues net of costs ('profit'). The analyses presented in the paper do not account for costs for two reasons – one methodological, the other practical. Including budget in the performance equation seems problematic in two respects: First, depending on the stage at which distributors agree to carry motion pictures, the budget may well depend on this agreement itself, and hence vary endogenously with our primary variables of interest (potentially another type of self-confirming dynamic). Indeed, a multivariate analysis of the

the only real source of income from the production of a motion picture. From 1900 to 1990, for example, theatrical exhibition accounted for 96% of the industry's revenue (Vogel, 2001). Though new technologies – television, VCR, cable, DVD – have opened additional channels from which to extract revenue, box office remains the most important benchmark when considering a film, as these ancillary revenues tend to correlate highly to the movie's performance during its theatrical exhibition period: Ravid and Basuroy (2003) found correlations of .86 between domestic (U.S.) and international box office revenue and .70 between domestic box office and video rentals.¹³ Moreover, those studies investigating the correlates of these revenue sources find identical patterns of relations across the various sources (Ravid, 1999).

Two common practices in the industry make these box office figures easily comparable across motion pictures. First, agreements between distribution companies and theater owners essentially split proceeds as a function of a percentage of total revenue, with an increasing portion going to the theater owners as the film matures; the arrangement roughly amounts to theater owners pro-rating their average cost of exhibition across the films they carry (Verter and McGahan, 1998; Vogel, 2001). Exhibitors earn profits primarily through concession sales – popcorn, candy and soda. Second, the contracts between distributors and the owners of the film also nearly universally specify the fees due to the distributor as a straight percentage of the revenue earned (Litwak, 1998; Vogel, 2001). All participants hence benefit from maximizing total sales.

Independent variables

To assess the importance of embedded exchange – in this case, repeated transactions – in the success of films, we estimate the effect of the *strength of the direct tie to the distributor*. We define this variable as the proportion of the principals' projects over the prior three years carried by the same distributor as the current project. This measure allows us to distinguish the concentration from the frequency of exchange.¹⁴ In the conditional logistic regression models, the estimation procedure makes a similar adjustment, but here we must explicitly account for experience. If repeated exchange

determinants of the reported budgets indicates that a one standard deviation increase in the strength of the connection between the film and the distribution company increases the expected budget by 7% ($p < .10$). Second, some production companies record costs such that the budget includes expenses tied to the success of the film (e.g., bonuses in actors' contracts); though this practice induces a correlation between budget and revenues, it problematically mixes types of costs. From a practical point of view, only a small portion of the movies in the sample report budget data, requiring us to drop 76% of the cases to include this information. In any case, models accounting for film budget produce qualitatively equivalent results to those reported.

¹³ Though the popularity of a film in the theaters correlates strongly to its ability to garner revenue from home video rentals and television rights, contracts also tighten this relationship as video retailers and television stations sometimes pre-negotiate (before the film's release in theaters) a price for rights to a film as a function of its performance in the U.S. box office (Litman, 1998).

¹⁴ An obvious alternative would be to use the number of prior interactions as a measure of embedded exchange, but this measure correlates strongly with the overall number of prior projects making simultaneous estimation of the separate effects problematic without making the two measures orthogonal (as the proportion does). Models with the number of prior interactions, rather than the proportion, and excluding total prior experience, nonetheless yield qualitatively equivalent results.

allows distributors to select better projects, then this measure should vary positively with film performance.

The models also include several controls for other characteristics of the team of principals involved in the film. At the most basic level, the *number of principals*, simply counts the number of different individuals involved in principal roles in the project. If each principal draws a particular audience (i.e., some people attend the movie because they like the director, while others go to see their favorite actress), projects with more principal participants might attract larger audiences, and hence greater theatrical revenue. In addition, the number of principals involved likely controls to some extent for the scale of the production itself. Recognizing, however, the likely heterogeneity in these participants, *principals' experience*, sums the experience of the principals, in terms of the number of films in which they have been involved, over the three years preceding the release date of a film.¹⁵ Experience likely captures several factors. On the one hand, principals may actually learn to perform their roles better or accumulate human capital over time. On the other hand, a selection process might simply weed out the least able over time. Also, since experience reflects the number of recent films in which an individual participated, it also captures the degree to which someone is 'hot' – both in favor with audiences at the moment and subject to particularly intense media attention (the controls introduced below, however, should limit the importance of this last factor).

In addition to these simple measures, the estimation includes two controls that provide different types of information on the underlying quality of the participants involved. *Observable past performance* averages the performance of other motion picture projects that the principals participated in over the three years preceding the release of the current film. As all industry participants (and even casual observers) can easily access this information, it seems difficult to believe that it might contain private information on the quality of particular principals. It does, however, provide a control for the fact that certain individuals (e.g., Arnold Schwarzenegger) have been involved in many high-grossing films and hence may act somewhat like a brand name in attracting audiences (Rosen, 1981; for a history of the emergence of stars in Hollywood, see Bakker, 2001).

The second measure, *unexplained past performance*, attempts to assess the more difficult to observe quality of principals in determining the success of their projects. In essence, this measure asks: how much better or worse did films with this principal do than one would have expected given their genre and rating, the amount spent on marketing them, and their release date? Practically, our estimation involves summing the residuals across the previous three years for the principals involved in the film. In the first stage, we

¹⁵ The selection of a window involves two choices: its length and when it should end. We chose to end the experience measure one year prior to the release of the current film as distributors typically commit to films many months prior to their release, often before filming even begins (Squire, 1992); hence, these measures should capture the information available to the distributor at the time it makes a decision. The choice of window length involves balancing the size of the sample used for estimation (since a three year window, for example, requires us to exclude our first three years of data from the analysis) with the reliability of the experience measures. We investigated longer window lengths with similar results, and given the stability of activity patterns within the industry, we adopted a shorter window length.

estimated the expected success of each film based on its distributor, genre, rating, opening week screens, release timing and year of release. The residuals between the predicted box office from this estimation and the actual box office provided the ‘unexpected’ performance of a film. We then calculated individual-level scores for each person in the data set for each year based on the residuals of the films they had been involved in over the preceding three years. To calculate our control, we averaged these scores across all principals involved with a film.

In addition to these measures of the principals involved, the models include two additional film-level attributes. First, a dummy variable indicates whether the production of a film took place in the United States. Films produced outside the United States may have been developed for a different audience, and hence may under-perform U.S.-produced films in the box office. Second, the models include controls for a film’s MPAA rating.¹⁶ Both industry participants and students of the industry widely believe that family-oriented films (G-rated) perform better, and that features produced for mature audiences (R-rated) perform worse, at the box office (Litman, 1983; DeVany and Wallis, 2002; Ravid and Busaroy, 2003). Dummy variables mark G- and R-rated features, with PG-rated films serving as the baseline category.

INSERT TABLE 3 ABOUT HERE

Estimation

The following equation represents our modeling approach for estimating logged box office revenue (ln R):

$$\ln R_i = \beta DT_i + \gamma x_i + \alpha + \delta + \eta + \epsilon_i,$$

where DT represents the strength of the direct tie linking the team of principals in film i to distributor j , x refers to a vector of control variables, α denotes a set of fixed effects for distribution companies, δ indicates fixed effects with respect to the film genre, and η represents fixed effects for the year of the motion picture’s theatrical release. Though we remain agnostic about these effects, prior research has found significant effects on box office performance due to both film genre (Litman, 1983; Prag and Casavant, 1994) and distributor. If embedded exchange allows distribution companies to make better selections, one would expect $\beta > 0$.

INSERT TABLE 3 ABOUT HERE

Table 3 reports the results of these estimates. The first column provides a baseline estimate of the determinants of box office success without considering who participates in the film or their relations to the distributor. Films produced in the U.S. enjoy higher revenues, perhaps because they had been developed to appeal to the American market; meanwhile R-rated movies garner less revenue, consistent with previous studies

¹⁶ MPAA ratings, initiated in 1968, represent a form of self-regulation by the movie industry in the United States. Distribution companies submit films to a review board for a rating recommendation. These ratings reflect the content of the film: PG and R ratings alert potential viewers that the film contains some type of content (profane language, sensuality, violence or nudity) deemed inappropriate for less mature audiences.

suggesting that Hollywood produces too many adult-oriented films (DeVany and Wallis, 2002; Ravid and Busaroy, 2003). Distribution companies, genre and year all significantly influence theatrical revenues. Model 5 introduces measures of the size of the team of principals involved in the film and their cumulative experience. Both have significant positive effects on the expected performance of the film. As noted above, each principal may draw from a relatively distinct audience allowing films with more participants to attract a greater number of viewers, or consumers may consider principals additively when deciding whether to see a feature (e.g., moviegoers that like both Sally Field and Reese Witherspoon would have found *Legally Blond 2* especially enticing). The fact that experience has a positive effect on box office could reflect several factors including the prominence of the principals, learning on the part of the film's participants, or simply selection.

The third set of estimates finally introduces the key variable of interest: the strength of the relationship tying the principals to the distributors. This variable has a substantial effect on the expected box office of the film; a one standard deviation increase in the strength of the team's tie raises its expected revenue by 12% ($= e^{.513 * .213}$). Controlling for both easily observable and unexplained differences in the past performance of the principals does not eliminate the positive effect of the strength of the direct tie, though these variables do improve the overall ability of the model to predict box office receipts (see model 7). Without further analysis, one might then conclude that these effects reflect the ability of distributors to make a better selection of films when they have stronger relations to the principals in the film, presumably thanks to their access to private information. These results, however, fail to account for the distributor's own behavior and how those actions might influence the success of the film.

ACCOUNTING FOR EFFORT

Two variables – both under the control of the distributor – matter tremendously in determining the box office success of a motion picture: the resources allocated to marketing the film and the date on which theaters begin screening the movie.

A variety of issues likely contribute to the value of marketing in this setting. At the most basic level, advertising and other forms of promotion make consumers aware of the availability of new films. Given the limited time that the typical movie spends in the theaters, potential viewers have limited opportunities to learn about new offerings through word of mouth; hence, advertising importantly broadcasts information on the availability of new products. Beyond this basic level, advertising also plays an important role in allowing consumers to assess the likely fit between the film and their own tastes. Movies vary greatly in their appeal to audiences, and both distributors and consumers benefit from appropriate matching – consumers in the pleasure received from the viewing and distributors in the positive word of mouth garnered from viewers (which can influence the success of a film). Distributors also likely hope to create positive affect for the movies they promote.

Several factors account for the importance of release dates: mostly significantly, demand fluctuates substantially over the course of a year. This seasonality when coupled with the

short box office life means that release timing can critically affect the success of a film; or as Barry Reardon, Warner Brothers President of Distribution bluntly asserts, “If you don’t pick the right release date, you can destroy a movie.” (Korts, 2001, pg. 514) An article in the *Wall Street Journal* expands on this noting that:

Studio executives insist the release date is critical, in part because a film’s opening weekend is usually the most lucrative one for its studio. Financial agreements with theaters normally give the filmmaker a greater percentage of the box office during the first weeks of release. And in this glutted market, studio executives also worry that theaters will replace a film with another if it doesn’t win audience quickly (King, 1991).

Dependent variables

The number of *opening screens* on which a film played in its first week of public exhibition provides us with a measure of the level of resources allocated to promoting a film.¹⁷ Though one might prefer an exact measure of the dollars devoted to marketing, distributors generally do not report these expenditures, making it impossible to assemble comprehensive data. Incentives on both sides of the distributor-exhibitor relationship, however, ensure a tight link between marketing expenditures and the number of screens: When distributors promote a film heavily prior to its release, it makes sense for them to open on as many screens as possible since the positive effects of advertising in the film industry appear to decay very rapidly, reaching nearly zero within two to three weeks after the film’s release (Lehmann and Weinberg, 2000). On the other side, substantial advertising expenditures entice more theater owners to exhibit the film because they know that the advertising will help bring customers to the theaters.

Despite these incentives, an accurate mapping of the number of screens to marketing effort likely requires adjustment for two external factors: supply and demand. When theater owners have more movies from which to choose, each will, on average, appear on fewer screens. And as the number of screens available increases (from 1985 to 2002 the number of theater screens in the U.S. grew from roughly 20,000 to more than 35,000; NATO, 2002), each film will on average open on more screens. To account for these effects, we normalize the number of screens using a measure that accounts for both forces: the average number of screens on which a movie opened in the same year of release.¹⁸ Hence, our measure divides the raw count by this average.

Corroboration of this proxy involved comparing it to two datasets. The first set includes all films, released from 1991 to 1996, for which we could locate reports of marketing budgets in Lukk (1997), the *Hollywood Reporter*, *Variety*, or through LEXIS/NEXIS. Within this set of 56 films, our measure correlated .890 with real dollar marketing expenditures. A second sample of actual marketing effort came from a civil case privy to

¹⁷ Since limited release films – those first shown on a small number of screens to generate word-of-mouth with the intention of being exhibited on hundreds of screens after a few weeks – follow a very different marketing strategy, we exclude these films from our study (roughly 2% of cases).

¹⁸ Zuckerman and Kim (2003) also use the number of screens to proxy for marketing, though they (appropriately given their short window) do not adjust for the supply of and demand for movies.

private (probably more accurate) information on actual media expenditures for a random sample of 250 films with a budget of more than \$5 million opening between April 1995 and April 1998 on at least 1000 screens. Even within this relatively truncated range, our measure correlates .410 with actual marketing expenditures.

Seasonality captures the second type of marketing decision, whether a distributor releases a film during a high demand period. Industry participants and observers have long understood that demand varies from week-to-week across the course of a year (Litman, 1983; Radas and Shugan, 1998). Though most peak seasons revolve around holidays, we develop a continuous measure of seasonality by taking a moving average of total box office receipts across all films for a three-week window centered around the film's release date during the previous three years.¹⁹ The three-week average allows the measure to accommodate the fact that some holidays shift slightly from year-to-year, while using the prior three years of data minimizes the effects of outliers on our seasonality measure. Figure 2 depicts the average value of the seasonality variable over the course of the year. One can clearly see that some weeks, particularly those surrounding major holidays and the height of summer offer much larger potential audiences.

INSERT FIGURE 3 ABOUT HERE

Estimation

Our approach to estimating marketing behavior essentially parallels that of our performance models:

$$M_i = \beta_1 DT_i + \beta_2 x_i + \beta_3 + \beta_4 + \beta_5 + \beta_6,$$

where M can either denote the relative number of screens or seasonality (total demand in the three week window following a film's release), DT again represents the strength of the direct tie linking the team of principals to the distributor, x refers to a vector of control variables, and β_3 , β_4 and β_5 denote fixed effects for distribution companies, film genre and year respectively. The models estimating correlates of marketing decisions differ in two respects from the performance models. On the one hand, the models reported in table 3 lack controls for the number of principals in the film. Though each principal might represent a draw to a unique audience, we found it more difficult to imagine why the number of principals might influence these marketing decisions.²⁰ On the other hand, the models here do include controls for the length of the film. Particularly when considering determinants of the number of opening week screens, theaters need more screens with a longer movie to meet the same level of demand (since the longer length necessarily entails fewer show times per day on each screen).

INSERT TABLE 4 ABOUT HERE

¹⁹ Prior research investigating seasonality in the film industry has typically looked only at whether a release falls on a holiday (e.g., Litman, 1983), though Ravid (1999) takes a similar approach to seasonality. Figure 2 clearly shows the importance of non-holiday related variation in sales.

²⁰ The results nonetheless remain robust to the inclusion of this control.

The first two columns of Table 4 report the correlates of the number of opening week screens, a proxy for marketing expenditures. Model 8 demonstrates that distributors choose to open films on more screens when they have a stronger direct tie to the principals involved in the film. This result holds even after controlling for easily-observable and difficult-to-observe quality differences among these principals (model 11); interestingly, distribution companies appear insensitive to quality differences across films' participants when making decisions regarding the amount of effort to allocate to marketing a new film. Among the control variables, U.S. produced films, G-rated films and longer movies open on more screens; R-rated movies open on fewer screens than all others. These results seem sensible as industry participants believe that G-rated films attract larger audiences while R-rated features appeal to a smaller set (or at least, some of those to whom they appeal likely find it difficult to gain admittance; see Medved, 1992, for qualitative evidence), also longer movies require more screens to schedule the same number of showings during the peak daily demand period from 7pm to 11pm.

The final two columns provide a parallel analysis of the determinants of a film's opening date. Once again, model 10 reveals that distribution companies favor films involving principals with whom they have previously worked, this time with respect to scheduling these films for attractive release dates. As with the number of screens, the observable and unexplained past performance of the participants involved in a project appear to have no effect on the scheduling of its release.

Re-estimating box office

To see how these marketing decisions influenced the performance of the films, Table 5 re-estimates the revenue models controlling for these factors. The first column in the table simply recounts the last model from Table 3 to ease comparisons. Model 12, the second column, includes the number of opening week screens and seasonality to account for marketing decisions. Both have very large and significant effects. Increasing marketing effort, as represented by a larger number of opening week screens, dramatically improves the expected performance of the film. For example, opening on double the average number of screens more than triples the expected box office revenue ($348\% = e^{1.248 * (2-1)}$). Though less pronounced, release timing has a similar effect on performance. Each unit of total demand (seasonality) raises a film's expected box office by roughly 17%. Since the total demand varies by a factor of more than three across the course of a year, opening a movie between Christmas and New Year's Day (the peak period) versus the middle of September (the weakest time) increases its expected revenue by more than 80%. Notably, the effect of prior relations with the distributor disappears after controlling for these factors; thus, it would appear that the positive effect of embedded transaction exists not because distributors show greater acuity in selecting films when they have prior experience with the principals, but rather because they favor these films when allocating their valuable marketing dollars and release windows.

INSERT TABLE 5 ABOUT HERE

Model 13 examines this finding in somewhat more detail. The non-significant effect of prior relations, while interesting, merely reveals that the choice does not appear to matter; in the absence of a better method for choosing which pictures to promote, this bias in

favor of repeated transactions does not necessarily imply any economic inefficiency. The third column evaluates, somewhat more saliently, whether the returns to marketing investments vary across movies as a function of the strength of the direct tie between the distributor and the film's principals. We examine this question by interacting each of the marketing variables – number of screens and seasonality – with the strength of the direct tie linking the principals to the distributor.²¹ The results reveal that distributors receive lower average returns from their efforts to open movies with which they have stronger ties. Likewise, these films also benefit less from favorable opening dates. In each case, a one standard deviation increase in the strength of the tie linking the distributor to the film reduces the effectiveness of promotion effort by about 6%.²² These negative coefficients suggest a suboptimal equilibrium, since distributors apparently would have benefited from allocating their effort more evenly across the films that they carried.²³

These results also allow us to rule out a subtle alternative explanation for our results. One might argue that distributors allocate more to marketing films with principals with whom they have previously worked because they learn how best to promote these pictures. If that story held, however, one would expect to see a *positive* coefficient on the interaction term between the strength of the tie and marketing effort and seasonality because distributors should realize increasing returns to their investments in a particular set of principals. The models nonetheless find the opposite.

Three additional alternative explanations struck us as important to consider in detail. The first argues that distributors benefit in repeated transactions not by selecting better quality films, but rather through economizing on search costs. Though this explanation could account for both the prevalence of repeated interactions and the absence of a film-level performance advantage to repeated exchange (because this cost savings would benefit *firm*-level performance), it cannot explain the excessive marketing of films made by known parties or the negative interactions between marketing effort and repeated exchange. Conditional on having selected a set of pictures, economizing on search costs should not influence marketing expenditures. Hence, while repeated transactions may indeed reduce search costs, this explanation cannot account for our results.

Second, one might worry that our measure of the strength of the tie connecting the film to the distributor captures other important characteristics of the film, most notably the contracts governing the property rights to the film. Three issues seem relevant. In some cases, distributors pay for all of the production costs (i.e. they do 'in house' production), thereby absorbing all of the risk and potentially shifting their incentives to promote the film. Though these situations represent a small proportion of projects (6% according to

²¹ We mean deviate the variables before calculating the interaction terms to minimize the co-linearity of the interactions with their components.

²² The effect of the relative number of screens declines from roughly 1.3 to 1.21, a 7% decline, with a one standard deviation increase in tie strength, and the seasonality coefficient shrinks from .17 to .16, a 6% reduction in effect.

²³ The optimal point technically occurs where the distributor equalizes the marginal, rather than the average, returns to their advertising expenditures. If one assumes, however, that the returns to marketing decline at a similar rate across films, then lower average returns suggest lower marginal returns as well.

Vogel, 2001), they might nonetheless influence the results. In other situations, distributors form output deals with producers (see footnote 9). Though rare, these output deals link producers to distributors and hence may influence our results. Finally, sequels represent another situation in which contracts (in this case for the original film) might explicitly link principals to distributors across films.²⁴

To test the robustness of the results to the exclusion of these cases, we estimated the models for the subset of cases in which the producer does *not* have a prior connection to the distributor. In all of the circumstances described above, we would expect a prior producer-distributor tie. In the case of in house production, distributors assign internal employees to manage the project. As permanent employees of the distributor, they will appear to work repeatedly across projects with the same distribution company. Output deals similarly link producers and distributors across multiple projects, and sequels nearly always have the same producers as the original film (also carried by the same distributor). Hence, excluding all films with prior producer-distributor ties from the analysis eliminates those cases one would worry about (though it also removes many additional cases that should not raise concerns).

INSERT TABLE 6 ABOUT HERE

Table 6 reports these models. The identification of the effect in these analyses comes only from prior interactions between distributors and the writers, directors and actors working on a project. As one can clearly see, the results hold even while excluding cases with prior producer-distributor ties. Moreover, the coefficients remain largely unchanged. Hence, it would appear that these contractual issues have little bearing on our results.

INSERT TABLE 7 ABOUT HERE

Third, a rather subtle alternative suggests that selection through embedded exchange improves performance not through an increase in the mean revenues, but rather in a reduction in their variability (potentially a very important concern in high risk industries, such as entertainment). To address this possibility, we analyzed the absolute value of the residuals (from model 13). Table 7 reports the results of these models using maximum likelihood estimation methods for data with a truncated normal distribution (Amemiya, 1973). Although some factors, most notably marketing expenditures, do reduce the variability of performance, repeated interactions offer no such advantage. Hence, some type of risk-return tradeoff does not appear to account for our findings.

DISCUSSION

The results appear broadly consistent with what one would expect if self-confirming dynamics account for the stable patterns of repeated interactions between parties in the film industry. Distributors work with the same parties from film to film. Even when they do work with new individuals, distributors invest less in the promotion of these projects, thereby dramatically reducing their odds of commercial success. Hence, a belief in the

²⁴ Virtually every distribution contract includes a clause assigning the rights to distribute future sequels as well as the current film to the distributor (Cones, 1997).

superiority of working with known parties remains unchallenged in the absence of relatively sophisticated and unbiased analysis.

Though our results focus on repeated interaction as a form of embedded exchange, these dynamics likely extend to indirect ties as well. In other words, when transacting with new parties, distributors likely favor friends of individuals with whom they have a great deal of experience. Not only do they more likely begin working with these individuals, but also when they do first work with them, they probably invest more resources in their projects, increasingly the likelihood of their success and concomitantly of a positive first experience. These favorable first transactions then increase the likelihood of subsequent exchange. Social structure thus engenders behavior that reinforces that very structure.

Other types of self-confirming dynamics also likely operate both in and beyond the film industry. Careful examination of the coefficients, for example, reveals another interesting type of self-confirming dynamic: Consistent with both industry beliefs and prior findings (which did not account for marketing effects), the models that do not control for marketing effort show that R-rated movies garner lower revenues than similar G- and PG-rated features. This effect appears to exist, however, as a result of distributors' own marketing decisions: They both open these movies on fewer screens, 27% fewer on average, and release them during lower demand times of the year. After controlling for these decisions, R-rated features show no distinguishable difference in box office performance from movies targeted at younger audiences. Thus, it would appear then that distributors should actually devote greater resources to promoting adult-oriented films.²⁵

Though not explicitly identified as such, additional evidence on self-confirming dynamics in the film industry also appears in Zuckerman and Kim (2003). Art house distributors market their films far more narrowly than those oriented at the mass market, virtually assuring that these pictures receive less attention. Interestingly, this market segmentation may perpetuate beliefs that the art market represents but a small niche in the market. As art market breakouts, such as *My Big, Fat, Greek Wedding* and *Bend It Like Beckham*, occasionally remind us: many films relegated to these niche markets might appeal to a broad audience if only given the chance.

These self-confirming dynamics might also account, for example, for the difficulty that both women and minorities have faced in breaking into leading positions in the industry. Consider a quote from Carolyn Shelby, a writer, offered by Bielby and Bielby (1996):

You come in with an action project, and they see you're a woman, and you can see it's not something they're comfortable with. They're thinking 'small picture' rather than *Terminator 2* when you're sitting there talking to them.

²⁵ Indeed, interaction effects parallel to those included in models 10 and 11 suggest that distributors receive higher average returns to marketing R-rated movies than more family-oriented fare, though it does not appear that they would benefit from re-thinking the release timing of these films (perhaps not surprising as the school holidays that seem to drive much of the seasonality in demand likely have less influence on adult movie-goers).

Given the ability of distributors to enact these results, one could easily imagine how these dynamics would play out: The distributor might agree to Carolyn's project, but invest little in it. And when considering their decision in the future, managers at the distributor might even congratulate themselves for "correctly" seeing that her project would only attract a small audience – not recognizing that they produced this effect themselves.

Though the analysis here focuses on the film industry, these dynamics undoubtedly play out in many other industries and settings. A wide variety of markets exhibit embedded exchange; though in some cases, these structures undoubtedly address market failures, in other cases – as in the film industry – participants themselves may enact these effects. Labor markets, in particular, strike us as an interesting setting for considering these processes. Research has repeatedly demonstrated that social networks strongly structure the matching process between workers and positions (Granovetter, 1973), and more recent research suggests that employees identified through social networks perform better than those hired without a connection (e.g., Fernandez and Weinberg, 1997). These results, however, may reflect the fact that individuals hired through a connection receive better treatment (perhaps more extensive mentoring) when they arrive at the firm.

As researchers consider these dynamics in other settings, however, careful attention must be paid to potential asymmetry in the direction of the advantages of embedded exchange. Though efficiency explanations (search and monitoring benefits) for embedded transaction frequently pose these effects as advantageous to both parties involved, the self-confirming dynamics described here convey an image of something more like a zero-sum game. In repeated transactions, the distributors in the film industry invest too much in marketing – to the benefit of the principals involved in the film. To the extent that banks enact the success of the firms to which they extend credit, they may transfer wealth to the owners of the firms. Who likely benefits from embedded exchange, buyers versus sellers, does not appear consistent across situations; thus, researchers must remain alert to the particulars of the settings they examine.

Ultimately, these effects can not only influence who exchanges with whom, but also reify the patterns of stratification in communities and societies at large. As Eliza Doolittle remarks in George Bernard Shaw's *Pygmalion*, the play from which one of the original studies of self-confirming dynamics in education took its name:

You see, really and truly, apart from the things anyone can pick up (the dressing and the proper way of speaking and so on), the difference between a lady and a flower girl is not how she behaves, but how she's treated. I shall always be a flower girl to Professor Higgins, because he always treats me as a flower girl, and always will, but I know I can be a lady to you because you always treat me as a lady, and always will.

REFERENCES

- Akerlöf, George A. (1970). "The market for 'lemons': Quality, uncertainty and the market mechanism." *Quarterly Journal of Economics*, 84: 488-500
- Amemiya, Takeshi. (1973). "Regression analysis when the dependent variable is truncated normal." *Econometrica*, 41: 997-1016
- Bacon, Francis. (1620|2002). *The New Organon*, edited by Lisa Jardine and Michael Silverthorne. Boston: Cambridge University Press.
- Baker, Wayne E. (1984). "The social structure of a national securities market." *American Journal of Sociology*, 90: 775-811
- Baker, Wayne E. (1990). "Market networks and corporate behavior." *American Journal of Sociology*, 96: 589-625
- Bakker, Gerben. (2001). "Stars and stories: How films became branded products." *Enterprise and Society*, 2: 461-502
- Bielby, Denise D., and William T. Bielby. (1996). "Women and men in film: Gender inequality among writers in a culture industry." *Gender and Society*, 10: 248-270
- Bott, Elizabeth. (1957). *Family and Social Network: Roles, Norms and External Relationships in Ordinary Urban Families*. London: Tavistock
- Burt, Ronald S. (1992). *Structural Holes*. Cambridge, MA: Harvard University Press.
- Burton, M. Diane, Jesper B. Sørensen, and Christine Beckman. (2002). "Coming from good stock: Career histories and new venture formation." *Research in the Sociology of Organizations*, 19: 229-262
- Caves, Richard E. (2000). *Creative Industries: Contracts between Art and Commerce*. Cambridge, MA: Harvard University Press
- Chamberlain, Gary. (1980). "Analysis of covariance with qualitative data." *Review of Economic Studies*, 47: 225-238
- Charness, Gary, and Nuno Garoupa. (2000). "Reputation, honesty and efficiency with insider information: An experiment." *Journal of Economics and Management Strategy*, 9: 425-451
- Chisholm, Darlene. (1997). "Profit-sharing versus fixed-payment contracts: Evidence from the motion pictures industry." *Journal of Law, Economics and Organization*, 13: 169-201

Coleman, James S. (1990). *Foundations of Social Theory*. Cambridge, MA: Harvard University Press

Coleman, James S., Elihu Katz and Herbert Mendel. (1957). "The diffusion of an innovation among physicians." *Sociometry*, 20: 253-270

Conant, Michael. (1960). *Antitrust in the Motion Picture Industry*. Berkeley, CA: University of California Press

Cones, John W. (1997). *The Feature Film Distribution Deal*. Carbondale, IL: Southern Illinois University Press

Darr, Eric D., Linda Argote, and Dennis Epple. (1995). "The acquisition, transfer and depreciation of knowledge in service organizations: Productivity in franchises." *Management Science*, 41: 1750-1762

Davila, Antonio, George Foster, and Mahendra Gupta. (2001). "The impact of rounds of venture capital funding on the growth strategy of startups." Research paper #1727, Graduate School of Business, Stanford University.

DeVany, Arthur, and W. David Wallis. (2002). "Does Hollywood make too many R-rated movies? Risk, stochastic dominance and the illusion of expectation." *Journal of Business*, 75: 425-451

DiMaggio, Paul J. (1987). "Classification in art." *American Sociological Review*, 52: 440-455.

DiMaggio, Paul J., and Hugh Louch. (1998). "Socially embedded consumer transactions: For what kinds of purposes do people use networks most?" *American Sociological Review*, 63: 619-637

Ellsberg, Daniel. (1961). "Risk, ambiguity, and the Savage axioms." *Quarterly Journal of Economics*, 75: 643-669

Faulkner, Robert R., and Andy B. Anderson. (1987). "Short-term projects and emergent careers: Evidence from Hollywood." *American Journal of Sociology*, 92: 879-909

Fernandez, Roberto M., and Nancy Weinberg. (1997). "Sifting and sorting: Personal contacts and hiring in a retail bank." *American Sociological Review*, 62: 883-902

Fried, Vance H., and Robert D. Hisrich. (1994). "Toward a model of venture capital investment decision making." *Financial Management*, 23: 28-37

Fox, Craig R., and Amos Tversky. (1995). "Ambiguity aversion and comparative ignorance." *Quarterly Journal of Economics*, 110: 585-603

- Fox, Craig R., Brett A. Rogers, and Amos Tversky. (1996). "Options traders exhibit subadditive decision weights." *Journal of Risk and Uncertainty*, 13: 5-17
- Fudenberg, D. and D. Levine. (1993). "Self-confirming equilibrium" *Econometrica*, 61: 523-545
- Geertz, Clifford. (1978). "The bazaar economy: Information and search in peasant marketing." *American Economic Review*, 68: 28-32
- Geletkanycz, Marta A., and Donald C. Hambrick. (1997). "The external ties of top executives: Implications for strategic choice and performance." *Administrative Science Quarterly*, 42: 654-681
- Gould, Roger V. (2002). "The origins of status hierarchies: A formal theory and empirical test." *American Journal of Sociology*, 107: 1143-1178
- Gouldner, Alvin W. (1960). "The norm of reciprocity: A preliminary statement." *American Sociological Review*, 25: 161-179
- Granovetter, Mark S. (1973). "The Strength of Weak Ties." *American Journal of Sociology*, 78: 1360-1380.
- Granovetter, Mark S. (1985). "Economic action and social structure: The problem of embeddedness." *American Journal of Sociology*, 91: 481-510
- Guseva, Alya, and Akos Rona-Tas. (2001). "Uncertainty, risk and trust: Russian and American credit card markets compared." *American Sociological Review*, 66: 623-646
- Hansen, Morten T. (1999). "The search-transfer problem: The role of weak ties in sharing knowledge across organization subunits." *Administrative Science Quarterly*, 44: 82-111
- Hayek, Friedrich A. von. (1937). "Economics of knowledge." *Economica*, 4: 33-54
- Heide, Jan B., and Anne S. Miner. (1992). "The shadow of the future: Effects of anticipated interaction and frequency of contact on buyer-supplier cooperation." *Academy of Management Journal*, 35: 265-291
- Ingram, Paul and Peter W. Roberts. (2000). "Friendships among competitors in the Sydney hotel industry." *American Journal of Sociology*, 106: 387-423
- Jones, Martin, and Robert Sugden. (2001). "Positive confirmation bias in the acquisition of information." *Theory and Decision*, 50: 59-99
- Kalai, Ehud, and Ehud Lehrer. (1993). "Subjective equilibrium in repeated games." *Econometrica*, 61: 1231-1240

Kim, Harris H., and Edward O. Laumann. (2003). "Network endorsement and social stratification in the legal profession." *Research in the Sociology of Organizations*, 20:

King, Thomas R. (1991). "Trying to enhance new films' prospects, studios increasingly shift release dates." *Wall Street Journal*, October 15: B1

Kollock, Peter. (1994). "The emergence of exchange structures: An experimental study of uncertainty, commitment and trust." *American Journal of Sociology*, 100: 313-345

Korts, Kenneth S. (2001). "The strategic effects of vertical market structure: Common agency and divisionalization in the U.S. motion picture industry." *Journal of Economics and Management Strategy*, 10: 509-528

Kreps, David M., and Robert Wilson. (1982). "Reputation and imperfect information." *Journal of Economic Theory*, 27: 253-279

Laumann, Edward O. (1966). *Prestige and Association in Urban Community*. Indianapolis: Bobbs-Merrill

Lehmann, Donald R., and Charles B. Weinberg. (2000). "Sales through sequential distribution channels: An application to movies and videos." *Journal of Advertising*, 64: 18-33

Litman, Barry R. (1983). "Predicting the success of theatrical movies: An empirical study." *Journal of Popular Culture*, 17: 159-175

Litman, Barry R. (1998). *The Motion Picture Mega-Industry*. Boston: Allyn and Bacon

Litwak, Mark. (1986). *Reel Power*. Los Angeles: Silman-James Press

Litwak, Mark. (1998). *Contracts for the Film and Television Industry (2nd Edition)*. Los Angeles: Silman-James Press

Lovaglia, Michael J., Jeffrey W. Lucas, Jeffrey A. Houser, Shane R. Thye, and Barry Markovsky. (1998). "Status processes and mental ability test scores." *American Journal of Sociology*, 104: 195-228

Løvås, Bjørn, and Olav Sorenson (2003). "Social capital, competition and resource mobilization." Working paper, London Business School

Lukk, Tiiu. (1997). *Movie Marketing: Opening the Picture and Giving It Legs*. Los Angeles: Silman-James Press.

Markovsky, Barry, David Willer, and Travis Patton. (1988). "Power relations in exchange networks." *American Sociological Review*, 53: 220-236

- Medved, Michael. (1992). *Hollywood vs. America: Popular Culture and the War on Traditional Values*. New York: Harper Collins.
- Merry, Sally E. (1984). "Rethinking gossip and scandal." Pp. 271-302 in *Toward a General Theory of Social Control*. Vol. 1, *Fundamentals*, edited by Donald Black. New York: Academic Press
- Merton, Robert K. (1948). "The self-confirming prophecy." *Antioch Review*, Summer: 193-210
- Merton, Robert K. (1968). "The Matthew effect in science." *Science*, 159: 56-63
- Mitchell, William, and Kulwant Singh (1996). "Survival of businesses using collaborative relationships to commercialize complex goods." *Strategic Management Journal*, 17: 169-196
- Mizruchi, Mark S. (1992). *The Structure of Corporate Political Action: Interfirm Relationships and Their Consequences*. Cambridge, MA: Harvard University Press
- National Association of Theater Owners (NATO). (2002). *Encyclopedia of Exhibition*. North Hollywood, CA: National Association of Theater Owners.
- Pfeffer, Jeffrey, and Gerald R. Salancik. (1978). *The External Control of Organizations*. New York: Harper & Row
- Podolny, Joel M. (1993). "A status-based model of market competition." *American Journal of Sociology*, 98: 829-872
- Podolny, Joel M. (1994). "Markey uncertainty and the social character of economic exchange." *Administrative Science Quarterly*, 39: 458-483
- Portes, Alejandro and Julia Sensenbrenner. (1993). "Embeddedness and immigration: Notes on the social determinants of economic action." *American Journal of Sociology*, 98: 1320-1350
- Powell, Walter W., Ken W. Koput, and Laurel Smith-Doerr. (1996). "Interorganizational collaboration and the locus of innovation: Networks of learning in biotechnology." *Administrative Science Quarterly*, 41: 116-145
- Prag, Jay, and James Casavant. (1994). "An empirical study of the determinants of revenues and marketing expenditures in the motion picture industry." *Journal of Cultural Economics*, 18: 217-235
- Radas, Sonja, and Steven M. Shugan. (1998). "Seasonal marketing and timing new product introductions." *Journal of Marketing Research*, 35: 296-315

- Ravid, S. Abraham. (1999). "Information, blockbusters and stars." *Journal of Business*, 72: 463-492
- Ravid, S. Abraham, and Suman Busaroy. (2003). "Beyond morality and ethics: Executive objective function, the R-rating puzzle and the production of violent films." *Journal of Business*, forthcoming
- Rosen, Sherwin. (1981). "The economics of superstars." *American Economic Review*, 71: 845-854
- Rosenthal, Robert, and Leonore Jacobson. (1968). *Pygmalion in the Classroom: Teacher Expectations and Pupils' Intellectual Development*. New York: Rinehart & Winston
- Ryall, Michael D. (2003). "Subjective rationality, self-confirming equilibrium and corporate strategy." *Management Science*, 49: 936-949
- Ryan, Bryce, and Neil C. Gross. (1943). "The diffusion of hybrid seed corn in two Iowa communities." *Rural Sociology*, 8: 15-24
- Simmel, Georg. (1908/1950). *The Sociology of Georg Simmel*, translated by Kurt Wolff. New York: Free Press.
- Sorenson, Olav and Toby E. Stuart. (2001). "Syndication networks and the spatial distribution of venture capital investments." *American Journal of Sociology*, 106: 1546-1588
- Squire, Jason E. (Ed.) (1992). *The Movie Business Book*. New York: Fireside
- Stuart, Toby E. (2000). "Inorganizational alliances and the performance of firms: A study of growth and innovation rates in a high-technology industry." *Strategic Management Journal*, 21: 791-811
- Stuart, Toby E., Ha Hoang and Ralph C. Hybels. (1999). "Interorganizational endorsements and the performance of entrepreneurial ventures." *Administrative Science Quarterly*, 44: 315-349
- Stuart, Toby E., and Olav Sorenson. (2003). "The geography of opportunity: Spatial heterogeneity in founding rates and the performance of biotechnology firms." *Research Policy*, 32: 229-253
- Thorton, Rebecca Achee, and Peter Thompson. (2001). "Learning from experience and learning from others: An exploration of learning and spillovers in wartime shipbuilding." *American Economic Review*, 91: 1350-1368

Uzzi, Brian. (1996). "The sources and consequences of embeddedness for the economic performance of organizations: The network effect." *American Sociological Review*, 61: 674-698

Uzzi, Brian. (1999). "Embeddedness in the making of financial capital: How social networks and relations benefit firms seeking financing." *American Sociological Review*, 64: 481-505

Veblen, Thorstein B. (1899|1979) *The Theory of the Leisure Class: An Economic Study of Institutions*. London: Penguin Classics.

Verter, Geoffrey, and Anita McGahan. (1998). "Coming soon: A theater near you." Harvard Business School case (9-797-011)

Vogel, Harold L. (2001). *Entertainment Industry Economics: A Guide for Financial Analysis (5th Edition)*. Boston: Cambridge University Press.

Wason, Peter C. (1968). "Reasoning about a rule." *Quarterly Journal of Experimental Psychology*, 20: 273-281

Zaheer, Akbar, Bill McEvily, and Vincenzo Perrone. (1998). "Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance." *Organization Science*, 9: 141-159

Zuckerman, Ezra W., and Tai-Young Kim. (2003). "The critical tradeoff: Identity assignment and box-office success in the feature film industry." *Industrial and Corporate Change*, 12: 27-67

Table 1: Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.
<i>Dyad analysis</i>				
Prior tie	.06	.23	0	1
Number of ties	.10	.63	0	64
Distributor capacity	5.10	6.19	1	35
Distributor specialization	.27	.36	0	1
<i>Film-level analysis</i>				
Ln (box office receipts)	14.00	3.08	5.36	20.21
Opening screens	1.02	1.29	0	6
Seasonality	3.28	1.00	1.84	7.06
Number of principals	7.67	2.08	1	18
Principals' experience (3-year)	7.36	7.32	0	77
Strength of direct tie to distributor	.12	.21	0	1
Observable past performance	12.72	5.94	0	18.42
Unexplained past performance	.14	.43	-4.45	2.57
G rating	.02	.15	0	1
R rating	.49	.50	0	1
US film	.75	.43	0	1
Film length	103.1	17.38	39	280

Table 2: Conditional logit estimates of film-distributor agreement*

Variable	Model 1	Model 2	Model 3
Prior tie (0/1)		1.284** (.044)	
Prior producer tie			1.757** (.056)
Prior writer tie			.891** (.072)
Prior director tie			.674** (.077)
Prior actor tie			.642** (.047)
Number of ties (not in dummies)		.479** (.017)	.305** (.021)
Distributor capacity	.132** (.002)	.099** (.002)	.104** (.002)
Distributor specialization	2.522** (.054)	2.409** (.064)	2.418** (.056)
N	323,475	323,475	323,475
Log-likelihood	-17792.7	-16302.3	-16136.3
Pseudo R ²	.163	.233	.241

* Significance levels: • p < .05; ** p < .01

Table 3: Fixed effects estimates of logged box office receipts*

Variable	Model 4	Model 5	Model 6	Model 7
Number of principals		.090** (.015)	.091** (.015)	.083** (.015)
Principals' experience (3-year window)		.073** (.005)	.070** (.005)	.056** (.005)
Strength of direct tie to distributor			.513** (.140)	.364** (.141)
Observable past performance				.025** (.007)
Unexplained past performance				.515** (.068)
G rating	.124 (.243)	.386 (.236)	.378 (.235)	.354 (.233)
R rating	-.287** (.064)	-.287** (.062)	-.281** (.062)	-.294** (.061)
US film	.740** (.081)	.499** (.080)	.501** (.079)	.488** (.080)
Distributor fixed effects	368 groups F = 16.10**	368 groups F = 11.57**	368 groups F = 11.26**	368 groups F = 10.02**
Genre fixed effects	13 groups F = 13.12**	13 groups F = 12.22**	13 groups F = 11.49**	13 groups F = 12.85**
Year fixed effects	17 groups F = 4.73**	17 groups F = 2.16**	17 groups F = 2.09**	17 groups F = 2.04*
N	5065	5065	5065	5065
Overall R ²	.181	.316	.327	.368

* Significance levels: • p < .05; ** p < .01

Table 4: Fixed effects estimates of correlates of release decisions*

Variable	Model 8 Opening Screens	Model 9 Opening Screens	Model 10 Seasonality	Model 11 Seasonality
Principals' experience (3-year window)	.032** (.002)	.031** (.002)	.012** (.005)	.011** (.003)
Strength of direct tie to distributor	.290** (.060)	.279** (.060)	.156* (.072)	.149* (.073)
Observable past performance		.002 (.029)		.001 (.003)
Unexplained past performance		.035 (.029)		.042 (.035)
Film length (minutes)	.003** (.001)	.002** (.001)	.007** (.001)	.006** (.001)
G rating	.228* (.100)	.225* (.100)	.127 (.121)	.125 (.121)
R rating	-.267** (.026)	-.268** (.026)	-.140** (.032)	-.140** (.032)
US film	.265** (.034)	.263** (.034)	-.028 (.041)	-.027 (.042)
Distributor fixed effects	368 groups F = 7.26 **	368 groups F = 6.78**	368 groups F = 1.21**	368 groups F = 1.19**
Genre fixed effects	13 groups F = 75.38**	13 groups F = 75.51**	13 groups F = 3.42**	13 groups F = 3.44**
Year fixed effects	17 groups F = 16.01	17 groups F = 15.91**	17 groups F = 9.32**	17 groups F = 9.31**
N	5065	5065	5065	5065
Overall R ²	.387	.391	.078	.078

* Significance levels: • p < .05; ** p < .01

Table 5: Fixed effects estimates of logged box office receipts (including controls for release decisions)*

Variable	Model 7	Model 12	Model 13	Model 14
Number of principals	.083** (.015)	.029• (.013)	.032• (.013)	.024 (.013)
Principals' experience. (3-year window)	.056** (.005)	.017** (.004)	.017** (.004)	.021** (.004)
Strength of direct tie to distributor	.364** (.141)	-.014 (.118)	.086 (.120)	.109 (.121)
X opening screens			-.364** (.080)	-.350** (.081)
X seasonality			-.054** (.016)	-.053** (.016)
Opening screens		1.248** (.029)	1.289** (.030)	1.293** (.030)
Seasonality		.161** (.024)	.170** (.024)	.175** (.024)
Observable past performance	.025** (.007)	.028** (.006)	.026** (.006)	.032** (.006)
Unexplained past performance	.515** (.068)	.430** (.057)	.438** (.056)	.
G rating	.354 (.233)	.105 (.195)	.131 (.195)	.135 (.196)
R rating	-.294** (.061)	.045 (.052)	.039 (.052)	.038 (.052)
US film	.488** (.080)	.169• (.067)	.170• (.069)	.132• (.067)
Distributor fixed effects	368 groups F = 10.02**	368 groups F = 6.88**	368 groups F = 6.71**	368 groups F = 6.95**
Genre fixed effects	13 groups F = 12.85**	13 groups F = 4.38**	13 groups F = 4.46**	13 groups F = 5.20**
Year fixed effects	17 groups F = 2.04•	17 groups F = 6.23**	17 groups F = 6.13**	17 groups F = 5.79**
N	5065	5065	5065	5065
Overall R ²	.368	.636	.641	.633

* Significance levels: • p < .05; ** p < .01

Table 6: Fixed effects estimates of logged box office receipts (excluding cases with prior producer-distributor relations)*

Variable	Model 14	Model 15	Model 16
Number of principals	.074** (.018)	.028 (.015)	.028 (.015)
Principals' experience. (3-year window)	.010** (.008)	.033** (.007)	.032** (.007)
Strength of direct tie to distributor	.321** (.081)	-.048 (.198)	-.039 (.197)
X opening screens			-.326* (.150)
X seasonality			-.051* (.022)
Opening screens		1.316** (.036)	1.317** (.037)
Seasonality		.173** (.029)	.167** (.029)
Observable past performance	.008 (.008)	.018** (.006)	.018** (.006)
Unexplained past performance	.435** (.081)	.415** (.069)	.419** (.069)
G rating	.505 (.261)	.137 (.222)	.161 (.222)
R rating	-.280** (.072)	.054 (.062)	.049 (.062)
US film	.432** (.087)	.134 (.074)	.139 (.074)
Distributor fixed effects	368 groups F = 7.77**	368 groups F = 5.62**	368 groups F = 5.56**
Genre fixed effects	13 groups F = 6.41**	13 groups F = 3.68**	13 groups F = 3.75**
Year fixed effects	17 groups F = 1.44	17 groups F = 3.26**	17 groups F = 3.22**
N	4005	4005	4005
Overall R ²	.334	.593	.595

* Significance levels: • p < .05; ** p < .01

Table 6: Maximum likelihood truncated normal estimates of the absolute residuals of logged box office receipts (from model 13)*

Variable	Model 17
Number of principals	-.086** (.022)
Principals' experience. (3-year window)	.008 (.008)
Strength of direct tie to distributor	-.282 (.215)
Opening screens	-1.354** (.069)
Seasonality	.170** (.041)
Observable past performance	-.020• (.010)
Unexplained past performance	-.132 (.097)
G rating	-.503 (.348)
R rating	-.429** (.086)
US film	.561** (.099)
Constant	1.305** (.216)
N	5065

* Significance levels: • $p < .05$; ** $p < .01$

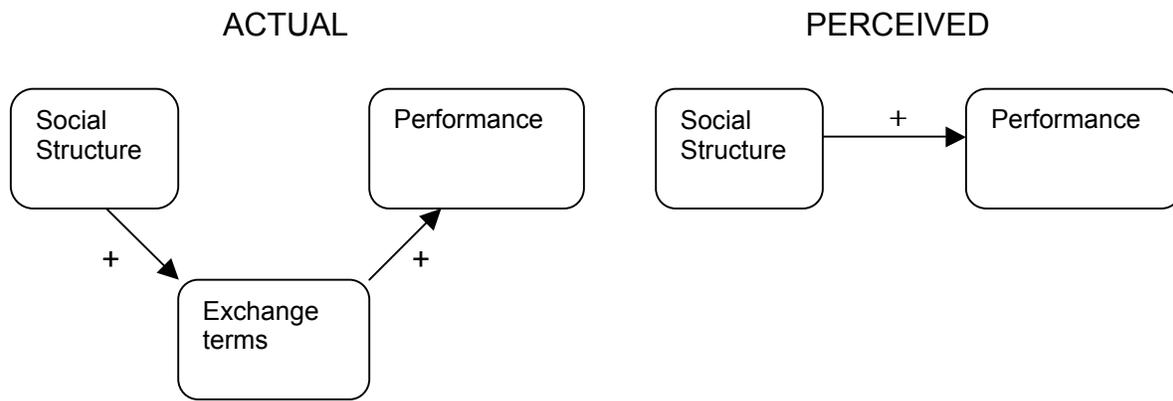


Figure 1: Actual and perceived causal paths in embedded exchange

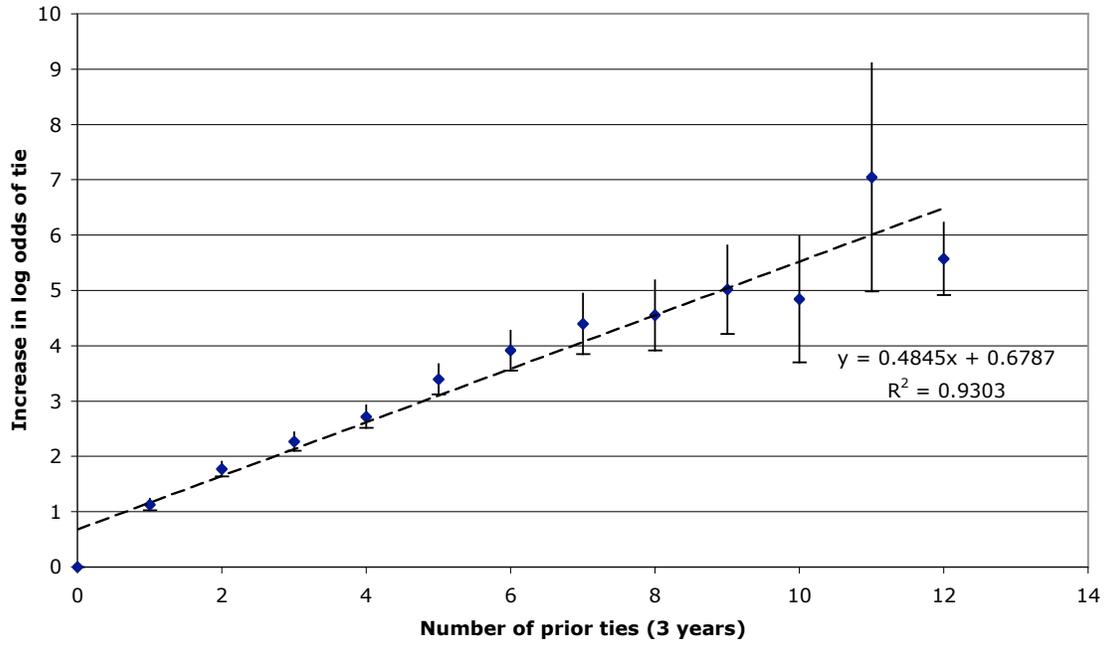


Figure 2: Effect of prior relations on likelihood of future distribution agreement

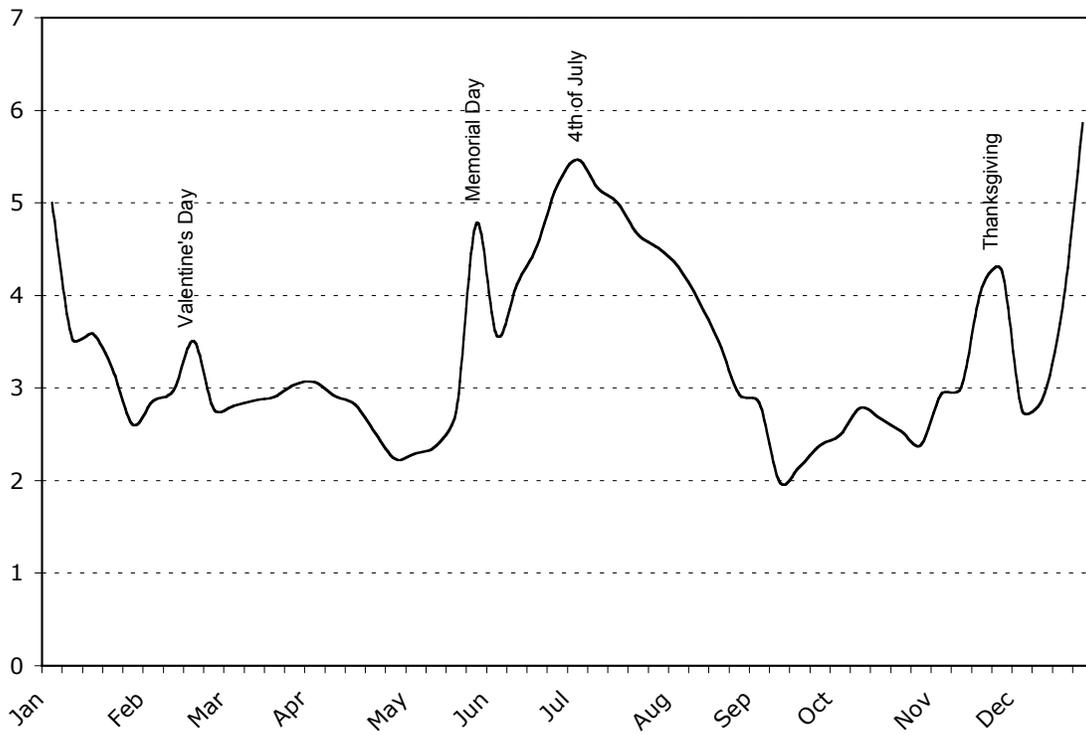


Figure 3: Seasonality in movie attendance