Social Structure and Exchange: Self-confirming Dynamics in Hollywood

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This study uses data on the U.S. film industry from 1982 to 2001 to analyze the effects on box office performance of prior relationships between film producers and distributors. In contrast to prior studies, which have appeared to find performance benefits to both buyers and sellers when exchange occurs embedded within existing social relations, we propose that the apparent mutual advantages of embedded exchange can also emerge from endogenous behavior that benefits one party at the expense of the other: actors offer better terms of trade and allocate more resources to transactions embedded within existing social relations, thereby contributing to the ostensible advantages of such exchange patterns. Findings show that not only do distributors exhibit a preference for carrying films involving key personnel with whom they had prior exchange relations, but also they tend to favor these films when allocating scarce resources (opening dates and promotion effort). After controlling for the effects of these decisions, films with deeper prior relations to the distributor perform worse at the box office. The results suggest that, rather than benefiting from repeated exchange, distributors overallocate scarce resources to these prior exchange partners, enacting a self-confirming dynamic.●

The English language has common words to describe situations in which an individual receives an advantage thanks to his or her social connections. Depending on the nature of the relation, we might call it cronyism, favoritism, or nepotism. All of these terms have negative connotations; people hold in low regard those receiving rewards through their social positions rather than by virtue of their own merits. Yet, at the same time, businesspeople often profess the value of strong relationships with both their suppliers and customers. When relations determine the choice of business partners, both society as a whole and the actors selecting partners may suffer if they pass over more able parties, but when friendships arise naturally from good business relations, they are thought to hurt no one and may even benefit those involved.

Despite this dichotomy in popular wisdom, social scientists have recently adopted a singular stance on such situations, emphasizing the benefits of friendships and prior relations to business transactions, referring to it as structurally embedded exchange. Focusing exclusively on the positive, scholars have observed the commonness with which actors transact repeatedly with the same parties, and their empirical research has identified a positive correlation between firm performance and structurally embedded exchange (e.g., Uzzi, 1996; Brüderl and Preisendorfer, 1998; Rowley, Behrens, and Krackhardt, 2000). These findings appear consistent both with accounts claiming that the private information available via social relations allows buyers to evaluate better the quality of the goods offered to them and with explanations based on the idea that embedded exchange reduces the likelihood of opportunistic behavior following an agreement; in either case, buyers and sellers could mutually benefit by sharing savings in search and enforcement costs (Granovetter, 1985). Implicit in this perspective is the assumption that social relations arise out of the rational comparison of costs to benefits;

structurally embedded exchange therefore maximizes both individual gains and social welfare.

But it is not clear that everyone always, or even usually, benefits from embedded exchange. Social interaction alters our perceptions of others in multiple ways, increasing our affect for and comfort with other parties and reducing the objectivity of our assessments of the information we receive about them (Zajonc, 1968; Lawler, 1992). Hence, for example, we think more highly of our friends. These effects alter the behavior of buyers and sellers in at least two ways. First, either believing that the goods being offered are of higher quality or that the transaction involves less risk, or simply deriving satisfaction from interacting repeatedly, both parties extend better terms of trade to those with whom they have prior relations (Kollock, 1994; Halpern, 1997). Second, buyers and sellers favor those they believe to be of higher quality when allocating scarce resources, opening opportunities for these embedded actors. For instance, a manager might spend more time training an employee that he or she personally recruited to the firm. Despite attempts to act rationally therefore, biased beliefs can lead both buyers and sellers astray. Under these conditions, not everyone benefits from embedded exchange. At best, exchange transfers wealth from one party to the other. At worst, the misallocation of resources also reduces productivity and, concomitantly, social welfare.

A positive correlation between embedded exchange and firm performance is not sufficient to rule out the role of affect and biased beliefs. To the extent that buyers and sellers act on their prior beliefs—offering better terms of trade and allocating greater resources to exchange partners with whom they share social relations—they may enact the very outcomes they expect in a self-confirming dynamic (Merton, 1948). For example, as a result of prior interactions, an investor might tender more money for a smaller share of equity to an entrepreneur about whom he or she feels particularly confident. That lower cost of capital, however, might well contribute to the success of the new venture, thereby confirming the investor's expectations and introducing a positive correlation between repeated exchange and firm performance. Studies that simply relate embedded exchange to better firm performance therefore cannot discern between this self-confirming dynamic and the reduction of search and/or enforcement costs as an explanation. Distinguishing between these competing alternatives requires evidence about both the prices at which transactions occur and the allocation of resources to trading partners, information unavailable in most studies of embedded exchange. In the event of a self-confirming dynamic, one would expect no relation, or possibly even a negative correlation, between embedded exchange and firm performance after controlling for endogenous differences in behavior. Our empirical analysis considered one setting in which we could isolate the mechanisms producing the positive correlation between embedded exchange and firm performance: the U.S. motion picture industry. In particular, we examined the relationships between distributors and produc-

tion companies, the teams of principals (i.e., producers, writers, directors, and actors) involved in a movie.

EMBEDDED EXCHANGE AND PERFORMANCE

Though precise definitions vary, the term structurally embedded exchange has typically been used to refer to the ways in which the existing pattern of social relations influences both who transacts with whom and the nature of those transactions. Operationally, researchers have drawn on this concept to explain the fact that actors exchange more frequently and more intensely with a restricted set of partners than one would expect by chance (e.g., Baker, 1990; Uzzi, 1996). In explaining this phenomenon, researchers have highlighted two mechanisms through which social structure might engender more efficient exchange: search and enforcement.

The first mechanism, the search benefit, points to the value of access to private information about the true quality of goods prior to exchange. Many types of products and services vary along a quality dimension. When buyers cannot accurately observe this quality before purchase, markets fail. Buyers, worried about receiving low-quality goods, only offer bids for the value of these inferior products; meanwhile, sellers of high-quality goods, unable to receive fair compensation for them, may remove their wares from the market (Akerlöf, 1970). Access to private information—for example, from personal experience or third-party endorsements—can ameliorate this problem by reducing the buyer's uncertainty about the quality of the goods being offered (Geertz, 1978).

A second explanation, the enforcement benefit, emphasizes the importance of social relations in mitigating opportunism when one party has both the ability and an incentive to renege on the agreement. When exchange does not occur simultaneously, uncertainty frequently surrounds whether the actors moving last in these sequences of transactions will fulfill their obligations (Fudenberg and Levine, 1993). In such situations, social relations facilitate exchange in several ways. A history of interactions between the parties allows each participant to develop stronger, though possibly inaccurate, expectations of the behavior of the other (Granovetter, 1985); a closer relationship increases the capacity of each actor to monitor the other (Merry, 1984); and beliefs about the possibility of future exchange discourage actors from reneging on agreements, lest these future opportunities disappear (Axelrod, 1984). The search and enforcement benefits of repeated exchange paint a portrait of rational actors maximizing both individual gains and social welfare, but their own endogenous behavior may prevent them from doing so.

Endogenous Behavior

When two actors engage in repeated exchange, one party may offer a better price or allocate important scarce resources following the exchange to the benefit of the other.[1] This behavior will most likely advantage the less powerful actors in the exchange, contributing to their success. In the movie industry, for example, distributors more heavily promote films that involve principals with whom they have prior experience. This promotion benefits the principals

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We use the terms actors and parties to refer both to individuals and to groups (e.g., firms), assuming that many group behaviors ultimately reflect the decisions of individuals within them and hence are susceptible to the same psychological biases.

involved in these films but comes at the expense of both the distributors and the other individuals producing films in the industry that do not have the advantage of these connections, leading to a self-confirming dynamic.

An important scope condition to a theory of self-confirming dynamics is uncertainty on the part of one or both actors about the actual value of the goods being exchanged. Without such uncertainty, neither buyers nor sellers would offer a premium when exchanging with known parties, nor would they fail to recognize the results of their own efforts. This assumption, however, does not greatly limit the theory's scope of application. A wide range of goods and nearly all services involve considerable uncertainty in their value to the buyer. Moreover, though we use the language of buyers and sellers for expositional clarity, the general dynamic applies to a wide variety of exchanges, for example, employment relations in which a firm buys services from employees (sellers).

A second scope condition concerns the situations in which we can identify self-confirming dynamics. Though these processes likely unfold in many settings, we can only observe them in situations in which one party can unilaterally influence the success of the other. This condition is probably both more and less restrictive than it first appears. On the one hand, in almost all cases, one party can act unilaterally by offering to sell the good at a lower price or offering to buy it at a higher price. On the other hand, even a large difference in the price for a single exchange often has little effect on the overall success of either actor.

Our central assumption is simply that actors hold biased assessments in favor of their prior exchange partners and tend to overestimate the actual quality and trustworthiness of those they know well. With the exception of these biased beliefs, one can assume that actors attempt to maximize their own gains, although this assumption is not necessary. One could easily motivate the behavior described below by altering actors' preferences, for example, by claiming that they have an interest in maintaining the relationship itself or that they gain satisfaction from interacting (Granovetter, 1985). Though these factors almost certainly do influence the behavior of parties that exchange repeatedly, if we assume only selfish behavior, it is more difficult to explain transfers of wealth from one party to the other.

Though we cannot observe actors' prior beliefs about the quality of the goods available to them in exchange, the notion that actors would tend to overestimate the quality of goods offered by prior exchange partners is neither controversial nor difficult to justify. Simple affect, for example, could influence beliefs (Zajonc, 1980). Actors who repeatedly exchange with one another often develop an emotional attachment to the relationship (Lawler, 1992; Durkheim, 1995), and psychologists have found generally that familiarity leads to positive affect (Zajonc, 1968). These positive emotions in turn engender biased evaluations. Experiments have repeatedly demonstrated that when in positive moods, individuals interpret feedback from the environment and recall past events more favorably (Bower, 1981; Johnson and Tversky, 1983) and

overestimate the probability of good events in the future (Wright and Bower, 1992; Alhakami and Slovic, 1994). Hence, one might expect actors to overestimate both the value of their prior interactions and their expectations for future exchanges with known parties. Some psychologists have related such behavior to an "affect heuristic" through which the brain encodes expectations as emotions to reduce the cognitive burden of evaluating situations analytically every time we face a decision (Damasio, 1994). As a result, it is easy for individuals to confuse emotions with analytical reasoning (for a review, see Slovic et al., 2002).

Even if actors feel no particular goodwill toward their exchange partners, systematic errors in judgment could nonetheless lead actors to believe their offerings to be of higher value. People tend to seek out and allocate undo attention to information that confirms their existing beliefs or expectations (Wason, 1968; Bacon, 2002). If we assume that people chose to exchange with another party the first time because they genuinely believed that that party had higher quality goods, we would then expect confirmation bias to inhibit them from updating this opinion. In fact, they might even become more biased in their beliefs as they interpret ambiguous information as supporting the correctness of their original decision. This evaluation bias also implies that the degree to which actors hold biased opinions of their prior exchange partners increases with uncertainty about quality following the exchange; in the absence of clear signals to the contrary, actors interpret evidence as supportive of their original decisions. Regardless of which of these factors accounts for the biased beliefs in favor of prior exchange partners, these beliefs should influence exchange behavior in at least two ways: in price setting and in resource allocation. Either of these mechanisms in turn could contribute to the success of one of the parties, thereby producing a self-confirming dynamic.

Prices. The first way in which biased prior beliefs influence exchange is that buyers submit higher bids to and sellers acquiesce to lower prices from parties with whom they have previously transacted. Buyers, for example, believing the goods being offered by known exchange partners to be of higher quality offer better terms to these sellers. Sellers similarly may perceive less risk to transacting with known buyers, and hence accept lower prices, when the nature of the trade requires them to assume risk, for example, if payment is contingent or delayed in time from the delivery of goods. Experimental studies confirm these effects. Buyers commonly forgo better prices to exchange with prior partners, particularly when purchasing goods of uncertain quality (Kollock, 1994). Sellers similarly accept lower prices when negotiating with friends (Halpern, 1997).

Given the symmetry of this effect, it seems difficult to predict which side, if any, should necessarily benefit from this behavior. The situation changes, however, when parties have substantial asymmetry in their relative bargaining power. Powerful buyers and sellers can dictate prices, reducing the other party to a price-taker. In such situations, a difference in the price offered has a large effect on the final outcome. For

example, if a powerful buyer offers a higher price to a seller lacking alternatives, then the seller gains more than he or she would without the relation. As this example illustrates, the benefits accrue to the party in a weaker negotiating position, a proposition confirmed in experimental studies (Tenbrunsel et al., 1999). When these goods represent a large share of inputs or outputs for the party lacking bargaining power, these pricing benefits influence the weaker party's likelihood of success.

Hypothesis 1: Actors in advantageous bargaining positions offer more favorable prices to actors with whom they have had prior exchange experience than to new exchange partners.

Resources. The second effect of biased prior beliefs is that one party may allocate valuable resources following the exchange, to the benefit of the other, without compensation. Although one could easily envision such behavior as a type of gift, even parties attempting to behave rationally might over-invest resources in their trading partners if they see those resources as complements to the goods or services acquired through exchange. By definition, the marginal value of a good rises with investment in its complement. Capital, for instance, is often considered to increase the value of skilled labor. A profit-maximizing firm should therefore invest more in capital improvements if it has a higher-skilled labor force. The implication of this effect is clear. If a firm has a biased belief about the quality of one of its inputs, it will overallocate its complementary resources to that input. Investors, for example, will offer more capital to entrepreneurs they know well, believing them to be more likely to succeed. Supervisors will reserve spaces in mentoring and training programs for employees they recruited, considering them to be the highest potential future managers. Bank loan officers will similarly offer more debt at lower interest rates to businesses run by their friends, regarding them as less likely to default.

Hypothesis 2: Actors controlling important resources allocate larger shares of those resources to exchange partners with whom they have previously interacted.

Performance. Both the relationships between prices and prior exchange and between resource allocations and prior exchange can influence firm performance. Preferential prices offer the clearest advantage to the party receiving them. Sellers who receive greater compensation for their wares will earn a larger profit (or generate a smaller loss). Hence, the actor in the less powerful bargaining position benefits from prior exchange relations to the extent that they result in better exchange prices. But price setting is a zero sum game. What benefits the actor receiving the favorable pricing costs the actor offering it. In this case, the actor in a more powerful bargaining position could have negotiated a better price.

Preferential resource allocations similarly benefit the firms and individuals receiving them even if the resource holders mistakenly allocate these resources in favor of less able parties. Consider the examples mentioned above. Capital contributes to the success of new firms regardless of their intrin-

sic quality, training programs likewise would benefit any employee, and loans can stimulate the growth of almost any business. Hence, these resource allocations contribute to the success of those receiving them. When the agreements between actors reward both parties for these complementary activities, these actions transfer wealth from the actor controlling the resources to the other, because the two parties split the gains but only one pays the costs. Even in cases in which the agreement does not split these gains, the overallocation of complementary goods still represents a loss to the actor distributing these resources (as well as a loss to society) because the resources could have been allocated more efficiently. Though little if any empirical research has considered these dynamics, this expectation follows directly from combining biased prior beliefs with an interest in maximizing returns. We tested our hypotheses with data on producer-distributor relations in the film industry and the box office performance of their films in the period 1982–2001.

METHOD

Producer-Distributor Relations[2]

Accounts of the importance of social connections to which scripts become movies and to which actors and actresses receive choice roles fill the popular press. And even casual observation of film credits suggests a high propensity for individuals to work together repeatedly (for systematic evidence, see Faulkner and Anderson, 1987; Zuckerman, 2004). Though social structure plays multiple roles in shaping this industry, our focus here concerns repeated transactions between producers and distributors. Whereas at one time, integrated firms, known as the "majors" (20th Century Fox, Metro Goldwyn Mayer, Paramount, RKO, and Warner Brothers), both produced and distributed films that they then exhibited in their own theaters, antitrust action led to a 1948 consent decree in which the majors agreed to divest their theater holdings (Conant, 1960). Around the same time, competition forced these studios to end exclusive contracting with talent, greatly reducing the extent of in-house production (Litman, 1998; Caves, 2000). Now, production companies assemble and coordinate resources to create a film. Though some, such as Pixar, operate as stable organizations, the more common structure is that of contract employment (Faulkner and Anderson, 1987): teams of principals come together to shoot a single film and then disband. To identify repeated exchange, we therefore tracked production companies by decomposing each team into its constituent principals: producer(s), writer(s), a director, and actors (a term we use to refer to both men and women). Distributors provide an important link between these production companies and exhibitors (theaters); they select the films they believe will appeal to audiences, convince theater owners to exhibit them, copy and distribute reels to the theaters, and promote films prior to and after their release.

This setting is a prime candidate for isolating the importance of endogenous behavior in embedded exchange for two reasons. First and most importantly, we can observe with relative accuracy the most significant activities that distributors

undertake to the potential benefit of films' production companies, in this case, their marketing decisions—the amount of resources devoted to promoting the films and their release dates. Second, the ability to measure success and failure at the same unit of analysis as the relationship, namely, at the level of each film, allows us to discount possible alternative explanations for this behavior.

The production of a film begins with the mobilization of resources. In the modern motion picture era, this process has an archetypal sequence (see, for example, accounts in Litwak, 1986; Squire, 1992). A producer first purchases rights to a story (e.g., a popular novel), a script, or a screenplay. He or she then hires a director, who enjoys a non-binding contract until the actual start of production. Together, the producer and director, often with the assistance of a casting agent, select actors to fill the various roles. Once these individuals have committed to the project, the production company has secured financing, and a production crew has been assembled, filming commences.

Production companies can engage in contracts with distributors at various points in this process. The earliest stage for such an agreement occurs before production begins. In these cases, the producer typically pitches the proposed project to distributors after having secured a script, a director, and commitments from the lead actors. The pitch itself involves a short presentation (less than 20 minutes) of the idea—the basic plot and the talent involved—to executives of the distribution company. In most cases, these executives know almost nothing about the proposed project prior to the meeting (Elsbach and Kramer, 2003). If the presentation goes well, the distributor might commit to a production, financing, and distribution (PFD) agreement. Here, the distribution company agrees both to finance the production of the film and to distribute it in exchange for ownership of the film. Alternatively, the distributor might commit to a "negative pickup," an agreement to advance royalties covering the production cost (and often a share of projected profits), or to purchase all or a portion of the film for a pre-negotiated price upon delivery of a completed motion picture. Production companies can then use this agreement as leverage in obtaining funding from other sources, such as bank loans and investment syndicates. These pre-production agreements cover roughly 30 percent of the films released in theaters.[3] In most cases, however, production companies do not secure a distribution commitment prior to making the movie. They must then obtain funding and produce the film in the hope of later—either during or after production—convincing a distributor to carry the film (an agreement known as an "acquisition").

Regardless of when producers and distributors sign these agreements, they vary little in their terms, and two standard features of these contracts are particularly relevant to a study of self-confirming dynamics. First, distribution agreements have invariant fee structures: distributors keep 30 percent of all domestic revenue and 40 percent of all foreign proceeds as a distribution fee (Vogel, 2001). Consequently, distribution companies have strong incentives to maximize revenue. Second, the contracts never detail specific release dates or lev-

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Fee (2002) reported that distributors financed 53 percent of the films released in 1992 or 1993, but his sample only included 326 of the 563 films released in those two years. If we accept his assertion that these missing cases "fall into the independently financed/independently distributed category" (Fee, 2002: 695), in other words acquisitions, then PFD and negative pickups combined would only account for 30.7 percent (= 53 percent × 326 / 562) of the 1992–1993 films in our sample.

els of marketing. Distributors must simply exert "reasonable effort" in the promotion of films (Cones, 1997). Hence, the choices of when to release as well as how and how much to market a particular movie are entirely at the discretion of the distributor.

Data

The unit of analysis is the film. Isolating effects to the level of the film, the level at which the relationships themselves come into play, avoids the potential ecological fallacy inherent in relating aggregated measures of prior exchange and distributors' success. Our dataset, derived from the Internet Movie Database (imdb.com) and the weekly box office listings reported in *Variety* includes all films ever generating a minimal level of theatrical revenue in the U.S. from January 1, 1982, to December 31, 2001 (N = 5,199). To be included, a film had to appear on the *Variety* listings of top-grossing films for at least one week during the observation period. Though one might worry that such a requirement would exclude a large number of films, the *Variety* listings include movies with extremely limited distribution; indeed, sales of as few as 100 tickets could qualify a motion picture for inclusion on the *Variety* lists, and nearly 10 percent of the films in the dataset never appeared on more than one screen in the United States. We began our observation 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," in which films open on the same day 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.

The film industry exhibits a high degree of repeated exchange between distributors and the principals involved in a film. Table 1 reports the number of films in our sample for

Table 1

Repeated Exchange between Production Teams and Distributors in Preceding Three Years*

	No experience	Prior experience
N	3,126	2,073
Expected (N)	4,852.6	346.4
Box office sales		
Mean	$7,000,000	$30,100,000
Median	$423,720	$13,900,000
Weeks in theaters		
Mean	10.9	13.4
Median	7	12
Production budget		
Mean	$24,500,000	$39,400,000
Median	$8,000,000	$30,000,000
Media advertising budget		
Mean	$11,100,000	$13,800,000
Median	$10,000,000	$13,000,000

* All means differ significantly across the two groups at $p < .01$. Budget data are only available for 1411 cases; media advertising budgets are only available for 250 cases.

which the principals either had or had not been involved in another film with the same distributor in the previous three years. For comparison, the next row reports the numbers one would have expected if each distributor selected films for its yearly portfolio with equal probability. Repeated transactions between distributors and principals occur roughly six times as often as one would expect by chance.[4] These figures nonetheless underestimate the true level of repeated exchange because in many cases teams without connections in this three-year window did have interactions in earlier years. The remaining rows in the table detail other dimensions on which films with a prior relation differ from those without a prior relation. Notably, films in which the principals had prior interactions with the distributor stayed in theaters longer and earned more than four times as much in average ticket sales. From these simple statistics, it would appear that distributors benefit from working repeatedly with the same principals.

Our central claim, however, is that distributors, believing the films produced by principals with whom they have prior experience of greater commercial potential, actually enact these effects, engendering a self-confirming dynamic. As noted above, this dynamic might arise through either or both of two mechanisms: pricing or post-exchange resource allocation. In this setting, two "prices" exist. One is the distribution fee, but contracts in this industry do not vary on that dimension. Another is the budget, when distributors commit to financing a motion picture (PFDs), or the negative cost for films purchased for a negotiated price or advanced royalties (negative pickups and some acquisitions). In both cases, a major portion of this amount goes to the salaries of the members of the production team, and in the case of pre-negotiated acquisition prices or royalty advances, it also can include profit guarantees. When agreeing to distribute films with principals with whom they have prior experience, according to hypothesis 1, one would then expect distributors to authorize larger budgets (or negative costs). The summary statistics in table 1 support this expectation. Films whose principals had previously worked with the distributor had a mean budget/negative cost of $39.4 million, compared with only $24.5 million for those without these prior relations.

The second mechanism is post-exchange resource allocation. In this setting, distributors have a great deal of influence through their promotion activities on the success of a film even after a contract has been signed. When marketing films from principals with whom they have more experience— believing these films to have greater commercial potential— one would expect distributors to promote them more heavily (hypothesis 2). These beliefs might influence two separate decisions. First, distributors may favor these films when deciding which to release during high-demand periods, such as the 4th of July. Second, they may allocate greater financial resources to advertising them. We found that when the principals had previously worked with the film's distributor, the distributor allocated $2.7 million more, on average, to advertising media. To the extent that these decisions affect ticket sales, they will enhance the box office performance of films

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The expected counts in table 1 reflect differences both in the number of active distributors and in the number of films that each of these distributors carried each year. Unreported multivariate analyses revealed that this high propensity for repeated exchange remained even after controlling for distributor specialization (in terms of genre). The multivariate analyses also allowed us to estimate the relative importance of prior relations across different classes of participants. Prior exchange between a producer and distributor had roughly twice the effect on the likelihood of future exchange as one between the distributor and a writer, a director, or an actor (which all had statistically equivalent effects).

whose principals have had prior dealings with their distributors.

The primary alternative hypothesis is that prior relations improve the selection process.[5] Distributors must sort through thousands of projects to decide which they will choose to market and distribute to theaters. Though a famous quip claims that "Nobody knows anything" (Goldman, 1983: 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 developing winning pictures (Elsbach and Kramer, 2003). Our conversations with distributors have also suggested a second issue. Distributors feel that prior relations give them earlier access to promising projects, believing that the principals involved in a film first approach those distributors with whom they have prior experience, giving them a virtual "right of first refusal" to distribute the film. Repeated exchange may therefore allow distributors to cherry-pick the best projects from those with whom they have worked in the past.

Dependent Variables

We began by exploring the ways in which prior relations influenced film budgets/negative costs (hereafter referred to jointly as "budgets"), as well as the allocation of resources by distributors to films following the exchange. Because contracts for motion pictures do not vary in terms of the proportion of the revenues flowing to the production and distribution companies, the most meaningful "price" in exchanges between these parties is the film's budget. In addition, two variables, both under the control of the distributor, help to determine 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.

Budget. Budgets represent a mechanism through which the principals involved in a film can extract rents from distribution companies. A large share of the budget for many films consists of the salaries (prices) paid to the director, producers, writers, and actors involved in the production. But a film's budget can also affect the success of a film in multiple ways. Additional resources allow production teams to record higher-quality sound, to shoot more and higher-quality footage, and to spend more on post-production work. In modern films, large budgets have also become increasingly important to supporting special effects, both traditional (e.g., car chases) and digital.

Our measure of *budget,* in units of logged dollars, came from the information recorded in the Internet Movie Database. These data have several limitations. First, neither imdb.com, nor any other source, carries budget data for all films. No legal regulation compels the private companies producing most films to disclose their costs. Also, because costs on a number of dimensions differ across countries and because of the difficulties inherent in translating amounts in foreign currencies, we excluded films produced outside the United States. Consequently, we only have budget information for a subset of 1,269 films. Second, even when available, one might question the comparability of these data because

accounting is notoriously non-standard in Hollywood. Third, we could not systematically identify those cases in which the distributor contracted for the movie prior to filming (i.e., when repeated exchange ought to have the largest effect on the size of the budget). Our exploration of the data, however, suggested that the sample with budget information dispro-portionately represents these cases. Finally, we could not determine what portion of the budget comprised payments to the principals on the production team, thereby represent-ing a transfer of wealth to the principals more than an indica-tor of value-creating investments in the film. Despite these drawbacks, the analysis of the budget data still gives us some sense of whether prior interactions correlate with "prices" after controlling for a number of other factors.

Promotion. Marketing affects ticket sales in many ways. At the most basic level, advertising and other forms of promo-tion alert consumers to the availability of new films. Given the short period that the typical movie spends in the the-aters, potential viewers have limited time to learn about new offerings. Advertising plays an important role in allowing con-sumers 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 satisfaction received from the viewing and distributors in the positive word of mouth elicit-ed from viewers, which can influence the success of a film. Distributors also likely hope to create positive affect for the movies they promote.

The number of *opening screens* on which a film played in its first week of exhibition provided us with a measure of the level of resources allocated to promoting a film.[6] Though ide-ally we would measure the exact dollars devoted to market-ing, distributors do not systematically report these expendi-tures. Incentives on both sides of the distributor-exhibitor relationship nevertheless ensure a tight link between market-ing expenditures and opening screens. Distributors maximize the efficiency of their pre-release advertising by opening on as many screens as possible because the positive effects of advertising decay very rapidly, reaching nearly zero within two to three weeks following the film's release (Lehmann and Weinberg, 2000). At the same time, substantial advertis-ing expenditures entice more theater owners to exhibit the film because they know that the advertising will help bring customers to their theaters. As one former executive of a large chain of theaters told us, "How many screens a film gets depends on how much advertising support the distribu-tor will give [the film]." To adjust for the skew and account for decreasing returns, we transformed the count of opening-week screens using a natural log function.

We validated this proxy by comparing it with 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, opening screens correlated .90 with actual marketing expenditures. A second sample of advertising allocations came from a civil case privy to internal distributor information on actual media expendi-

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Because limited-release films—those first shown on a small number of screens to generate word-of-mouth with the inten-tion of being exhibited on hundreds of screens after a few weeks—follow a very different marketing strategy, we excluded these films from our study (roughly 2 per-cent of cases).

tures for a random sample of 250 films with budgets of more than $5 million and opening on at least 1000 screens between April 1995 and April 1998. Even within this relatively truncated range, opening screens correlates .44 with actual marketing expenditures.

Release timing. Several factors account for the importance of release dates: most significantly, demand fluctuates substantially over the course of the year (Litman, 1983; Radas and Shugan, 1998). This seasonality, coupled with the short period a movie spends in the theater, means that release timing can critically affect the success of a film, or as Barry Reardon, Warner Brothers' president of distribution, bluntly asserted, "If you don't pick the right release date, you can destroy a movie" (Korts, 2001: 514). *Season* captures whether a distributor released a film during a high-demand period. Though most peak seasons revolve around holidays, we developed a continuous measure of seasonality by creating 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. The three-week average allows the measure to accommodate the movement of holidays from year to year, while using the prior three years of data (instead of one) minimizes the effects of outliers on our seasonality measure. Figure 1 depicts the average value of the season 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. We also transformed this variable using a natural log function.

Figure 1. Seasonality in movie attendance.
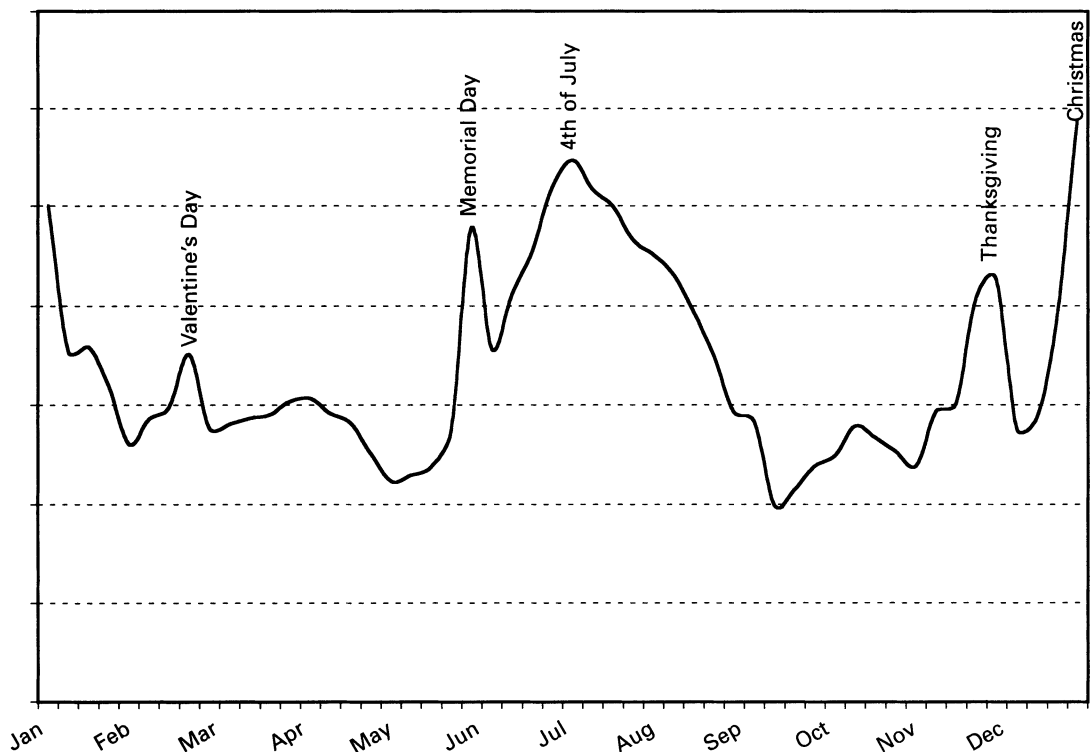
Independent Variables

Our primary independent variable of interest is the production team's *number of direct ties to the distributor,* the count of the principals' films over the prior three years carried by the same distributor as the current one. Because of the skew in its distribution, we added one to it and transformed the resulting number by the natural log. If repeated exchange leads distributors to offer better prices (budgets) and more resources to production teams with whom they have previously exchanged, then we should see a positive relationship between this variable and our three measures of behavior. We also investigated the possibility of non-monotonic effects in all of the models; though most models had significant quadratic terms, the inflection point always fell at a number of ties in excess of 16 (within the range of the data, but above the 99th percentile and therefore indistinguishable from simple decreasing returns to deeper prior relations). For simplicity of interpretation, we therefore only report models with logged counts.

The models also included several controls. The *number of principals* counts the number of different individuals in principal roles. The size of a film can increase its costs, and if each 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 principals might attract larger audiences. *Principals' experience* averages the number of films in which each of these individuals has been involved over the prior three years. It captures several factors. On one hand, principals may actually learn to perform their roles better or accumulate human capital. On the other hand, a selection process might simply weed out the least able over time. Also, because 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 estimation also included a control for the underlying quality of the participants involved. *Observable past performance* averages the box office sales of other motion picture projects that the principals participated in over the three years preceding the release of the current film. As all distributors (and even non-industry observers) can easily observe these sales, it does not represent private information, but it does 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 (Bakker, 2001).[7]

We also controlled for two film-level attributes. First, an indicator variable captured 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 receive less promotion and underperform U.S.-produced films. Second, the models included indicator variables for films' ratings by the Motion Picture Association of America (MPAA) (PG-rated films served as the baseline). MPAA ratings, initiated in 1968, represent a form of self-regu-

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In unreported models, the results also remained robust to controlling for *unexplained past performance.* Intuitively, this measure addressed the question of how much better or worse films with these principals did than one would have expected given their budget, genre, and rating, the amount spent on marketing them, and their release date. Practically, our calculation of this variable involved summing the residuals of film performance for the projects in which the principals had been involved during the preceding three years. In the first stage, we estimated the expected success of each film based on its distributor, budget, 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.

lation by the movie industry in the United States. Distribution companies submit films to a review board for a recommendation. These ratings reflect the content of the film: PG (parental guidance) and R (restricted) ratings alert potential viewers that the film contains some type of content (profane language, sexuality, violence, or nudity) deemed inappropriate for less mature audiences. Both industry participants and researchers 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 Basuroy, 2004).

Finally, we used three additional variables to help us gauge the effects of the endogenous behavioral variables when we estimated the consequences of repeated exchange for performance (i.e., we use them as "instruments"). *Film length* should increase the production costs and hence the budget, but we did not expect it to have any independent effect on film revenue (conditional on the budget, the correlation between film length and sales is .008, $p > .76$). With respect to the number of screens, we expected the total number of *available screens* to influence the opening-week screens but did not expect any direct effect of this variable on sales (the partial correlation between U.S. first-run screens and sales conditional on the number of opening-week screens is $-.019$, $p > .17$). Finally, we used the seasonality of the last film released by the same distributor in the same genre, *distributor lagged seasonality,* to identify seasonality. Though this variable reveals firm behavior, the distributor's decisions about when to release earlier films should not have a direct effect on the public's interest in viewing any particular focal film—though the partial correlation is only .143, we cannot reject the possibility of a direct effect. To identify the models, each of these variables only predicts one of the dependent variables in table 3, and none enters the second stage performance equations (Johnston and DiNardo, 1997). Table 2 reports descriptive statistics for these measures.

Table 2

Descriptive Statistics

Variable	Mean	S.D.	Min.	Max.
Ln (box office receipts)	14.00	3.08	5.36	20.21
Ln (budget)	16.48	1.60	6.90	19.11
Ln (opening screens)	4.18	2.86	0	8.21
Ln (season)	14.96	.28	14.42	15.77
Number of principals	7.67	2.08	1	18
Principals' avg. experience (3-year)	.92	.87	0	9.71
Ln (ties to distributor + 1)	.50	.72	0	4.17
Observable past performance	12.72	5.94	0	18.42
G rating	.02	.15	0	1
R rating	.49	.50	0	1
U.S. film	.75	.43	0	1
Film length	103.1	17.38	39	280
Ln (available screens)	8.17	.94	6.95	9.06
Ln (lagged distributor season)	14.97	.28	14.42	15.77

Multivariate Analysis

We began by examining whether distributors offered better prices (hypothesis 1) and allocated more resources (hypothesis 2) to films on the basis of the depth of their relations with

the films' principals. Because the main alternative hypothesis to our theory of biased prior beliefs is one of rational pricing and resource allocation on the basis of private information, implying that distributors perhaps should allocate extra resources to their trusted exchange partners, we analyzed the effects of repeated exchange on film performance to determine the plausibility of this alternative account. The following equations represent our modeling approach for estimating budget, marketing, and release dates:

$$B_i = \alpha DT_i + \Sigma\beta_x x_i + \sigma_i + \gamma_i + \tau_i + \eta_i, \quad (1)$$

$$OS_i = \alpha DT_i + \Sigma\beta_x x_i + \sigma_i + \gamma_i + \tau_i + \eta_i, \quad (2)$$

$$RT_i = \alpha_i DT_i + \Sigma\beta_x x_i + \sigma_i + \gamma_i + \tau_i + \eta_i, \quad (3)$$

where B stands for the logged film budget, OS denotes the logged number of opening-week screens, RT indicates logged season (total demand in the three-week window following a film's release), DT represents the (logged) number of direct ties linking the team of principals to the distributor, x refers to a vector of control variables, σ, γ, and τ denote fixed effects for distribution companies, film genre (as classified by *Variety*) and year, respectively, and η represents film-specific error terms. Though we remain agnostic about these effects, prior research has found significant effects on box office performance due to both film genre and distributor (Litman, 1983; Prag and Casavant, 1994). Practically, we mean-deviated the data, and adjusted the degrees of freedom appropriately, to account for distributor fixed effects and included sets of dummy variables to capture genre and year effects; we used least squares minimization to generate the coefficient estimates and standard errors.

Our analysis of performance began by estimating the effect of repeated exchange on box office receipts, the most direct measure of film performance. Because contracts in this industry allocate revenue both to exhibitors (theater owners) and to distributors as percentages of overall receipts (Vogel, 2001), all participants wish to maximize sales. Though new technologies have opened additional revenue sources, box office sales remain the critical measure of success, particularly as these ancillary revenues tend to correlate highly with theatrical sales. Ravid and Basuroy (2004), for example, reported correlations of .86 between domestic (U.S.) and international ticket sales and of .70 between domestic box office and video rentals, and studies investigating the correlates of these revenue sources have found identical patterns of relations across the various sources (Ravid, 1999). Our approach to estimating performance parallels that of our behavior models, box office sales (ln S):

$$\ln S_i = \alpha DT_i + \Sigma\beta_x x_i + \sigma_i + \gamma_i + \tau_i + \varepsilon_i, \quad (4)$$

where DT represents the logged number of direct ties linking the team of principals in film i to their distributor, x refers to a vector of control variables, σ denotes a set of fixed effects for distribution companies, γ indicates fixed effects with respect to the film genre, τ represents fixed effects for the year of the motion picture's theatrical release, and ε is a film-specific error term. If $\alpha > 0$, the results suggest that embedded exchange improves performance. Once again, we estimated the coefficients by minimizing least squares and implemented the distributor fixed effects by mean-deviating the data and the genre and year fixed effects through the inclusion of sets of dummy variables.

RESULTS

Table 3 reports the results of our estimations of the effects of the budget, marketing, and release dates. For each dependent variable, the first column reports a model that estimates the gross effects of the number of direct ties to the distributor, while the second column reports a model controlling for other attributes of the production team that may correlate with these ties. Among those motion pictures on which we have information, having ties to the distributor appears to have a large effect on the budgets. A doubling in the number of prior ties between the production team and the distributor raises the expected budget by 25 percent ($= e^{\ln(2)*.323}$). Some

Table 3

Fixed Effects Estimates of Logged Budget, Logged Opening Screens and Seasonality*

Variable	Model 1 Budget	Model 2 Budget	Model 3 Opening screens	Model 4 Opening screens	Model 5 Season	Model 6 Season
Ln (ties to distributor + 1)	.323** (.037)	.161** (.033)	.423** (.039)	.234** (.045)	.031** (.007)	.018* (.008)
Number of principals		.089** (.015)		.084** (.013)		.003 (.002)
Principals' avg. experience (3-year window)		.287** (.038)		.171** (.040)		.015* (.007)
Observable past performance		.124** (.008)		.031** (.006)		.000 (.001)
Film length (minutes)	.020** (.002)	.017** (.001)				
Ln (available screens)			.317** (.028)	.306** (.028)		
Ln (distributor lagged season)					.259** (.085)	.236** (.085)
G rating	.003 (.189)	−.125 (.166)	.489* (.201)	.502** (.200)	.024 (.034)	.027 (.034)
R rating	−.396** (.058)	−.309** (.052)	−.313** (.053)	−.338** (.053)	−.036** (.009)	−.036** (.009)
U.S. film			1.178** (.067)	1.052** (.068)	−.012 (.011)	−.016 (.012)
Distributor fixed effects	124 groups F = 9.38	124 groups F = 6.35	370 groups F = 10.86	368 groups F = 8.66	368 groups F = 1.20	368 groups F = 1.19
Genre fixed effects	13 groups F = 9.03	13 groups F = 8.99	13 groups F = 48.38	13 groups F = 48.34	13 groups F = 2.98	13 groups F = 3.07
Year fixed effects	17 groups F = 7.52	17 groups F = 5.28	17 groups F = 3.26	17 groups F = 2.41	17 groups F = 10.54	17 groups F = 10.46
N	1269	1269	5065	5065	5065	5065
Overall R²	.406	.623	.407	.481	.072	.073

* $p < .05$; ** $p < .01$.
* Standard errors are in parentheses.

of this difference, however, appears to stem from other attributes of the production team: the number of principals, which potentially captures scale here, the recent experience of the principals, and their past observed success all significantly increase the expected budget. After controlling for these effects, the results still support hypothesis 1: a doubling in the number of prior ties is associated with an 11.8 percent increase in budget (roughly $4,144,000 on the average U.S. film in 2000).

As expected, longer films require more resources. In fact, the scaling of costs appears to increase more than linearly—a 10 percent increase in the runtime of the film over the industry average increases its expected budget by 19 percent ($= e^{.017*10.3}$)—perhaps because the added time also intensifies the complexity of the production process. R-rated films, in contrast, appear to involve smaller budgets.

The next two columns report the correlates of the (logged) number of opening-week screens, a proxy for marketing expenditures. Consistent with hypothesis 2, model 3 reveals that distributors open films on more screens when they have deeper ties to the principals involved in them. The magnitude of this effect is substantial; a doubling in the number of prior ties corresponds to 34 percent ($= e^{\ln(2)*.423}$) more opening screens. Again, a portion of this effect appears to stem from the greater promotion associated with films with more, more experienced, and more successful, principals. After controlling for these factors, a doubling in prior ties predicts a 17.6 percent increase in the number of opening screens.

Among the control variables, distributors appear to promote G-rated films more heavily than PG movies and U.S. films more than those produced abroad. R-rated films open on fewer screens on average. As expected, the total number of screens in the United States available for first-run exhibition significantly increases the expected number of opening-week screens.

In addition to investing more in the marketing of films when they have prior experience with the principals involved, distributors also allocate these films to more attractive release dates, consistent with hypothesis 2. The final two columns provide parallel models of the determinants of the aggregate demand on a film's opening date. Once again, models 5 and 6 reveal that distribution companies favor films involving principals with whom they have previously worked. The overall effect, however, is not large; in model 6, a doubling in the number of ties corresponds to only a 2.1 percent rise in seasonality (aggregate demand). Films involving principals with heavy recent exposure appear during higher-demand times of the year, while those receiving an R rating are relegated to less attractive opening dates. Distributors appear to exhibit consistency in their preference for high- or low-demand periods for particular genres, as their seasonality on the lagged offering within a genre positively and significantly predicts the aggregate demand during the release week for the focal film.

Though the relationships between repeated exchange and budgets, promotion, and release timing appear consistent

with our contention that biased evaluations of prior exchange partners lead distributors to favor these teams of principals in budgets and the allocation of resources, these patterns might also reflect rational (and efficient) decisions. If repeated exchange, for example, enables better coordination or the transmission of valuable private information, both parties could benefit from this behavior. An analysis of performance, however, potentially allows us to distinguish between these two cases. If repeated exchange benefits both parties, we should then observe a positive effect, or at the very least no negative effect, of prior relations on performance, in this case, box office sales. If, in contrast, this behavior reflects biased decision making, then repeated exchange could have a negative effect on financial performance.

Tables 4 and 5 report the results of our analysis of performance. Model 7 offers a baseline model, with controls for film rating, U.S. production, and distributor, genre, and year fixed effects. Without controls for characteristics of the production team, the strength of the tie from this team to the distributor appears to have a large positive effect on performance: a doubling in the number of prior ties corresponds to a 53 percent ($= e^{\ln(2)^{*}.612}$) increase in expected box office sales. Though other characteristics of the production team—including its size, average experience, and observable past performance—account for a little more than half of this effect, tie strength continues to have a positive and significant effect on sales. In this sense, we can replicate the positive effects of repeated exchange found in prior studies (e.g., Uzzi, 1996).

The critical question, however, is whether these effects remain robust to the inclusion of controls for film budget, promotion effort, and release timing. The estimation of these effects required a change in our approach because the endogenous determination of budget, opening screens, and release timing introduces a type of selection bias. OLS yields inconsistent estimates with these endogenous variables because distributors do not randomly choose budgets, marketing levels, or release dates, which introduces a correlation between these variables and the unexplained portion of film sales (because common unobserved factors influence both).

To address this problem, we estimated the effects of these endogenous variables using a two-stage least squares (2SLS) instrumental variables approach (for a review, see Johnston and DiNardo, 1997). Practically, we substituted the predicted values from the first stage equations for opening screens and season (and later for budget as well) found in models 4 and 6 (and later 2) for the endogenous variables. Though we could then use OLS to derive the coefficient estimates, least squares tends to underestimate the standard errors in the second stage. To correct for this problem, we generated the standard errors through bootstrapping (50 iterations). In unreported models (available from the first author), we also estimated the models using Garen's (1984) generalization of Heckman (1976) for continuous selection variables. Both approaches produced nearly identical results, increasing our confidence in the estimates reported.

Models 9 and 10 in table 4 report the results of these regressions. We began by introducing controls only for the number of opening screens and release timing because we have this information for all films in our sample. Marketing decisions have a large effect on box office receipts. A doubling in the number of opening-week screens increases the expected box office receipts by 44 percent, while a doubling of total demand (seasonality) raises the expected revenue by 171 percent. Properly accounting for the endogenous effects of marketing effort and release dates dramatically alters the results. Most notably, the effect of prior dealings with the distributor shifts from positive to negative. After accounting for the effects of these marketing decisions, a doubling in the number of ties depresses the expected box office by 25.9 percent (close to $5 million for the average film in 2000). The positive effect of repeated exchange in models 7 and 8, therefore, appears to exist only because distributors favor these films when allocating their valuable marketing dollars and release dates. As a robustness check, model 10 replicates model 9 using a dummy variable (in both first and second stages) to indicate those cases in which any member of the production team had a prior relationship with the distributor in the preceding three years.

Accounting for the effects of marketing decisions shifts the effects of several other variables as well. The number of principals, their average experience and their observable past performance no longer have significant effects on performance. Prior box office success and experience in the indus-

Table 4

Fixed Effects Estimates of Logged Box Office Receipts (N = 5065)*

Variable	Model 7	Model 8	Model 9	Model 10
Ln (ties to distributor + 1)	.612** (.046)	.283** (.053)	−.431** (.135)	
Prior tie dummy				−.401** (.136)
Ln (opening screens)			.529** (.121)	.381** (.115)
Ln (season)			1.436** (.260)	1.413** (.252)
Number of principals		.118** (.015)	−.010 (.025)	−.006 (.181)
Principals' avg. experience (3-year window)		.326** (.047)	−.201 (.160)	−.274 (.160)
Observable past performance		.024** (.007)	−.006 (.011)	.004 (.009)
G rating	.261 (.239)	.330 (.233)	−.826* (.387)	−.724* (.361)
R rating	−.249** (.063)	−.292** (.062)	.960** (.197)	.906** (.184)
U.S. film	.643** (.080)	.503** (.080)	.403* (.172)	.563** (.213)
Distributor fixed effects	368 groups F = 12.80	368 groups F = 9.68	368 groups F = 6.65	368 groups F = 6.49
Genre fixed effects	13 groups F = 11.31	13 groups F = 12.54	13 groups F = 8.62	13 groups F = 8.66
Year fixed effects	17 groups F = 2.88	17 groups F = 2.07	17 groups F = 8.69	17 groups F = 8.78
Overall R^2	.245	.483	.493	.486

* $p < .05$; ** $p < .01$.
* Models 9 and 10 report bootstrapped standard errors. Standard errors are in parentheses.

try only appear to matter in terms of influencing distributors to allocate more resources to films. Also, the effects of G and R ratings flip.

Despite the fact that our standard errors remain relatively consistent across these models, the reversal of signs raises concerns that multicollinearity may have introduced numerical instability into our results. We therefore examined this possibility in two ways. First, we calculated the square root of the ratio of the largest to smallest eigenvalues of the moment matrix (the "condition number"). When this ratio exceeds 30, it indicates moderate to strong collinearity (Belsley, Kuh, and Welsch, 1980). In our models, however, this ratio ranges from 9.6 to 13.5, indicating that our variables have no more than weak multicollinearity. Second, we calculated variance inflation factors (VIFs) for all coefficients in all models. Again, the VIFs fell well below the level at which one would worry about multicollinearity (typically 10); they reached a maximum of 3.1 for the logged opening screens variable in model 9.

Models 11 and 12 in table 5 then include the effects of budget. We began by reestimating model 8 for only those cases for which we had budget data available (but without yet including budget as a control). This subsample appears to dif-

Table 5

Fixed Effects Estimates of Logged Box Office Receipts*

Variable	Model 11 Budget not missing	Model 12 Budget not missing	Model 13 No producer ties
Ln (ties to distributor + 1)	.165•	−.778••	−.316••
	(.073)	(.157)	(.138)
Ln (budget)		1.138••	
		(.324)	
Ln (opening screens)		.461••	.442••
		(.098)	(.105)
Ln (season)		.898••	1.125••
		(.187)	(.196)
Number of principals	.109••	−.175••	.020
	(.026)	(.044)	(.023)
Principals' avg. experience (3-year window)	.327••	−.466••	.135
	(.074)	(.138)	(.135)
Observable past performance	.039•	−.175••	−.015
	(.016)	(.047)	(.009)
G rating	.114	−.607	−.464
	(.332)	(.415)	(.261)
R rating	−.449••	1.379••	.704••
	(.099)	(.325)	(.183)
U.S. film			.360•
			(.173)
Distributor fixed effects	124 groups F = 7.55	124 groups F = 5.05	368 groups F = 5.74
Genre fixed effects	13 groups F = 5.06	13 groups F = 6.62	13 groups F = 7.48
Year fixed effects	17 groups F = 1.38	17 groups F = 6.11	17 groups F = 1.28
N	1269	1269	4005
Overall R^2	.346	.559	.445

• $p < .05$; •• $p < .01$.
* Standard errors are in parentheses.

fer from the population on several dimensions. Within this subset, direct ties to distributors have an attenuated effect on expected box office. Further investigation revealed that films with budget information available, on average, have much higher levels of repeated exchange, attenuating the range for comparison. Principals' average experience shows a similar effect. Regardless of these differences, the coefficients on all variables show similar shifts from model 11 to model 12, as they do from model 8 to model 9. As with promotion and release timing, larger budgets have a substantial effect on expected performance: a doubling in the film's budget is associated with a 73 percent increase in expected box office revenues. After accounting for the (endogenous) effects of these budget differences, repeated transaction appears to have an even stronger negative effect on expected box office sales: a doubling in the number of prior ties corresponds to a decrease in expected box office of 42.3 percent (more than $8 million for the average film in 2000).

Though the evidence appears to support our thesis, at least three alternative possibilities seem worthy of careful consideration. First, one might worry that repeated exchange reflects contracts governing property rights to the film. In some cases, either through in-house production or a PFD agreement, distributors own the film. Though owning the film might appear to increase the incentives to market it, it in fact decreases them because distribution agreements uniformly permit distributors to recover their promotion costs before they begin to split revenue with the production companies (Cones, 1997). In other cases, known as "development deals," distributors pay producers for the right of first refusal to the projects they pursue over some time period. Though rare, these agreements link producers to distributors and hence may influence our results. Finally, sequels represent another situation in which contracts for the original film explicitly link principals to distributors across films, as nearly all distribution contracts include a clause assigning the rights to distribute potential sequels as well as the current film to the distributor (Cones, 1997).

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, one would expect a prior producer-distributor tie. In the case of in-house production, distributors assign internal employees to manage the project. Output deals similarly link producers and distributors across multiple projects, and sequels nearly always have the same producer 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. Model 13 in table 5 reports these results. The effect in this analysis 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; the coefficients, moreover, remain largely unchanged. These contractual issues therefore appear to have little bearing on our results.

The second alternative interpretation is that distributors may benefit in repeated transactions not by selecting better quality films but, rather, through economizing on search costs. Though this explanation could account for the absence of a film-level performance advantage from repeated exchange (because savings in search costs would only appear at the firm-level distributor performance), it cannot explain the allocation of larger budgets to and the excessive marketing of films made by known parties. Conditional on having selected a set of pictures, economizing on search costs should not influence these expenditures. Hence, while repeated transactions may reduce search costs, this explanation cannot account for our complete set of findings.

Third, a rather subtle alternative interpretation suggests that selection through repeated exchange improves performance not through an increase in average revenues but through a reduction in their variability, potentially a very important concern in high-risk industries, such as entertainment. If true, then net of other factors, films involving prior exchange partners should exhibit less variability in their sales. To assess this possibility, we analyzed the absolute value of the residuals (from model 9), a measure of variance in film performance. Table 6 reports the results of these models using maximum likelihood estimation for data with a truncated normal distribution, censored at a lower bound of zero (Amemiya, 1973). We report the estimation in stages because doing so reveals an interesting pattern. Though films

Table 6

Maximum Likelihood Truncated Normal Estimates of the Absolute Residuals of Logged Box Office Receipts, from Model 9 (N = 5065)*

Variable	Model 14	Model 15	Model 16
Ln (ties to distributor +1)	−.171**	−.206**	−.050
	(.047)	(.054)	(.091)
Ln (opening screens)			−.547**
			(.120)
Ln (season)			.169
			(.137)
Number of principals		−.021	−.030
		(.016)	(.024)
Principals' avg. experience (3-year window)		.142**	.095
		(.047)	(.064)
Observable past performance		−.016*	−.023**
		(.007)	(.008)
Unexplained past performance		−.166*	−.183*
		(.070)	(.091)
G rating	−.103	−.064	−.332
	(.238)	(.237)	(.271)
R rating	−.074	−.079	.021
	(.063)	(.063)	(.120)
U.S. film	.256**	.256**	.079
	(.081)	(.083)	(.152)
Distributor fixed effects	368 groups	368 groups	368 groups
	F = 931.15	F = 882.95	F = 839.75
Genre fixed effects	13 groups	13 groups	13 groups
	F = 38.64	F = 34.80	F = 23.52
Year fixed effects	17 groups	17 groups	17 groups
	F = 33.95	F = 35.28	F = 31.03

* $p < .05$; ** $p < .01$.
* Standard errors are in parentheses.

with more prior ties appear less risky in model 14, this effect disappears once we account for the effect of the number of opening screens and the release date. Rather than accounting for our results, even the apparent risk-return tradeoff of working with known parties stems from distributors' endogenous promotion efforts.

DISCUSSION

Film distributors exhibit a strong tendency to contract repeatedly with the same sets of principals. They also allocate more resources to the films produced by those with whom they have had prior interactions, approving larger production budgets, marketing these films more heavily, and scheduling them on more attractive release dates. Before accounting for these decisions, films whose principals have prior relations to the distributor appear to outsell others. Once one controls for the effects of marketing and release dates, however, these films actually perform worse at the box office; distributors would almost certainly benefit from allocating their resources more evenly across exchange partners. Our results therefore strongly implicate self-confirming dynamics as the source of the positive correlation between repeated exchange and firm performance in the motion picture industry.

The principals involved with producing films in the motion picture industry commonly work with the same distributors across projects, at a level much higher than one would expect due to chance alone. These repeated interactions, moreover, superficially appear beneficial to both production teams and distributors, as films enjoy higher box office sales when principals and distributors have worked together in the past. Researchers have frequently interpreted such patterns as revealing the value of the private information available through the social relationship or the prior relation's usefulness in enforcing an incomplete contract. Our analyses, however, reveal that in the film industry, distributors produce this effect through their own effort and allocation of resources. When distributors have prior relations with the principals involved in a film, they authorize larger budgets, promote these films more intensively, and release them during periods of higher demand (e.g., Memorial Day). All three increase sales. After accounting for these decisions, films in which the principals have prior relations with the distributor actually perform worse at the box office.

At least two factors could account for this negative effect. On the one hand, scarce resources, in terms of marketing dollars and prime release dates, might offer lower average returns when allocated to films involving principals with prior connections to the distributor. Because our model constrains the number of screens and aggregate demand to have equal effects on box office sales for films with and without such prior connections, our estimation would force any difference in the slopes of these curves into the intercept, as an average across the observed ranges. Such an explanation is completely consistent with our thesis if marketing dollars and favorable release dates benefit higher-quality movies more than lower-quality films and if distributors overallocate these resources to films whose principals they know because they

overestimate their true quality. Consistent with this interpretation, in unreported models in which we allowed the slopes of these variables to shift as a function of the number of prior relations, we found that films with deeper relations to the distributor appear to benefit less from opening on a larger number of screens and that allowing the slopes to vary reduces the magnitude of the negative effect of prior relations.

On the other hand, those films involving repeated exchange may actually have lower quality on average than those that do not. Such a situation could arise for multiple reasons. In line with our thesis, distributors may overestimate the true quality of these films. Or adverse selection may lead production teams to offer only their lower-quality films to prior exchange partners. It is also possible that distributors may even knowingly and willingly carry films of lower quality from their prior partners because they gain satisfaction from working again with the individuals involved. Though both differential returns to investments and heterogeneity in production team quality likely influence our results, we emphasize the former because the latter cannot easily explain why distributors would allocate more valuable resources to these films post-exchange.

By contrast, one explanation that is not consistent with our findings is the notion of investing (rationally) in relationships. One might assert that distributors knowingly and willingly accept lower returns from films that involve participants with whom they have previously worked in order to strengthen their relationships with those individuals, perhaps in the hope of carrying their future films. But a relational "investment" implies that actors should also see a "return": at some point, prior relationships should positively affect performance. Distributors in the motion picture industry, however, never enjoy such a return. As noted above, we investigated the possibility of non-monotonicity in the function linking the number of prior relations to box office sales by including a quadratic term. Though the results suggest that such a curvilinear relationship may exist, the question is really the point at which prior relations shift from producing a negative to a positive return. In our analysis, this shift only occurs when a production team has more than 46 prior dealings with the distributor over the past three years, a level reached by only seven cases out of 5,199 in our data. Even in those few cases, distributors would have accumulated massive forgone earnings in these relationships before they began to see any return. So even if distributors believe in the notion of relational investments, the results strongly suggest that they do not benefit from them.

Our explanation for the results rests on the notion that actors hold biased assessments in favor of those with whom they have had prior interactions. Here, for example, we expect that distributors overestimate the sales potential of the films they carry involving prior exchange partners. One might nonetheless reasonably ask why distributors do not update their prior beliefs. Multiple factors undoubtedly contribute to the stability of this system. To begin, industry participants receive precisely the information that they expect from the

environment: films involving prior exchange partners do perform better, on average, before controlling for the distributor's efforts. When feedback matches expectations, even purely rational actors will persist in their strategies and forgo the costs associated with testing other options (Fudenberg and Levine, 1993; Ryall, 2003). Even common wisdom suggests that managers should not change a winning game. Moreover, should distributors experiment with other strategies, the combination of noise and systematic evaluation errors, such as the confirmation bias—the tendency to interpret ambiguous or mixed evidence as supporting one's expectations—can engender substantial inertia in beliefs.

We nevertheless freely admit that one cannot necessarily conclude from our results that all cases of apparent positive correlations between embedded exchange and performance stem from self-confirming behavior. In particular, though this appears true in the motion picture industry, contracts in this setting align the incentives of producers, directors, and actors with those of the distribution companies. Not only do these key individuals typically receive bonuses calculated as percentages of box office sales, they also often share in the residual rights to the film. Both production teams and distributors therefore wish to maximize revenue. Our analysis thus primarily demonstrates that self-confirming dynamics can mislead practitioners and researchers into believing in the existence of a search benefit to repeated exchange. An important further empirical test therefore would be to examine whether these same dynamics hold in settings in which the need for monitoring and agreement enforcement play a larger role, and contracts cannot easily address these problems—favor exchange, construction projects, and supply chain management, for example, are interesting settings for investigation.

That expectations could produce self-confirming effects is not a new idea. Our findings to some degree parallel research in both the sociology of science and the sociology of education. Merton (1968), for example, in describing the "Matthew effect" in scientific careers, highlighted the fact that when multiple researchers uncover new knowledge, society tends to credit only those with the highest status. A strong research tradition in the sociology of education has also used experimental manipulation to identify these effects. Rosenthal and Jacobson (1968), for example, demonstrated 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 administering the exam.

Despite the fact that prior work has alluded to such self-confirming dynamics, it has nonetheless remained in the background in both theoretical and empirical research on the dynamics of economic exchange. Many discussing the importance of trust in facilitating transactions, for example, have noted that trust may have little grounding in actual differences in the reliability of potential exchange partners (Coleman, 1990). Nonetheless, efforts to portray trust as a rational

basis for action largely dominate the literature. Podolny (1993) similarly defined status only in terms of perceived quality and noted that the structure of exchange relations may impede the alignment of these perceptions with the actual underlying values, but he nonetheless maintained that status rankings loosely correspond to true quality distinctions among producers. Hence, though admitting the possibility, the literature has largely downplayed self-confirming dynamics and failed to investigate them empirically, preferring more functionalist interpretations of findings.

Our novel findings have a wide range of important implications. At a theoretical level, they resurrect one of the most central ideas in sociology, the distinction between the actor and the position. Particularly in research that attributes the benefits of embedded exchange to better partner selection, this line has become blurred by relying heavily on differences across actors in their underlying quality as an explanation for trading patterns. Our results, however, 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, our findings call attention to the potential importance of unobserved (and endogenous) behaviors across many types of exchange. For example, in internal labor markets, sponsorship networks may influence promotion chances, creating a "glass ceiling" for those employees excluded from these mentoring relations (Brass, 1984).

We suspect that such self-confirming dynamics could play out in a variety of economic settings, even beyond those described in this study. Individuals hold beliefs not just about those with whom they have previously interacted but also about those they have never even met. These beliefs often depend on classifying people into socially constructed categories and then forming expectations based on prior observations of others perceived as similar (Berger, Cohen, and Zelditch, 1974). One might, for example, form beliefs about the probable abilities of an individual based on his or her gender or ethnicity. To the extent that actors' behaviors have the potential for enacting these beliefs, these expectations become powerful sources of stratification. This is illustrated by a quote from Carolyn Shelby, a writer in the film industry: "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" (quoted in Bielby and Bielby, 1996: 250). 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. 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.

These dynamics also may contribute to the importance of institutional processes in the evolution of organizations and

industries. Organizational ecologists, for example, have increasingly focused on the role of societal expectations as the source of legitimacy and on the sanctioning of illegitimate organizations as the connection between these beliefs and density dependence (Hannan, Carroll, and Pólos, 2003). The actual processes involved, however, may have more to do with the fact that resource holders allocate more to nascent and established firms that fit with their beliefs about what a firm should look like than to the punishment of those that violate these codes. To the extent that these resources give an advantage in competition to firms that conform to expectations relative to those that do not, this alternative leads to the same macro-level outcomes and hence does not pose a challenge to the density dependence model. It does, however, suggest different avenues of investigation for researchers interested in the micro-processes of legitimation.

A research program on self-confirming dynamics in exchange is important because it poses a strong counterpoint to functionalist critiques of (and tendencies in) economic sociology. Unlike most existing work on the effects of social networks in exchange, emphasizing the search and enforcement benefits of embeddedness, our argument does not imply economic efficiency in the sense of maximizing social welfare. On the contrary, distributors suffer, as they could have allocated their scarce marketing dollars and choice release dates to better films. Similarly, those lacking social connections receive few and, even then, handicapped opportunities. Not only do distributors pass over their films but also, even when they do crack this barrier, distributors underpromote their movies. Preferential treatment may appear less pernicious than discrimination, but that is no consolation to those that fail to receive it.

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