

The Structure of Consensus: Network Ties, Legitimation, and Exit Rates of U.S. Feature Film Producer Organizations

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Recent research emphasizes that legitimacy depends on consensus among agents (audiences) about the features and activities of organizations (candidates) that become taken-for-granted elements in a social domain. This study examines how consensus is affected by the structure of interaction in the network connecting social audiences to candidate organizations. It analyzes how audience members reach, reinforce, and preserve consensus about candidates' features and behavior, affecting a crucial organizational outcome, survival. The findings show that survival is enhanced by the degree of connectivity and the repeated interactions between audience members and candidate organizations and is reduced by the degree of turnover of audience members. We situate our analysis in the U.S. motion picture industry, where we trace the interorganizational network between feature film producer organizations (candidates) and distributor organizations (the audience) and its influence on producer organizations' exit rates over the period 1912–1970. We find strong support for the claim that the legitimation process has a relational foundation that involves ties between organizational entities and the external others with whom they interact. The results contribute to the dialogue between ecological and network theories of organizations and support the claim that legitimation has a relational foundation involving ties between organizations and audiences. ●

Building and sustaining organizations depends on the availability of environmental resources, and legitimation signifies the process by which social acceptance (or legitimacy) facilitates organizations' task of accessing these resources (Stinchcombe, 1965; Weber, 1968). Legitimacy also grants organizations the capacity to defend their claims on resources against other contending social units (Hannan and Carroll, 1992; Scott, 1995; Hannan, Pólos, and Carroll, 2007). As a necessary condition for creating and maintaining steady resource flows from the environment (Meyer and Rowan, 1977), legitimacy is directly linked to organizational outcomes such as vital rates of founding and mortality (Carroll and Hannan, 2000).

Sociologists fundamentally consider legitimation a collective process that implies the presence of both social audiences and social objects being evaluated and that depends on audiences' consensus about what features and actions these objects should have to be accepted in social contexts (Johnson, Dowd, and Ridgeway, 2006; Ridgeway and Correll, 2006). As a collective construction of social reality, legitimation has a cognitive dimension, whereby agents recognize a social object as valid and taken for granted, and a normative-prescriptive dimension that represents the social object as right (Berger and Luckmann, 1966; Pólos, Hannan, and Carroll, 2002).

Organizational research has echoed this formulation of legitimacy. Whether legitimacy is the result of sociopolitical processes—what a society's norms and institutional rules endorse and prohibit (DiMaggio and Powell, 1983; Baum and Oliver, 1992)—or the product of cognitive processes—a set of schemas or beliefs agents collectively share (Carroll and

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Hannan, 2000; Hsu and Hannan, 2005)—institutional scholars and organizational ecologists are converging on the idea that legitimacy depends on the consensus among agents (audiences) that the features and activities of organizations (candidates) are appropriate and desirable within a widespread, taken-for-granted system of norms or social codes (Zuckerman, 1999; Hannan, Pólos, and Carroll, 2007), terms we use synonymously to indicate cultural phenomena that prescribe and proscribe behavior in specific circumstances (Hechter and Opp, 2005). Although extant research has enhanced our understanding of the processes that grant or withdraw legitimacy, the conditions fostering audience convergence toward a common set of social codes, as well as the persistence of such codes throughout the social domain, remain underexplored. Still relatively undeveloped is how “the structure and dynamics of the audience . . . might affect consensus formation” (Hannan, Pólos, and Carroll, 2007: 302–303). If audiences and candidates coevolve, the question is how the process of legitimation is affected by the exchange structure connecting candidate organizations to their social audiences. It is the characteristics of this exchange structure that should influence the likelihood of establishing consensus around candidates’ accepted features and patterns of behavior, hence affecting candidates’ survival rates.

Building on social network studies concerned with the transmission and acceptance of knowledge, political agreement (classic works include Lazarsfeld, Berelson, and Gaudet, 1944; Berelson, Lazarsfeld, and McPhee, 1954), and social conformity (Sherif, 1936; Festinger, 1957; Thibaut and Kelley, 1959; Coleman, Katz, and Menzel, 1966), we suggest three basic conditions under which consensus—agreement within the audience on the candidates to accept or to exclude—is reached, strengthened, and preserved: the degree of connectivity of the network between audience members and candidate organizations, repeated interactions between audiences and candidates, and the degree of turnover of audience members. The first two conditions—connectivity and repeated interactions—are the result of mutual interactions between the audience and candidates and account for the creation of consensus among audience members about which features and behaviors candidates must exhibit in order to be accepted or excluded. While connectivity defines the threshold of candidates’ acceptance by signaling their inclusion as members, repeated interactions highlight candidates’ exemplariness by signaling preferred audiences’ interactions among accepted candidates. The third condition, audience turnover, is a structural feature of audiences that affects the stability of consensus or the lack thereof.

We developed and tested hypotheses on audience consensus and firm survival in the U.S. feature film industry from 1912 to the end of 1970, focusing on the ties between producer and distributor organizations. Because they act as gatekeepers for producers’ output to exhibitors and spectators and access to relevant resources, distributors are members of a crucial audience for producers, and producers are candidates for that audience’s evaluation (Hannan, 2005). Although other audiences play an important role in this setting (e.g.,

movie critics, exhibitors, moviegoers), the central nature of the relationship between producer and distributor organizations makes it especially useful for examining the audience-candidate interface and the consensus that leads to legitimation.

CONSENSUS AND LEGITIMATION

Legitimation has been recognized as a cornerstone of organizational theories attempting to explain organizational action (Scott, 1995). Organizational action is subject to social scrutiny by a variety of external agents, including other organizations, public authorities, intermediaries, and consumers. These agents (or audiences) consider the features and activities of organizations (candidates) in relation to what they expect organizations can or should do. Social codes originate from this set of expectations, generating approval and advantages when respected but also posing limits to action due to implied sanctions if expectations are violated (Zuckerman, 1999).

Recent contributions in institutional and ecological research have emphasized the role of social expectations and consensus on those expectations in shaping legitimation and various outcomes vital for individuals, organizations, and populations (Zuckerman, 1999; Carroll and Hannan, 2000; Zuckerman et al., 2003; Hsu and Hannan, 2005; Hannan, Pólos, and Carroll, 2007). Consensus is a critical stage in any social process of evaluation. Similarly, the first step in the audience-candidate process of evaluation is that audiences reach consensus to validate organizational action (Zuckerman, 1999: 1406; but see also DiMaggio, 1982; Rosa et al., 1999). Without this consensus, determining the behaviors viewed as legitimate, and therefore the organizations that will receive or be denied legitimate standing, remains highly uncertain. By conferring legitimacy on candidates, audiences act as autonomous gatekeepers whose influence can determine the fate of products or organizations (Hirsch, 1972). Organizations that successfully pass audiences' scrutiny can access material and symbolic resources more easily, enhancing their life chances; those that do not conform to audiences' expectations experience difficulty in maintaining the flows of environmental resources (Hannan, Pólos, and Carroll, 2007). In his study of illegitimacy costs in the stock market, Zuckerman (1999) demonstrated that when American companies were not covered by the securities analysts who specialized in the industries in which they operated, their stock prices suffered discounts. Similarly, Zuckerman and colleagues (2003) argued that the interaction between employers and prospective employees can be framed as an interface between a set of candidates who compete with one another to be selected by an audience. Employers screen candidates according to recognized cognitive categories, and candidates "who succeed in associating themselves with one such category enjoy greater success in attracting employers' attention" (p. 1021). On the contrary, agents who defy prevailing socio-cognitive frames risk engendering ambiguity among relevant audiences, thereby producing penalties in the form of lack of attention or outright rejection.

Structural theory on social influence (e.g., Friedkin, 1998) and studies on political disagreement (e.g., Huckfeldt, Johnson, and Sprague, 2004) have elucidated the conditions that foster the creation and stability of consensus. Both strands of research stress the importance of examining structural characteristics of the relationships that connect agents. These literatures typically focus on the structural characteristics of networks among agents located in the same social position, such as citizens voting for a new president, but they would also apply to a network with two distinct organizational populations whose interaction can be framed in terms of an audience-candidate interface. Consensus on codes would depend on three major characteristics of this network: connectivity between the audience and the candidates, the number of repeated interactions between the audience and the candidates, and audience turnover, or instability. These conditions describe distinct, though complementary mechanisms shaping consensus formation and change.

Network Connectivity

Network-based models of social influence suggest that structurally connected networks foster the formation and development of consensus among network members (Harary, 1959; Friedkin, 1998; Moody, 2004). Multiple features of connected networks facilitate convergence toward consensus. First, networks comprising highly interconnected agents allow for broader and timelier propagation of information (Owen-Smith and Powell, 2004; Powell et al., 2004). Network members exchange ideas, information, and implicit rules with their partners. Interactions in more connected networks stimulate convergence toward common schemas. This, in turn, results in less uncertainty as information gaps are more easily filled (Walker, Kogut, and Shan, 1997). Also, because the scope for information variation is narrower, the likelihood of being exposed to unique information in more connected networks is usually lower.

Second, higher levels of network connectivity signal membership in a collective entity and reduce ambiguity about legitimate organizational identities. A network refers not only to social relations, to the links that connect specific individuals directly or indirectly, but also to meanings and categories and the attributes possessed by individuals (White, 1992; Moody and White, 2003). Individuals make choices by observing the fate of others who have faced similar choices and the patterns and outcomes that emerge from relations among other actors in the network (Leifer and White, 1987: 86). By signaling membership, general connectivity fosters the emergence of a more tightly linked and coherent community, i.e., a "catnet" (White, 1992), in which members share the same ties and the same categories. The higher the level of connectivity within a social domain, the more extensive are its common identity and its ability to articulate a common interest.

Interconnected networks also provide multiple avenues by which deviant behaviors are promptly identified (Gnyawali and Madhavan, 2001). Robinson and Stuart (2007) suggested that the aggregate network structure becomes a platform for diffusing information about the transactional integrity of

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exchange partners. By spreading information about agents' behaviors, network connectivity facilitates the definition of collective sanctions that "involve group members punishing other members who violate group norms, values, or goals and range from gossip and rumors to ostracism (exclusion from the network for short periods or indefinitely) and sabotage" (Jones, Hesterly, and Borgatti, 1997: 931). Acheson's (1985) study of Maine lobster trapping illustrates how collective sanctions are enforced when agents in a connected network break widely shared social norms: interlopers who violate the accepted demarcation of fishing territories, for example, are sanctioned through surreptitious destruction of their traps.

Different considerations hold for fragmented networks in which exchange activities tend to remain confined to self-contained groups or sub-networks, thereby impeding widespread information flows across the social domain. The presence of self-contained groups with relatively impermeable communication networks engenders diversity in social norms. Each group develops distinct sets of norms that differentiate that group from other social groups. Thus candidates typically encounter norms that are inconsistent, pointing them in different directions, and ambiguous in that "expectations are incomplete or insufficient so that the appropriate action is uncertain" (Friedkin, 1998: 13). Connectivity increases the taken-for-granted character of a set of norms. How agents perceive the natural way of collective action forms the basis of constitutive legitimation (Carroll and Hannan, 2000: 223) and enhances the ability of organizations to access resources and fend off challenges. Higher connectivity of the system should reduce ambiguity about organizational action and foster consensus on the rules that specify what types of agents are allowed to exist, what actions are conceivable, and what meanings are associated with these actions (Ruef and Scott, 1998: 877). Hence, we hypothesize:

Hypothesis 1: Increasing connectivity in the audience-candidate network reduces candidates' exit rates.

Repeated Interactions

Studies dealing with the social psychology of groups highlight the importance of repeated interactions in the development of norms (Sherif, 1936; Festinger, 1957). Interactions consist of agents that exhibit behaviors in each other's presence, create products for each other, and communicate with each other (Thibaut and Kelley, 1959: 10). A social norm exists only in a category of recurrent situations and cannot be developed through accidental or temporary interpersonal contacts. In their study on dyadic relationships, Thibaut and Kelley (1959) showed that a norm is a behavioral rule that is at least partially accepted by both members of the dyad or, in larger groups, by a majority of members, and is the result of repeated interactions. Consensus is strengthened by a trial-and-error process in which conformity to rules and agreements that have proved rewarding in past interactions is preserved in the future. The idea that consensus is reinforced through repeated interaction is also prevalent in political communication studies. Sociologists have argued that when the frequen-

cy of political communication among citizens increases, individual political preferences are increasingly exposed to social scrutiny (Berelson, Lazarsfeld, and McPhee, 1954; Katz and Lazarsfeld, 1955; Lazarsfeld, Berelson, and Gaudet, 1944; McPhee, 1963). Previously idiosyncratic preferences become socially visible, and individuals correspondingly conform to their surroundings (Huckfeldt, Johnson, and Sprague, 2004: 19).

Social situations constantly demand actions or opinions (Lazarsfeld, Berelson, and Gaudet, 1944). In their analysis of the mechanisms and process through which a group develops common attitudes, Lazarsfeld and his colleagues highlighted how mutual interactions of group members are more powerful than other mechanisms in explaining the formation, change, and development of public opinion. As mutual interactions take place, a new distribution of articulate opinions and attitudes emerges or is reinforced. When no prior attitudes exist, mutual interactions will form definite opinions; when prior attitudes exist, mutual interactions will crystallize them. The formation of opinions can be compared with the kinds of problems with which economists have struggled for many years. Economists have viewed prices stabilizing as a consequence of the interaction between supply and the demand of individuals. Lazarsfeld, Berelson, and Gaudet (1944: xxiv) saw this dynamic as similar to the distribution of opinion in a group: "In neither case can the final result be explained by the previous actions or opinions of individuals considered separately. In both cases the final result is a function of interactions which have as their by-product something which had not existed before."

Mutual interactions among organizations foster the emergence and development of common attitudes and public opinion. By engaging in mutual interactions, organizations are likely to disclose some of the private information and experiences that support common attitudes. The end result of such interactions is reinforcement, a mutual strengthening of common attitudes (Granovetter, 1973; Larson, 1992). Also, organizations that repeat collaborations may serve as reference points for other agents who may evolve roles from observations of repeated behaviors (White, 2001). The extent to which candidates are treated as preferred members of a population and their offerings as typical increases taken-for-grantedness and the associated organizational benefits (Hannan, Pólos, and Carroll, 2007). Accordingly, we hypothesize:

Hypothesis 2: Increasing repeated interactions in the audience-candidate network reduces candidates' exit rates.

Audience Turnover

Social organizations often exhibit continuity so that as members leave and are replaced by other members, complex organizations can still function as ongoing social units (McNeil and Thompson, 1971: 624). Yet sociological studies indicate that organizational continuity depends both on the enduring commitment of old-timers, such as veterans in organizations, long-time activists in social movements, or the "old guard" in political parties, and on the inclusion of new-

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comers. At the same time, the emergence of new participants in the social process and the withdrawal of their predecessors can threaten stability and provide the opportunity for social transformations (Ryder, 1965). Generational processes of recruitment and cohort turnover can thus produce change in social organizations (White, 1970; McNeil and Thompson, 1971) and movements (Whittier, 1997).

Even if new entrants share basic assumptions and goals with their predecessors, they often differ in important ways. Unaware of specific routines and tacit knowledge, newcomers' ingenuity, improvisation, and diversity of experience bring a fresh perspective to the organization or the group (March, 1991; Jackson, Stone, and Alvarez, 1993). Though slower turnover permits greater socialization of new members by experienced ones and therefore leads to greater organizational continuity, extensive recruitment can lead long-tenured members to lose power, allowing new members to gain influence within established organizations or groups (Whittier, 1997).

Similar processes would be at work in the continuity or preservation of consensus. Norms tend to persist once established. They do not need to be reinvented when a new relationship is formed and often can be transferred from existing relationships. But new audience members need time to learn established codes and may instead foster changes. Especially when audience turnover is high, new members have more difficulty in learning established norms and are more likely to change them if they are less exposed to veterans and the existing code. Until a new consensus is reached, different norms will proliferate and vie for dominance. As norms increase in number, they inevitably begin to overlap and compete. Because norms often are inconsistent, deciding which norms should receive precedence and which should be applicable to specific cases becomes increasingly difficult (Thibaut and Kelley, 1959: 140). As a result of higher turnover levels, unique identities (White, 1992) and diverse schools of thought (Price and de Solla, 1963) emerge, and consensus around a shared set of social norms becomes harder to achieve. As highlighted by Hannan, Pólos, and Carroll (2007: 54), "The ability of the members of an audience segment to reach agreement . . . is potentially problematic. . . . For instance, [some members] could be in open competition with others, and conflict and strategic behavior . . . might preclude agreement." Because shared norms help to identify and sanction deviant behaviors, the absence of consensus due to audience turnover not only amplifies uncertainty about candidates' appropriate behavior but also lowers behavioral pressures to conform. Lack of consensus and increased uncertainty reduce the satisfaction of expectations, compound the problem of maintaining a steady flow of resources from the environment, and thus hamper organizational survival. Hence, we hypothesize:

Hypothesis 3: Greater audience turnover in the audience-candidate network increases candidates' exit rates.

Legitimacy, Social Codes, and Consensus in the American Feature Film Industry

In his ethnographic account of Hollywood filmmaking, Powdermaker (1950: 35) argued that just as every social system operates under a number of institutionalized controls regulating economic and social life, so Hollywood has its specific codes or taboos that "influence the methods of production, the relationships between people, and leave their stamps on the movies." Movies and their producers are evaluated on features that include details such as (1) "names"—i.e., stars; (2) "production value"—elaborate sets, big crowds, and other indicators of great expense; (3) "story value"—the price paid for the original story and its reputation as a novel or play; (4) "picture sense"—the conglomeration of all these items; and (5) "box office appeal"—the standardized values that proved successful in years past (see Jacobs, 1939: 295–296).

The interaction between producer and distributor organizations lies at the center of this system of controls, and distributors are the ones who evaluate production methods and the legitimacy of producer organizations. As one early economic analysis noted, ". . . By virtue of the division of labor within the business, film distributors are much more closely in touch with the moviegoing public than are the producers, and they trade heavily on their advantageous positions. From their seat in the box office they announce that so-and-so is 'poison at the box office', that what the public wants is musicals or blood-and-thunder westerns, that English stars murder business, and that sophisticated farce comedies leave their audiences completely cold" (Huettig, 1944: 230). Sixty years later, distributors continue to "act as gatekeepers: they decide which movies get produced and how they are made, and they also largely determine when and at what price viewers get to see them on which media. . . . Producers, directors, and other talent make their movies with varying degrees of creative autonomy," but mainly, distributors "maintain overall control of the production process" (Waterman, 2005: 16-17).

Given the central role distributor organizations played within the system, they represent a critical audience, and their relationships with producers have always influenced the content and meaning of what producers do. The formulas for pictures have been a series of constantly changing *do's* and *don'ts*, such as, "You cannot make an A picture about a prize fight," "No pictures with any kind of message do make money," "The love story must be the most important part of an A picture" (Powdermaker, 1950: 40). Departure from the codes results in harmful consequences, like obstructed channels to obtaining resources: "Violators of these taboos do not commit suicide nor are they killed by members of their clan. But they are refused its seal of approval, which is considered a form of business suicide" (Powdermaker, 1950: 55). The bankruptcy of Triangle Film Corporation is one of the most famous examples of business suicide. Triangle Film Corporation was a major production company founded in 1915 by Harry and Roy Aitken, based on the producing abilities of filmmakers D. W. Griffith, Thomas Ince, and Mack Sennett.

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Aitken's goal for Triangle was clear: to produce motion pictures that articulated exclusive, highbrow cultural values and yet to appeal to a broad, cross-class audience. Less than a year after its birth, however, Triangle found itself on the brink of financial ruin, having failed to attract audiences of any class (King, 2005). Part of the reason was the epic fiasco of Griffith's grandiose *Intolerance* (1916), a colossal undertaking filled with monumental sets, lavish period costumes, and more than 3,000 extras. The movie was by far the most expensive made at that point, and when it became a flop at the box-office, the burden was so great that Triangle Studios went bankrupt.

The production process of *Intolerance* presented unusual characteristics that departed from established conventions (Drew, 1986). First, an unorthodox editing was used to portray an elaborately interwoven collection of four distinct but parallel stories that covered 2,500 years during different ages in world history. Critics and European film theorists praised this technique, which became enormously influential, particularly among Soviet filmmakers, but for the moviegoers, it was difficult to follow the story. Second, none of the characters had names because they had to be emblematic of human types across history, but the moral and psychological connections among the different stories were too subtle for most of the moviegoers, leaving them unengaged. Third, the majestic buildings of the outdoor sets, which were the largest ever built in motion pictures, were constructed in their entirety, not just the parts that had to be filmed. This allowed more freedom in filmmaking but increased the costs of the production enormously. Actual costs to produce *Intolerance* are unknown, but best estimates are close to \$2 million, an astronomical sum in 1916. When the movie failed, these unusual characteristics became established taboos for producers in the industry for the next 80 years. The movie *Titanic* (1997) was the only other film for which an entire complete set was built (Parisi, 1998: 134).

Just as primitive societies think "failure would result from changing the form of a spell, so men in Hollywood consider it dangerous to depart from their formulas. Each group can point to the times it worked and conveniently forget or rationalize the other occasions" (Powdermaker, 1950: 285). When distributors disagree about such formulas, like what constitutes "names" or "production value," or "story value," producers are less likely to receive resources for their productions. When, in 1914, D. W. Griffith proposed to produce a picture dealing with the American Civil War, he was confronted with immediate opposition. Some leaders of the industry, who even in 1914 showed a tendency toward "creative standardization," went so far as to try to block both the production and the distribution of *The Birth of a Nation*. Griffith had to seek his financial backing entirely among people outside the industry. During the early and precarious life of the motion picture industry, bankers were not attracted to this business, partly because the business was new and unknown but most of all because the customary standards of credit rating could not be applied. In 1926, the banker A. P. Giannini, a pioneer in the financing of motion picture produc-

tion, opined that market value in film depended on “the presence of artists or producer organizations of recognized standing” (*Wall Street Journal*, 1926: 3). When value was in doubt, the judgment of a half-dozen distribution exchange or theater managers allowed one to obtain an immediate rating. The acceptance or rejection evaluations by audience members, therefore, critically influenced what resources would be available for filmmaking.

Information is necessary to navigate the film industry. Although a great deal of information is available on the status of ongoing projects or the performance of completed projects, such information requires decoding and has varying degrees of reliability. The wisdom of the “movie colony” is conveyed not through formal blueprints but through the use of deep symbolism, relationships, and constant interactions. Formulas and taboos are the result of knowledge and traditions based on instinct: “The movie makers work with hunches, not logic; they trade in impressions rather than analyses. It is natural that they court the intuitive and shun the systematic, for they are expert in the one and untutored in the other” (Rosten, 1948: 48). Other fields similarly fail to articulate fully the bases of their valuations. In the art world, Becker (1982: 199) observed, “. . . artists find it difficult to verbalize the general principles on which they make their choices. They often resort to such non-communicative statements as ‘it sounds better that way,’ ‘it looked good to me,’ or ‘it works.’”

In such a context, more connected networks between producer and distributor organizations provide several advantages. First, producer organizations are less likely to require justification for their work but are also less likely to invest in unconventional formulas for which there are few current resources available, as in experiments in color pictures prior to the 1950s (Bordwell, Staiger, and Thompson, 1985). Second, they have access to more consistent information about production trends, and if they inadvertently target popular and oversaturated film genres, such as westerns in the 1920s, they could find themselves in a weaker position to obtain resources (Lewis, 1933). Similarly, repeated interactions between production and distribution organizations can generate various advantages not offered by networks with episodic interactions. For example, they can allow producer organizations to calibrate styles and features that distributors have noted are likely to receive limited critical and public acceptance, as happened with non-narrative films. In serial productions, this calibration fine-tunes new elements while holding the others constant.

The influence of social codes is also affected by turnover in the industry network. Replacement of personnel and organizations, including distributors, is an important characteristic of the film industry. As Rosten (1948: 37) noted, “As a professional community which is itself young, and whose population is weighted toward youth composition, the movie business moves with relentless speed.” Hollywood’s traditionally young profile makes it “not surprising then that the movie colony has not achieved stability or integration.” And Powdermaker (1950: 39–40) explained that Hollywood has “deep

roots in the past, which dominates the present; but there are also new tendencies, some of which may be merely aberrations—and others, signposts to the future. . . . Each one of the formulas has been successfully broken and shown to be false at one time or another. But each time anyone departs from the formula and meets with success, the departure then becomes another formula.”

METHOD

Data

We analyzed an original database that includes all motion picture producer organizations in the United States. The observation period begins in 1912, the year of release of the first American-produced feature film, and ends in 1970, the last year covered by the primary data source. Although the first public screening of motion pictures in the United States dates to 1895, it was not until 1912 that production companies started making and showing multiple-reel feature films. Feature-length films, usually defined as longer than four reels (each reel runs 1,000 feet, or about 10 minutes), altered the organization of all activities within the industry. Not only were feature films longer, but they also were more complex to make and market, requiring higher levels of capital investment and differentiated marketing efforts (Bordwell, Staiger, and Thompson, 1985).

We reconstructed the life histories of producing organizations through the release dates of their films. Producer organizations enter the population with the release of their first film and exit it the first day following the release date of their last film (see also Mezias and Mezias, 2000). We examined all films produced in the United States during the study period and reconstructed the evolution of the network by linking the producer and distributor organizations. As with other corporate demography studies using product-level information, these data do not account for the duration of pre-production processes (Carroll and Hannan, 2000), but the short period of time necessary to produce a film—on average, production companies complete a film in six to eighteen months—limits the importance of pre-production periods.

The *American Film Institute (AFI) Catalog of Motion Pictures Produced in the United States: Feature Films, 1911–1970* (1989–1999, Berkeley: University of California Press) serves as the primary data source. This directory comprises reviews of all motion pictures distributed in the U.S. between 1893 and 1970 and provides detailed information on each film. In addition to this primary source, we also collected industry-level statistics and supplemental information from two encyclopedic publications, *The Motion Picture Year Book* and the *Motion Picture Almanac*. Although experts generally consider the AFI catalog the most complete and comprehensive source on the film industry (Mezias and Mezias, 2000), it has one shortcoming: it lists feature films released in the periods 1911–1950 and 1960–1970 but only partially documents the period from 1951 to 1960. To fill this missing window, we consulted additional sources: (1) A. G. Fetrow’s (1999) filmography, covering film production in the U.S. in the 1950s; (2) the *Motion Picture Catalog of the Library of Congress*, which

provides a list of all films that received copyright protection from 1950 to 1959, along with their respective production and distribution companies; and (3) *The Motion Picture Guide 1927–1982*, a reference set edited by J. R. Nash and S. R. Ross (1985–1986; New York: Cinebooks) that provides comparable information. We restricted the population of producer organizations in several ways. We excluded films produced and released for non-commercial purposes, such as those commissioned by government agencies. We also excluded imported films, as these come from non-U.S. based production companies. In cases of international co-production, we included films in which an American producer organization appeared as the first stakeholder.¹ Finally, we excluded films from the late 1960s that provided no information on genre.

Variables

Analyzing failure, or exit rates, is a typical strategy to test ecological theories. Accordingly, our dependent variable is *exit rates of feature film producer organizations* from the market. Organizations can exit in many different ways, including disbanding, bankruptcy, merger, or acquisition. For this study, we could only identify mergers that resulted in a merged entity that produced a film following the merger. When a dominant partner existed, we treated it as having survived and the subordinate partner as having exited. As we could not distinguish between other modes of exit, we did not attempt to analyze transition rates for these different types of events separately. The network in this setting is represented by two vertically related sets: producer organizations selling their product (feature films) and distributor organizations. The analysis considers the population of producer organizations as candidates and distributor organizations as audience members interacting with candidates. To gauge the structural dynamics of the network connecting audiences and candidates, we modeled it as a valued bipartite undirected network (Asratian, Denley, and Haggkvist, 1998). In this network, each film title represents an attachment between the two sets (i.e., producer organizations supplying a film to a distributor). Thus we assumed these attachments to be homogeneous for a producer organization i and distributor j , with $a_{ij,t}$ denoting the number of films produced by producer organization i for distributor j at time t .

In defining a tie, we had to make an assumption about the duration of the relationship between producer and distributor organizations. With no control for relationship decay, network connectedness of the domain would be highly inflated due to the inclusion of ties to inactive agents. Following a common practice in network studies, we used a moving window to control for the duration of each tie, hence making the adjacency matrixes time-varying (e.g., Podolny, Stuart, and Hannan, 1996; Gulati and Gargiulo, 1999). In the analysis, we used a three-year moving window: if one organization did not appear in the industry for three years, that organization and its ties were removed from the network in the fourth year, but we integrated that organization and its links back into the network if it reentered the industry the following year (see also Uzzi and Spiro, 2005). Thus the adjacency matrix for a given year traces collaborations formed in that year and in

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In supplemental analyses, we added controls for the cases of co-production, co-distribution, and cooperative distribution but found no significant effects or impact on the results we present. We also examined cases of producer organizations releasing their films through regional distribution channels and found that regional sub-distribution increased producer companies' exit rates, perhaps because in the absence of national distributors who invest in advertising and promotion, the organizations that managed the release tended to be less efficient. Still, the findings we present were unaffected. Results for these additional analyses are available from the authors upon request.

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any of the previous three years. We also employed alternative windows of two, four, and five years but found no significant differences from the results we report. Following this codification procedure, we created valued yearly biadjacency matrices in which edges connect vertices from different sets of organizations and there are no ties within any set (Borgatti and Everett, 1997; Asratian, Denley, and Haggkvist, 1998). The cells of these matrices are valued because any producer organization could supply more than one film to the same distributor in a given year (the element ij and the symmetric ji may assume values greater than 1) and because we tracked distributed movies by any pair of organizations (producer and distributor) over a three-year window. We used the biadjacency matrices to compute all actor- and aggregate-level network measures.

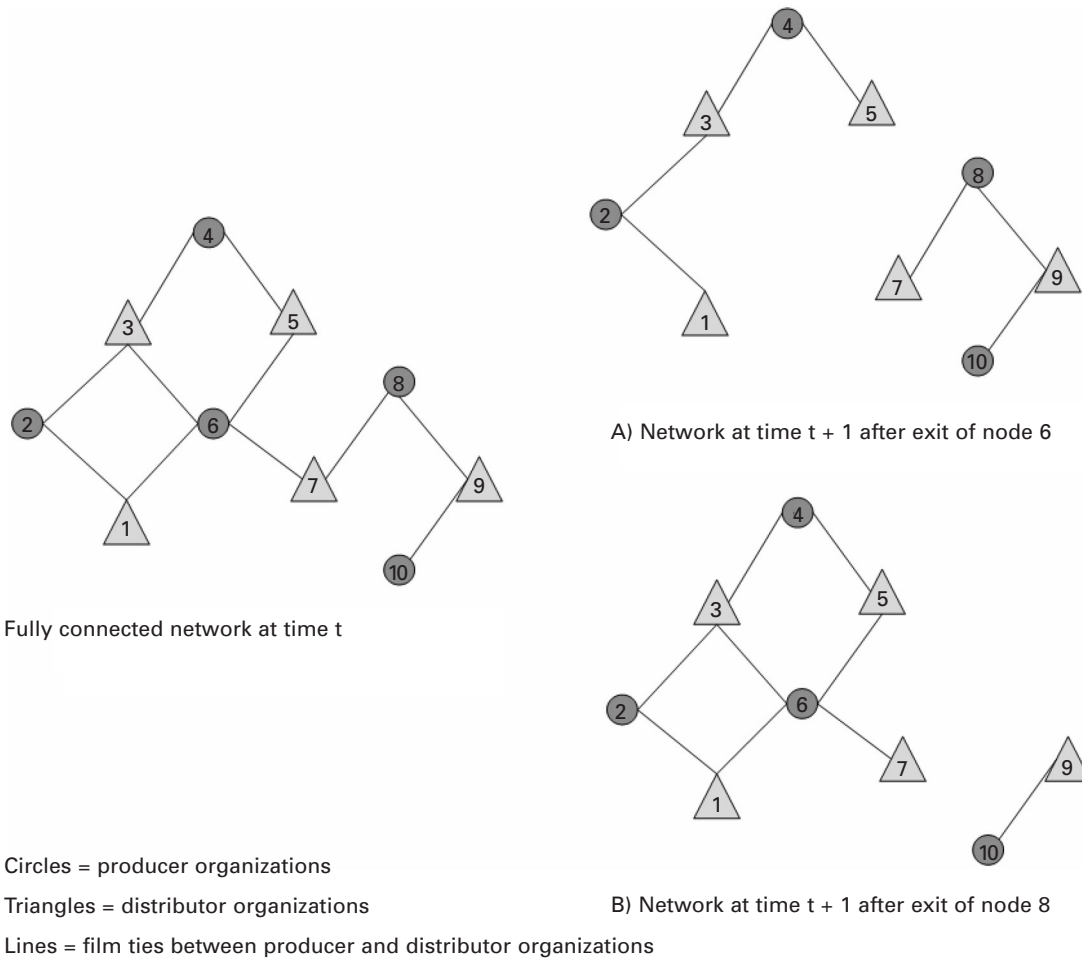
Our first explanatory variable is *connectivity*. The most straightforward indicator of network connectivity is the reciprocal of the count of the number of components, i.e., the maximal connected sub-graphs into which the network is disaggregated (Wasserman and Faust, 1994). This components-based connectivity measure reaches a maximum when the number of components is equal to 1, that is, all nodes of the network are connected. Conversely, connectivity is minimal when every node is an isolate, and there are as many components as there are nodes. The limitation with this approach is that it does not take into account the size of the components (see Borgatti, 2006). This is illustrated in the producers-distributors network depicted in figure 1, in which circles represent producer organizations and triangles represent distributors. The network at time t consists of a single component and is therefore fully connected. Now compare the two alternative cases at time $t+1$. In the first case, node 6 exits the network; in the second case, it is node 8 that leaves the network at time $t+1$. Both exits fragment the network into two components, resulting in a drop in components-based connectivity from 1 to 0.5, yet, in the first case, more pairs of nodes will be separated from each other.

This suggests an alternative approach to measuring connectivity that accounts for components' size. The approach we chose builds on Krackhardt's (1994) measure of connectedness, which simply counts the number of pairs of nodes that are connected to one another. Given a matrix R in which $r_{ij} = 1$ if i can reach j and 0 otherwise, the measure of connectivity can be defined as follows:

$$2 \sum_i \sum_{j < i} r_{ij} / n(n-1)$$

Krackhardt's score provides the proportion of mutually reachable pairs over the total number of reachable pairs in a fully connected network. It therefore ranges from 0 to 1, with 0 equal to no connectivity in the network, and 1 equal to maximum connectivity. When applied to the previous example, this measure returns a value of 0.44 for network A and 0.61 for network B, thus providing a more accurate representation of the difference in connectivity between the two structures. Another benefit of using this measure is that it does not

Figure 1. An illustration of network connectivity.



depend deterministically on either population density or the number of films released in any given year. In fact, unlike the standard density measure (percentage of all possible ties present in the network), which always decreases with the number of nodes in the domain, the connectivity measure can change freely, because the number of mutually reachable pairs depends only on the topology of the network and the rules of attachment that underpin it. For instance, new entrants into the population might connect across previously separate components and enhance the connectivity of the entire domain or choose to link to minor components or operate in isolation from the rest of the population, thus dampening the overall level of connectivity. For the same reason, the release of new films does not necessarily add to the interconnectivity of the field so long as the corresponding exchanges between producer and distributor organizations do not span previously unconnected components of the network. Theoretically, the connectivity measure reflects a simple yet essential enabling structural condition for achieving consensus among the members of a community, i.e., the existence of a relational pathway connecting as many members as possible. This intuition was captured well by Markovsky and Lawler (1994) when they identified “reachability” as an essential feature of cohesion and is consistent

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with our approach, which rests on the reachability between a node and any other node in the network, either directly adjacent or via a walk. Empirically, it has the notable advantage of making network size irrelevant, whereas any approach based on volume (or density) of relations necessarily limits the ability to explore structural connectivity in large social settings because the investments required to increase density rise exponentially with the number of agents (Moody and White, 2003).

Our second independent variable is the *mean level of repeated ties* at the population level. Repeated ties occur when a producer organization repeats its exchange of a film with a distributor organization. We calculated a measure of repeated ties for each producer organization in each year by counting the average number of times the organization worked with a distributor in the three-year window. We then summed these values and divided them by the total number of connected pairs in the network. The independent variable used in the analysis measures the log of the average number of times producer organizations repeated collaborations with the same distributors during the window period.

Our third independent variable is *audience turnover*. We measured the heterogeneity of audience members by analyzing the tenure distribution and included the standard deviation of distributor tenure as the measure of heterogeneity. Research in organizational demography often measures turnover by using the coefficient of variation; however, recent methodological work recommends estimating heterogeneity in the tenure distribution using a measure of variation, like the standard deviation, while controlling for the effect of mean tenure (Sørensen, 2002). The use of a single measure like the coefficient of variation may confound the effect that the two distinct characteristics of demographic distributions can have on turnover and other organizational outcomes. Therefore, when we estimated the effect of tenure heterogeneity, we included a variable that measures the mean organizational tenure of distributor organizations. In alternative measurements, we calculated turnover as (1) the share of exits of distributor organizations, calculated as the ratio of the number of distributor exits in the prior year divided by the number of distributor organizations (*oldtimer ratio*) and (2) the percentage of new distributor organizations that enter each year (*newcomer ratio*). We expected the two alternative measurements would continue to show a positive effect on exit rates. We present estimations using these alternative measures as robustness tests in the results section.

Controls

Our analysis included several control variables. To account for *age dependence*, we estimated a piecewise exponential specification, which we describe in greater detail below. By including time-varying information on *organizational size*, we could isolate the effects of age from size. Research on time-varying size and life chances conceptualizes organizational size in two ways: capacity and scale of operations. Our measure here—the logged annual volume of film production (i.e., a count of films released in the previous 12 months)—focus-

es on scale. Organizations involved in more projects survived longer because of their ability to diversify some of the project-specific uncertainty plaguing each individual film.

An analysis of interdependence between populations raises the issue of how to treat boundary-spanning organizations, namely, film producer organizations that are vertically integrated in distribution. The modeling of the network of relationships between producer and distributor organizations implies ignoring transactions that producers manage themselves, a decision that could have influenced our theoretical predictions and empirical strategy. We addressed this problematic issue in two ways: (1) by introducing a time-varying dichotomous measure of *vertical integration*, taking a value of 1 if the production company also distributed at least one of its films in that year and 0 otherwise, and (2) by estimating models only for the subset of non-integrated production companies. To account for the network size of the focal organization, we added a measure of the log of the *number of network partners* with which each producer organization engages in exchange every year. This variable increases whenever the focal production company adds new ties to its network. New ties in a firm's network broaden the scope of the firm, thereby increasing the likelihood of obtaining new information and adding to the diversity of information to which a firm is exposed (Baum and Ingram, 1998; Beckman, Haunschild, and Phillips, 2004).² Another network control at the firm level is the *membership in the main component*, i.e., connection to the largest weakly connected network sub-graph. Firms that are part of the main component are more likely to face converging expectations from their audiences and to tap into rich information spillovers. As suggested by Owen-Smith and Powell (2004), membership in the main component offers a channel to the widest range of information flows while increasing a firm's visibility in labor markets and in informal networks.

Additional controls include repeated ties measured at the dyadic level in two ways. First, we calculated *repeated ties between each producer organization and distributor organization* in any given year as the logged average number of times that an organization repeated collaboration with the same distributors during the observation window. As organizations repeat their collaborations, several advantages develop that have a positive impact on survival, including mutual trust (Granovetter, 1973), norms of reciprocity (Larson, 1992), and joint problem solving arrangements (Uzzi, 1996). Moreover, reduced exit rates may result from buyers offering better terms of trade and allocating more resources to transactions embedded within existing suppliers, thereby contributing to the advantages of such exchange patterns. Sorenson and Waguespack (2006) showed that motion picture distributor organizations exhibit a preference for carrying films involving key personnel with whom they have had prior exchange relations and that they tend to favor these films in the allocation of resources like opening dates and marketing investments. To control for such dynamics, we measured *repeated ties between individual producers and distributor organizations*. This control also helps us account for the fact that a non-

2

A frequently used proxy for information diversity is Burt's (1992) structural holes measure, which captures the extent to which an actor's contacts are themselves connected to one another. This measure is less appropriate here, as the bipartite nature of the network implies a restriction on the mixing, such that ties only cross classes. By implication, in this network, no connection between the ego's alters can ever occur.

trivial number of production companies are one-off ventures, coming into existence only for the realization of one or a few movies. This intrinsic feature of the industry would suggest that the appropriate level of analysis is individual networks rather than organizational ones. The measure at the individual level mitigates this concern. It should be emphasized, however, that it was not until the late 1950s that short-term projects and individual networks became pervasive features of the American film industry (Faulkner and Anderson, 1987; De Vany, 2004). This potential source of bias is therefore probably more relevant in subsequent years than in the period covered by our study. Finally, to control for survival-related effects of *niche width* (Dobrev, Kim, and Hannan, 2001), we analyzed film production across genre segments and included a measure of the log of the number of film genres in which each producer organization operates every year. Finally, when we tested for the effect of audience turnover, we also included a variable measuring the *mean size of distributor organizations*. We calculated this variable as the average number of films released by distributors to separate size-dependent effects in the audience, such as the exercise of market power in buyer-supplier relationships, from the hypothesized impact of audience turnover. We also introduced several aggregate-level variables to control for changes in carrying capacity and industry structure. The first of these controls is *population density*. We measured density by counting the number of film producer organizations operating each year. Based on the knowledge that production in the motion picture industry requires an average of 12 months of pre-entry activity, we updated density and other covariates annually using 12-month moving averages. Following other recent studies (Ruef, 2004; Lomi, Larsen, and Freeman, 2005), we used moving averages to adjust for inertia in the rate at which firms respond to changes in population density and environmental characteristics. The use of moving averages accounts for the fact that organizational vital rates do not reflect events that occurred precisely 12 months earlier and also reduces the effect of measurement error in our recording of the timing of events. Because exit rates are influenced by the effects of population density at the time of founding and the resulting liability of resource scarcity (Carroll and Hannan, 1989), we included *density delay* as an additional control. To capture community-level effects, we included a variable measuring the *density of distributor organizations*. Finally, because connectivity may capture industry size effects rather than network structure, we included a variable measuring *industry mass* (Barnett, 1997), calculated as the total number of films made each year.

Over the period studied, motion pictures went from being the primary form of visual entertainment (1912–1946) to being an alternative to other media, particularly television (1947–1970). We therefore entered *weekly attendance* in terms of millions of admissions per year to measure carrying capacity in the models.³ In addition, we included *television penetration* to address potential symbiotic or competitive relationships between film and television. We introduced a measure of *market concentration* to control for potential barriers to entry and resource partitioning (Carroll, 1985; Mezas

3

Data on film attendance are incomplete before 1918. Since the introduction of a war tax on movie consumption, however, attendance has been systematically reported. Some sources provide information for earlier years, e.g., Donahue (1987) for 1911, which we used to interpolate the missing data. The findings presented in the paper were analogous when we use number of theaters, which also contained interpolations. We employed alternative variables that can be used to measure carrying capacity. For example, we collected data on annual recreational expenditures (i.e., money spent in recreational activities) in the U.S. over the study period from the *Historical Statistics of the United States, Colonial Times to 1970, Bicentennial Edition* (Bureau of the Census, 2003). The main findings we report hold across these measurements, and the alternative variables did not provide better-fitting specifications.

and Mezias, 2000). We utilized a Hirschman-Herfindahl index, obtained by squaring and then summing the market share of each production company based on the number of films produced. We included two dichotomous variables to control for period effects. One variable addresses the potential effects associated with the establishment of the Hollywood *Studio-system period* (RKO, the youngest of the “majors,” began producing films in 1928); our measure takes a value of 1 between 1928 and 1947 and 0 otherwise. Historical analyses of the industry suggest that total integration might have reduced the viability of smaller or more specialized producers because the majors controlled access to a significant proportion of first-run theaters (Conant, 1960; Balio, 1985). The other variable (*post-Paramount period*) addresses the potential impact of antitrust actions on the structure of the industry. In 1948, a government suit against the eight largest firms (*United States vs. Paramount Pictures*, 334 U.S. 131) culminated in a Supreme Court decision that imposed divestiture of the exhibition chains owned by the majors. Observers subsequently have argued that production activities have become more and more organized around short-term, decentralized projects (Balio, 1985; Caves, 2000). The variable takes the value of 1 from 1948 to 1970 and 0 otherwise. Table 1 reports descriptive statistics and the correlation matrix for the variables used in the regressions.

Model

We modeled the exit of producer organizations using $r(t)$, the instantaneous risk of exiting. This hazard rate is defined as the limiting probability of exiting between t and $t + \Delta t$, given that the organization was operating at t , calculated over Δt :

$$\mu(t) = \lim_{\Delta t \rightarrow 0} \Pr(t < T \leq t + \Delta t \mid T > t) / \Delta t$$

Parametric estimates of the hazard rate require assumptions about the effect of time (in these models, age) on failure. We adopted the piecewise exponential specification, which allows the base rate of exit to vary flexibly with organizational age. This approach splits time into pieces according to the tenure of the organization. The base failure rate remains constant within each time piece, though these base rates can vary across pieces. As a result, the piecewise model does not require any strong assumption about the exact form of duration dependence (for more information on this approach, see Barron, West, and Hannan, 1994). Our exploratory research on the population found the best fit using five break points, at 1, 2, 4, 10, and 20 years (intervals open on the right). The first segment includes events occurring within the first year of tenure in the industry and cases that enter and exit within the same year. The second segment includes events that occur within the first and second years of tenure, and so forth. The form of the model is

$$r(t) = e^{\beta X} e^{\alpha t} \text{ if } t \in I_r,$$

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Table 1

Descriptive Statistics and Correlation Matrix

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9
Organizational tenure	3.94	7.15									
1. Organizational size	.39	.85									
2. Vertical integration	.13	.34	.54								
3. Number of network partners	.13	.85	.24	-.01							
4. Repeated ties prod. org.–distrib org.	.38	.71	.45	.03	.20						
5. Repeated ties ind. prod.–distrib org.	.68	3.78	.40	.21	-.02	.20					
6. Niche width	.69	.97	.17	.13	.05	.16	.21				
7. Membership in main component	.23	.42	.08	-.07	.16	.13	-.04	.02			
8. Density of producer orgs.	178	64.06	-.17	-.07	.03	-.10	-.20	-.72	-.06		
9. Density of producer orgs. ² × 10 ⁻²	357	243.05	-.17	-.07	.02	-.12	-.19	-.69	-.08	.98	
10. Density delay	179	62.83	-.14	-.07	-.04	-.15	-.12	-.54	-.10	.80	.80
11. Density of distributor orgs.	66	33.77	-.12	-.03	.03	-.10	-.14	.02	-.10	.77	.81
12. Mass	2.59	.24	.14	.06	.10	.16	.05	.44	.07	-.06	-.11
13. Weekly theater attendance	45.23	22.60	.17	.11	-.01	.13	.28	.72	.00	-.66	-.65
14. Television penetration	34.20	40.76	-.23	-.12	-.07	-.19	-.12	-.07	-.10	.59	.61
15. Market concentration	3.76	2.75	.12	.06	-.05	.07	.03	-.02	.04	-.65	-.58
16. Studio-system period	.22	.42	.11	.10	-.03	.04	.27	-.02	-.08	-.46	-.52
17. Post-Paramount period	.47	.50	-.23	-.13	-.09	-.18	-.08	-.09	-.05	.51	.51
18. Connectivity	.40	.18	.01	-.03	.04	.03	-.09	-.14	.17	-.26	-.33
19. Mean repeated ties	1.06	.63	.09	.05	.10	.14	.03	.31	.06	-.17	-.20
20. Mean audience size	7.43	4.19	-.09	-.07	-.11	-.05	.16	-.17	.00	-.20	-.21
21. Mean audience tenure	6.73	3.94	.17	.04	.01	.14	.19	.60	.11	-.62	-.62
22. Audience turnover	9.13	4.82	-.19	-.11	-.13	-.14	.09	-.49	-.06	.15	.14

Variable	10	11	12	13	14	15	16	17	18	19	20	21
11. Density of distributor orgs.	.74											
12. Mass	-.03	-.03										
13. Weekly theater attendance	-.58	-.53	.33									
14. Television penetration	.56	.50	-.48	-.67								
15. Market concentration	-.59	-.54	.40	.57	-.53							
16. Studio-system period	-.38	-.29	.18	.70	-.35	.44						
17. Post-Paramount period	.37	.33	-.49	-.54	.78	-.40	-.50					
18. Connectivity	-.29	-.43	-.08	-.14	-.14	.16	-.44	.06				
19. Mean repeated ties	-.17	-.25	.49	.26	-.38	.01	.09	-.32	.15			
20. Mean audience size	-.23	-.42	.32	.24	.21	.07	.10	.49	.15	-.02		
21. Mean audience tenure	-.52	-.56	-.23	.59	-.57	.20	.31	-.33	.15	.17	.24	
22. Audience turnover	.07	-.05	-.40	-.14	.53	-.07	-.08	.70	-.02	-.20	.77	-.06

where X is the vector of covariates, β is the associated vector of coefficients, and α_l is the constant coefficient associated with the l^{th} age period. Life histories of each production company were broken into one-year spells to incorporate time-varying covariates. The reported results are maximum-likelihood estimates.

RESULTS

Tables 2–4 report the results from the regression analysis. In addition to likelihood ratio tests used to compare nested models, the tables refer to Akaike's information criterion (AIC) as a likelihood-based measure of overall model fit to compare competing, including non-nested, models. The conventional interpretation of AIC is as an estimate of the loss of precision (increase in information) that results when θ_x , the maximum likelihood estimate, is substituted for the true parametric value, θ_r , in the likelihood function. Thus, by selecting the model with minimum AIC, the estimated loss of precision is minimized. Smaller values of AIC indicate better fitting models.

Model 1 in table 2 presents a baseline specification that includes only the controls. The baseline shows that film producer organizations experience decreasing exit rates over their tenure. This result supports the idea that new organizations have more difficulty in being accepted in the audience-candidate network. Yet the extremely high exit rate associated with the first year may stem from a specific feature of the movie industry: individuals frequently organize to produce a single motion picture and then disband. Alternatively, this liability may reflect the risky nature of movie-making, whereby the vast majority of products fail to attract sufficient moviegoers to cover costs. With respect to scale, increasing size appears to reduce market risks effectively, and all models reveal negative size-dependence. In separate analyses, we included relative size in place of or in addition to absolute size and obtained equivalent results. Given that previous analyses of the industry did not typically find substantial cost savings associated with simultaneously producing multiple movies, these effects likely stem from risk diversification rather than economies of scale. Market concentration does not significantly influence exit in any of the models; hence, cost advantages do not appear to push smaller production companies out of the market. We separately analyzed the historical evolution of concentration in production and found that it does not interact with time trends, again in opposition to resource partitioning logic. Integration seems to insulate producers from resource dependence on distributors (Negro and Sorenson, 2006). Spanning across genres increases exit rates, suggesting that the ability of the external audiences to perceive and identify an organization's fit with established market positions decreases with niche width (Hsu, 2006).

Among the period effects, the studio-system indicator exhibits a negative and significant coefficient, suggesting that performance of production companies actually improved during the years of dominance by the Hollywood majors. The post-Paramount variable shows a positive and weakly ($p < .10$) significant coefficient, reflecting a riskier environment. Television penetration produces a positive and weakly significant effect on exit rates, suggesting the existence of competition between media. As illustrated by model 1, film producer organizations are affected by density-dependent U-shaped dynamics, with density first reducing and then increasing exit rates. Density delay has the predicted positive and significant effect, while distributor density shows a negative and significant effect on the production companies' exit rates, suggesting the presence of symbiosis provided by complementary differences between audience members and candidate organizations (Audia, Freeman, and Reynolds, 2006). Mass has a positive effect on exit, indicating that increasing aggregate size generates more intense competition and consequently lowers survival. At the dyadic level, we find that repeated ties have a negative effect on exit rates. The effect is significant for both the producer-organization and the individual-producer dyads with the distributor organization. Although film production can have a transient nature, our observation of distinct effects by individual producer and organizational networks suggests that the latter is the appropriate level for our analysis of exit rates. Finally, network size has a positive

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Table 2

Piecewise Exponential Regression Models of Exit Rates of Feature Film Producer Organizations*

Variable	Model 1	Model 2	Model 3	Model 4	Model 5
Tenure 0 ≤ u = 1	0.627** (0.250)	1.011*** (0.263)	0.025 (0.316)	0.882*** (0.273)	0.390 (0.329)
Tenure 1 ≤ u = 2	-1.433*** (0.257)	-1.050*** (0.269)	-2.042*** (0.323)	-1.179*** (0.280)	-1.679*** (0.336)
Tenure 2 ≤ u = 4	-1.495*** (0.256)	-1.100*** (0.269)	-2.109*** (0.323)	-1.225*** (0.279)	-1.723*** (0.336)
Tenure 4 ≤ u = 10	-1.861*** (0.258)	-1.476*** (0.271)	-2.470*** (0.324)	-1.602*** (0.283)	-2.101*** (0.338)
Tenure 10 ≤ u = 20	-2.079*** (0.276)	-1.680*** (0.288)	-2.686*** (0.338)	-1.819*** (0.297)	-2.302*** (0.350)
Tenure > 20	-2.595*** (0.341)	-2.212*** (0.351)	-3.199*** (0.393)	-2.355*** (0.357)	-2.852*** (0.403)
Organizational size	-0.908*** (0.050)	-0.904*** (0.051)	-0.917*** (0.051)	-0.904*** (0.050)	-0.911*** (0.051)
Vertical integration	-0.515*** (0.065)	-0.512*** (0.065)	-0.513*** (0.065)	-0.512*** (0.065)	-0.507*** (0.065)
Number of network partners	-0.180*** (0.065)	-0.185*** (0.065)	-0.168** (0.066)	-0.203*** (0.066)	-0.191*** (0.066)
Repeated ties producer org.– distributor org.	-0.156*** (0.042)	-0.162*** (0.042)	-0.147*** (0.042)	-0.166*** (0.042)	-0.161*** (0.043)
Repeated ties individual producer– distributor org.	-0.030** (0.013)	-0.027*** (0.013)	-0.030** (0.013)	-0.023* (0.012)	-0.022* (0.012)
Niche width	0.843*** (0.098)	0.607*** (0.104)	0.976*** (0.108)	0.570*** (0.126)	0.416*** (0.144)
Membership in main component	-0.206*** (0.040)	-0.189*** (0.040)	-0.201*** (0.040)	-0.187*** (0.040)	-0.181*** (0.041)
Density of producer organizations	-0.019*** (0.002)	-0.017*** (0.002)	-0.016*** (0.002)	-0.020*** (0.002)	-0.015*** (0.002)
Density of producer organizations ²	0.006*** (0.000)	0.006*** (0.000)	0.006*** (0.000)	0.007*** (0.000)	0.006*** (0.001)
Density delay	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)
Density of distributor organizations	-0.009*** (0.002)	-0.013*** (0.002)	-0.011*** (0.002)	-0.015*** (0.002)	-0.019*** (0.002)
Mass	0.075* (0.043)	0.082* (0.043)	0.096** (0.045)	0.112** (0.046)	0.118** (0.047)
Weekly theater attendance	-0.001 (0.003)	-0.006** (0.003)	-0.001 (0.003)	0.000 (0.005)	0.003 (0.005)
Television penetration	0.004* (0.002)	0.001 (0.002)	0.004** (0.002)	0.006* (0.003)	-0.003 (0.004)
Market concentration	-0.031 (0.134)	0.041 (0.136)	0.018 (0.135)	-0.135 (0.142)	0.083 (0.148)
Studio-system period	-0.436** (0.128)	-0.536*** (0.122)	-0.439*** (0.128)	-0.305** (0.130)	-0.329** (0.134)
Post-Paramount period	0.181* (0.101)	0.192* (0.098)	0.199** (0.100)	0.186 (0.142)	0.334*** (0.144)
Connectivity		-0.475*** (0.075)			-0.277*** (0.084)
Mean repeated ties			-0.040*** (0.013)		-0.040*** (0.013)
Mean audience size				0.032** (0.012)	0.039*** (0.010)
Mean audience tenure				-0.225*** (0.026)	-0.188*** (0.027)
Audience turnover				0.193*** (0.034)	0.130*** (0.037)
Log-likelihood	-16248.28	-16228.569	-16243.553	-16207.889	-16193.427
Chi-square vs. null	6930.34***	7004.93***	6939.03***	7060.86***	7104.92***
Chi-square vs. model 1		39.42***	9.45***	80.78***	109.706***
Chi-square vs. model 2					70.284***
Chi-square vs. model 3					100.252***
Chi-square vs. model 4					28.924***
AIC	32542.56	32505.14	32535.11	32467.78	32442.85

* p < .10; ** p < .05; *** p < .01.

* Standard errors are in parentheses. N = 9,316 firm/year spells.

influence on survival: numerous exchange partners improve production companies' market power and minimize the risk of uncertain exchanges. Membership in the main component shows a negative effect, hinting at the benefits of being part of the larger element of the network. We performed a likelihood ratio (LR) test between the specification in model 1 and a reduced specification with only ecological variables, omitting number of exchange partners, repeated ties between distributor and producer organizations, repeated ties between distributor organizations and individual producers, and membership in the main component. The test reveals that the model that contains network variables explains producer exit rates much better than the simple ecological model ($\chi^2[L_1 - L_{\text{reduced}}] = 60.7, p < .001$ for 4 d.f.). The AIC values (32542.6 vs. 32595.3) indicate the same tendency.

Model 2 adds the first network measure, connectivity: As expected, the effect on exit rates is negative and statistically significant. At its mean value, network connectivity reduces producer exits by about 38.9 percent. As indicated by the LR test ($\chi^2[L_2 - L_1] = 39.4, p < .001$ for 1 d.f.) and the AIC, this specification improves over the baseline model. We thus find support for hypothesis 1, that increasing reachability decreases the exit of producer organizations. Figure 2 presents the graphical representation of the effect of network connectivity on the multiplier of the exit rate.

Model 3 includes the second network measure, mean repeated ties. As predicted, the variable has a negative and significant effect on producers' exit. A one-standard-deviation increase in repeated interactions reduces producer exits by about 2.5 percent. Net of the influence of repeated ties at the dyadic level, the effect of mean repeated ties is significant. In unreported estimations, we replaced the mean repetition variable with the median and continued to find a negative and significant effect. The specification of model 3 has a better fit than the baseline ($\chi^2[L_3 - L_1] = 9.5, p < .001$ for 1 d.f., and AIC is 32535.1) and supports hypothesis 2, that increasing repeated interactions between audience members and candidates reduce the latter's exit. Figure 3 depicts the effect of mean repeated ties on the multiplier of the exit rate.

Figure 2. Effect of network connectivity on the multiplier of the exit rate.

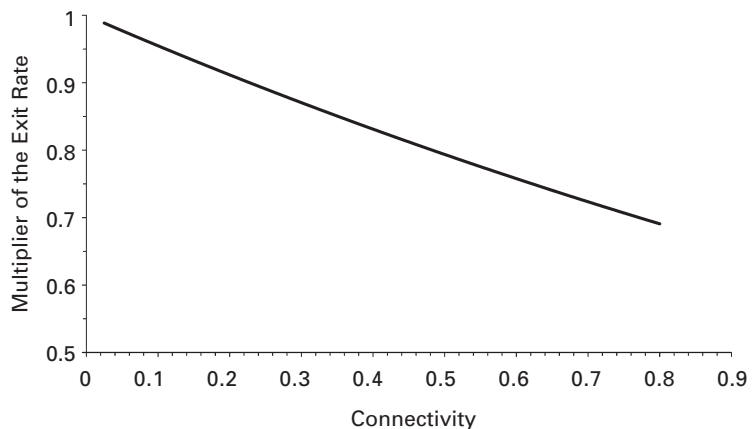


Figure 3. Effect of mean repeated ties on the multiplier of the exit rate.

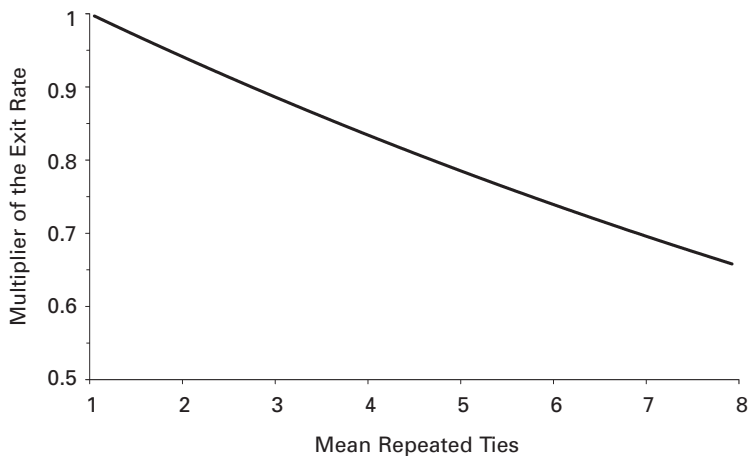
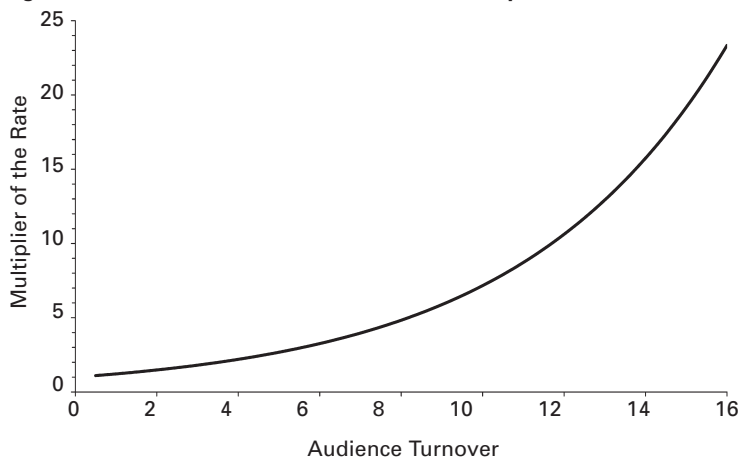


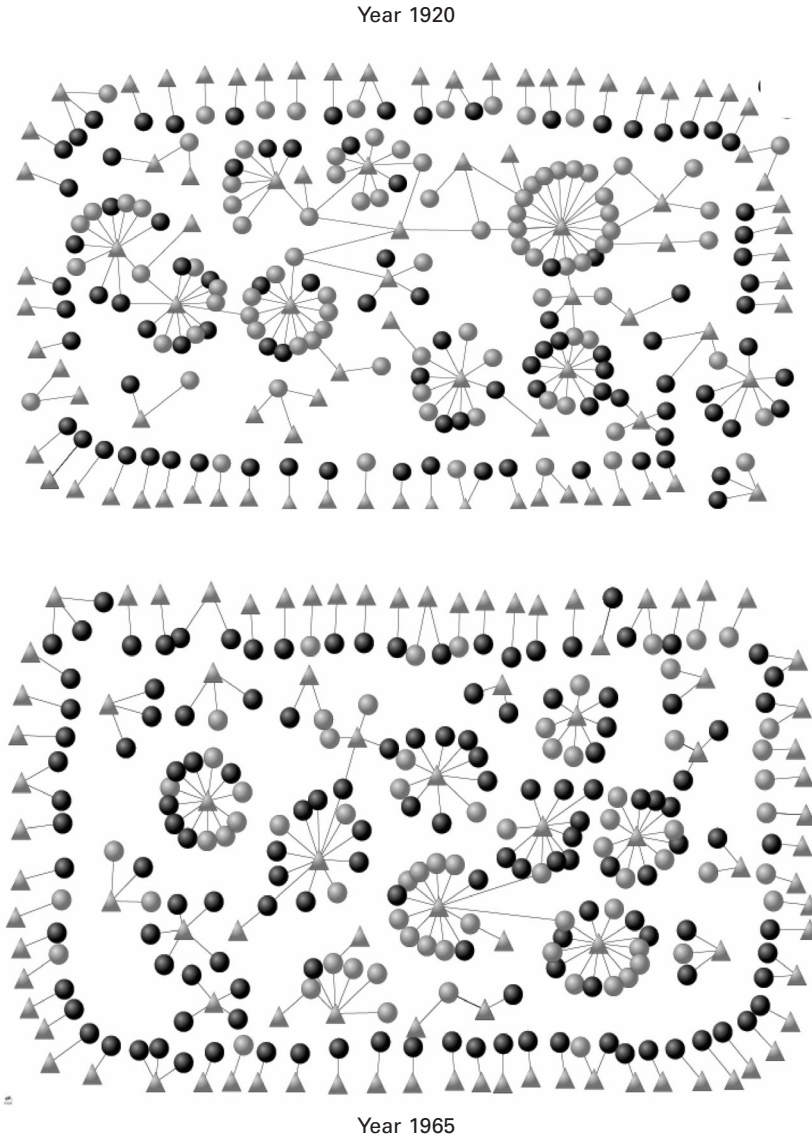
Figure 4. Effect of audience turnover on the multiplier of the exit rate.



Model 4 tests hypothesis 3 by including the third network measure, audience turnover. This specification adds a term capturing the effect of mean distributor size to control for size-related processes such as buyer’s market power. As we hypothesized, turnover has a positive and significant effect on exit. At its mean value, audience turnover increases producers’ exit rates by about 21.3 percent. The specification of model 4 has a better fit than the baseline ($\chi^2[L_4 - L_1] = 80.8$, $p < .001$ for 3 d.f., and AIC is 32467.8). This supports hypothesis 3. A graphical illustration of the effect of audience turnover on the multiplier of the exit rate is shown in figure 4.

Model 5 jointly tests the effects of the three explanatory variables and confirms previous results. Overall, this specification shows better fit than the intermediate models, providing support for hypotheses 1, 2, and 3: the likelihood ratio test shows model 5 is an improvement over any of the previous specifications as indicated by the LR tests ($\chi^2[L_5 - L_1] = 109.7$, $p < .001$ for 5 d.f.; $\chi^2[L_5 - L_2] = 70.3$, $p < .001$ for 4 d.f.; $\chi^2[L_5 - L_3] = 100.3$, $p < .001$ for 4 d.f.; $\chi^2[L_5 - L_4] = 28.9$, $p < .001$ for 2 d.f.) and the AIC value (32442.9) as well. Figure 5 provides visual evidence of the effect of network

Figure 5. The configuration of interorganizational networks between feature film producer and distributor organizations.



Circles = producer organizations. Darker circles are producer organizations exiting the network in the next year

Triangles = distributor organizations

Lines = film ties between producer and distributor organizations

connectivity. The figure illustrates the structure of the domain in 1920 and 1965. These years allow for a pertinent comparison, as they exhibit roughly the same number of incumbents (298 in 1920 and 310 in 1965), thus allowing us to focus on the change in connectivity while holding constant the ecological density. Circles represent production companies and triangles represent distributors. The black nodes are producer organizations that will exit the following year. As is apparent from the picture, these years differ significantly in terms of network connectivity, which decreases from 35 percent in 1920 to 8 percent in 1965. In line with our theory, this drop in

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connectivity corresponds to an increase in producer organizations' exit rate from 53 percent in 1920 to 66 percent in 1965.

The regressions in table 3 examine our hypotheses further in two ways. Not all producers can benefit from the network-related processes: whereas the typical member's life chances rise with greater structure and stability, the penalties for a producer organization that defies conformity to socio-cognitive frames would be amplified. To attract audience resources, organizations need to engage in focused efforts by making their offerings available and known (Hannan,

Table 3

Piecewise Exponential Regression Models of Exit Rates of Feature Film Producer Organizations—Robustness Checks*		
Variable	Model 6	Model 7
Tenure $0 \leq u = 1$	-0.554 (0.632)	1.377 ^{***} (0.363)
Tenure $1 \leq u = 2$	-2.639 ^{***} (0.635)	-0.702 [*] (0.369)
Tenure $2 \leq u = 4$	-2.682 ^{***} (0.636)	-0.746 ^{**} (0.370)
Tenure $4 \leq u = 10$	-3.055 ^{***} (0.638)	-1.123 ^{***} (0.371)
Tenure $10 \leq u = 20$	-3.274 ^{***} (0.645)	-1.331 ^{***} (0.382)
Tenure > 20	-3.786 ^{***} (0.669)	-1.874 ^{***} (0.431)
Organizational size	-0.919 ^{***} (0.051)	-0.910 ^{***} (0.051)
Vertical integration	-0.511 ^{***} (0.065)	-0.518 ^{***} (0.065)
Number of network partners	-0.194 ^{***} (0.066)	-0.200 ^{***} (0.066)
Repeated ties producer org.–distributor org.	-0.163 ^{***} (0.042)	-0.165 ^{***} (0.043)
Repeated ties individual producer–distributor org.	-0.021 (0.012)	-0.023 [*] (0.012)
Niche width	0.923 ^{***} (0.282)	0.456 ^{***} (0.146)
Membership in main component	-0.185 ^{***} (0.041)	-0.183 ^{***} (0.041)
Density of producer organizations	-0.027 ^{***} (0.004)	-0.018 ^{***} (0.002)
Density of producer organizations ²	0.010 ^{***} (0.001)	0.008 ^{***} (0.001)
Density delay	0.003 ^{***} (0.001)	0.003 ^{***} (0.001)
Density of distributor organizations	-0.019 ^{***} (0.003)	-0.018 ^{***} (0.002)
Mass	0.632 ^{**} (0.253)	0.063 (0.045)
Weekly theater attendance	0.004 (0.005)	-0.004 (0.005)
Television penetration	-0.013 ^{**} (0.004)	-0.024 (0.005)
Market concentration	-0.158 (0.154)	-0.339 (0.163)
Studio-system period	-0.073 (0.148)	-0.054 (0.142)
Post-Paramount period	0.221 (0.146)	0.205 (0.148)
Connectivity	-0.623 ^{**} (0.253)	-0.355 ^{***} (0.086)
Mean repeated ties	-0.175 ^{***} (0.046)	-0.057 ^{***} (0.013)
Mean audience size	0.383 ^{***} (0.113)	0.098 ^{***} (0.014)
Mean audience tenure	-0.297 ^{***} (0.032)	-0.291 ^{***} (0.032)

(continued on next page)

Table 3 (continued)

Piecewise Exponential Regression Models of Exit Rates of Feature Film Producer Organizations—Robustness Checks*

Variable	Model 6	Model 7
Audience turnover	0.379 ^{***} (0.061)	0.341 ^{***} (0.051)
Niche width × Connectivity	0.331 ^{**} (0.147)	
Niche width × Mean repeated ties	0.108 ^{**} (0.045)	
Niche width × Audience turnover	-0.080 ^{***} (0.021)	
Audience overlap		-0.332 ^{***} (0.053)
Log-likelihood	-16166.217	-16193.42
Chi-square vs. null	7238.46 ^{***}	7186.71 ^{***}
Chi-square vs. model 1	158.62 ^{***}	109.72 ^{***}
AIC	32394.43	32405.81

• $p < .10$; •• $p < .05$; ••• $p < .01$.

* Standard errors are in parentheses. N = 9,316 firm/year spells.

Pólos, and Carroll, 2007). Given that organizations have a finite capacity for engagement, paying attention to a broader, more diverse set of audiences means less attention paid to establishing and communicating a clear fit to each (Hsu, 2006). One implication is that increases in niche width must decrease the level of an organization's engagement across its diverse positions, resulting in lowered audience appeal across these positions. Targeting a broad niche makes it difficult for organizations to clearly establish their fit with targeted taste positions, and broader niches present patterns of features that lack conformity to audience-relevant schemas (Hannan, Pólos, and Carroll, 2007). If so, this lack of conformity limits legitimation via a reduction in consensus and entails a higher hazard of exit. Genres reflect sets of positions that are relevant for producers and audiences alike. Hsu (2006) found that films that target more genres generally attract a larger proportion of audiences. At the same time, however, these films diminish the audience's ability to clearly perceive and identify an organization's fit within established market positions. In our context, we expect that lack of conformity associated with producer organizations that operate in broader genre niches will increase penalties under conditions of greater connectivity, greater repeated interactions, and lower turnover. Model 7 includes interaction effects with niche width and shows significant effects, as expected.

Moreover, model 8, in table 4 considers one other factor that would lead to consensus, the role of homogeneity in the audience. We expected higher homogeneity among audience members to be more congenial to the development of consensus. Model 8 includes as a measure of homogeneity the average niche overlap across genres among distributor organizations. Though increasing overlap among distributors can increase distributors' exit due to crowding processes, the impact on producer organizations can be beneficial: with more competitive overlap among audience members, there should be more agreement about the features candidates ought to present. This effect shows net of the density of distributor organizations. Consistent with this logic, we find that

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Table 4

Piecewise Exponential Regression Models of Exit Rates of Feature Film Producer Organizations—Robustness Checks*					
Variable	Model 8	Model 9	Model 10	Model 11	Model 12
Tenure $0 \leq u = 1$	0.732 [*] (0.394)	0.618 [*] (0.342)	1.344 ^{***} (0.334)	0.480 (0.331)	0.523 [*] (0.320)
Tenure $1 \leq u = 2$	-1.341 ^{***} (0.399)	-1.609 ^{***} (0.349)	-1.207 ^{***} (0.341)	-1.588 ^{***} (0.338)	-1.549 ^{***} (0.337)
Tenure $2 \leq u = 4$	-1.377 ^{***} (0.399)	-1.691 ^{***} (0.350)	-1.361 ^{***} (0.341)	-1.633 ^{***} (0.338)	-1.593 ^{***} (0.338)
Tenure $4 \leq u = 10$	-1.766 ^{***} (0.399)	-2.104 ^{***} (0.352)	-1.716 ^{***} (0.344)	-2.013 ^{***} (0.340)	-1.973 ^{***} (0.339)
Tenure $10 \leq u = 20$	-1.962 ^{***} (0.411)	-2.212 ^{***} (0.365)	-1.986 ^{***} (0.356)	-2.216 ^{***} (0.352)	-2.179 ^{***} (0.351)
Tenure > 20	-2.497 ^{***} (0.459)	-2.733 ^{***} (0.435)	-2.570 ^{***} (0.406)	-2.781 ^{***} (0.423)	-2.711 ^{***} (0.404)
Organizational size	-0.908 ^{***} (0.052)	-1.093 ^{***} (0.061)	-2.224 ^{***} (0.062)	-0.912 ^{***} (0.051)	-0.911 ^{***} (0.051)
Vertical integration	-0.494 ^{***} (0.066)		0.349 ^{***} (0.070)	-0.509 ^{***} (0.065)	-0.509 ^{***} (0.065)
Number of network partners	-0.196 ^{***} (0.066)	-0.167 ^{**} (0.069)	0.420 ^{***} (0.066)	-0.191 ^{***} (0.066)	-0.195 ^{***} (0.066)
Repeated ties producer org.– distributor org.	-0.181 ^{***} (0.044)	-0.103 ^{**} (0.046)	0.201 ^{***} (0.041)	-0.160 ^{***} (0.043)	-0.159 ^{***} (0.043)
Repeated ties individual producer– distributor org.	-0.020 [*] (0.012)	-0.019 (0.013)	0.029 ^{***} (0.010)	-0.023 [*] (0.012)	-0.023 [*] (0.012)
Niche width	0.511 ^{***} (0.141)	0.512 ^{***} (0.144)	0.462 ^{***} (0.137)	0.564 ^{***} (0.136)	0.433 ^{***} (0.141)
Membership in main component	-0.157 ^{***} (0.041)	-0.199 ^{***} (0.041)	-0.194 ^{***} (0.041)	-0.175 ^{***} (0.041)	-0.188 ^{***} (0.041)
Density of producer organizations	-0.017 ^{***} (0.002)	-0.015 ^{***} (0.002)	-0.023 ^{***} (0.002)	-0.016 ^{***} (0.002)	-0.017 ^{***} (0.002)
Density of producer organizations ²	0.007 ^{***} (0.001)	0.006 ^{***} (0.001)	0.008 ^{***} (0.001)	0.006 ^{***} (0.001)	0.007 ^{***} (0.001)
Density delay	0.002 ^{***} (0.001)	0.003 ^{***} (0.001)	0.006 ^{***} (0.001)	0.003 ^{***} (0.001)	0.003 ^{***} (0.001)
Density of distributor organizations	-0.019 ^{***} (0.002)	-0.018 ^{***} (0.003)	-0.019 ^{***} (0.002)	-0.018 ^{***} (0.002)	-0.010 ^{***} (0.003)
Mass	0.115 ^{**} (0.051)	0.118 [*] (0.050)	0.191 ^{***} (0.049)	0.131 ^{***} (0.048)	0.090 [*] (0.047)
Weekly theater attendance	-0.001 (0.005)	-0.001 (0.005)	-0.006 (0.005)	-0.002 (0.005)	0.006 (0.005)
Television penetration	-0.003 (0.004)	-0.003 (0.004)	-0.007 [*] (0.004)	-0.005 (0.003)	0.000 (0.004)
Market concentration	0.224 (0.171)	-0.005 (0.152)	0.207 (0.145)	-0.005 (0.145)	-0.137 (0.152)
Studio-system period	-0.438 ^{***} (0.132)	-0.477 ^{***} (0.136)	-0.647 ^{***} (0.129)	-0.402 ^{***} (0.130)	-0.490 ^{***} (0.134)
Post-Paramount period	0.305 ^{**} (0.142)	0.251 [*] (0.145)	-0.009 (0.142)	0.271 [*] (0.141)	0.312 ^{**} (0.142)
Connectivity	-0.331 ^{***} (0.084)	-0.357 ^{***} (0.088)	-0.322 ^{***} (0.084)	-0.314 ^{***} (0.084)	-0.429 ^{***} (0.089)
Mean repeated ties	-0.041 ^{***} (0.013)	-0.043 ^{***} (0.013)	-0.066 ^{***} (0.013)	-0.038 ^{***} (0.013)	-0.050 ^{***} (0.013)
Mean audience size	0.029 ^{**} (0.013)	0.041 ^{***} (0.013)	0.049 ^{***} (0.013)	0.032 ^{**} (0.012)	0.035 ^{***} (0.012)
Mean audience tenure	-0.178 ^{***} (0.028)	-0.185 ^{***} (0.029)	-0.249 ^{***} (0.029)	-0.184 ^{***} (0.028)	-0.215 ^{***} (0.030)
Audience turnover	0.128 ^{***} (0.037)	0.134 ^{***} (0.038)	0.220 ^{***} (0.037)	0.144 ^{***} (0.037)	0.282 ^{***} (0.055)
Size > 1			-1.915 ^{***} (0.045)		
Cumulative size				0.001 (0.000)	
Industry age					-0.045 ^{***} (0.013)
Log-likelihood	-15747.316	-15372.359	-15092.723	-16197.351	-16191.43

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Table 4 (continued)

Piecewise Exponential Regression Models of Exit Rates of Feature Film Producer Organizations—Robustness Checks*					
Variable	Model 8	Model 9	Model 10	Model 11	Model 12
Observations (firm/year spells)	9,151	8,044	9,316	9,316	9,316
Chi-square vs. null	6921.54***	7414.77***	10973.32***	7096.62***	7108.22***
AIC	31550.63	30798.72	30243.45	32452.7	32440.86
Chi-square vs. model 1 (same obs)	104.07***	105.19***	2311.11***	101.86***	113.70***
AIC of model 1 (same obs)	31644.7	30893.91			
Variable	Model 13	Model 14	Model 15	Model 16	
Tenure $0 \leq u = 1$	0.055 (0.323)	-0.038 (0.383)	0.677** (0.327)	-0.892* (0.468)	
Tenure $1 \leq u = 2$	-2.022*** (0.330)	-2.102*** (0.389)	-1.393*** (0.334)	-2.957*** (0.472)	
Tenure $2 \leq u = 4$	-2.078*** (0.330)	-2.154*** (0.389)	-1.452*** (0.334)	-3.015*** (0.472)	
Tenure $4 \leq u = 10$	-2.460*** (0.332)	-2.523*** (0.390)	-1.822*** (0.334)	-3.395*** (0.474)	
Tenure $10 \leq u = 20$	-2.645*** (0.344)	-2.748*** (0.403)	-2.019*** (0.348)	-3.591*** (0.484)	
Tenure > 20	-3.164*** (0.397)	-3.278*** (0.448)	-2.555*** (0.402)	-4.112*** (0.523)	
Organizational size	-0.920*** (0.051)	-0.915*** (0.050)	-0.912*** (0.050)	-0.917*** (0.051)	
Vertical integration	-0.506*** (0.065)	-0.512*** (0.065)	-0.512*** (0.065)	-0.518*** (0.065)	
Number of network partners	-0.190*** (0.066)	-0.193*** (0.066)	-0.220*** (0.066)	-0.178*** (0.066)	
Repeated ties producer org.– distributor org.	-0.152*** (0.042)	-0.159*** (0.043)	-0.168*** (0.043)	-0.153*** (0.043)	
Repeated ties individual producer– distributor org.	-0.028** (0.013)	-0.023* (0.012)	-0.024* (0.012)	-0.027** (0.013)	
Niche width	0.704*** (0.132)	0.831*** (0.148)	0.319*** (0.122)	0.838*** (0.116)	
Membership in main component	-0.182*** (0.041)	-0.185*** (0.040)	-0.189*** (0.040)	-0.174*** (0.040)	
Density of producer organizations	-0.012*** (0.002)	-0.016*** (0.002)	-0.014*** (0.002)	-0.011*** (0.002)	
Density of producer organizations ²	0.005*** (0.001)	0.007*** (0.001)	0.004*** (0.001)	0.005*** (0.001)	
Density delay	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	0.003*** (0.001)	
Density of distributor organizations	-0.016*** (0.002)	-0.016*** (0.002)	-0.016*** (0.002)	-0.015*** (0.002)	
Mass	0.083* (0.045)	0.149*** (0.050)	0.141*** (0.048)	0.133*** (0.047)	
Weekly theater attendance	0.001 (0.005)	0.005 (0.005)	-0.004 (0.003)	0.002 (0.004)	
Television penetration	0.004 (0.003)	-0.001 (0.004)	0.002 (0.002)	0.004* (0.002)	
Market concentration	0.051 (0.141)	-0.056 (0.143)	0.038 (0.139)	0.082 (0.141)	
Studio-system period	-0.333*** (0.126)	-0.359*** (0.132)	-0.532*** (0.123)	-0.574*** (0.125)	
Post-Paramount period	-0.146 (0.154)	0.191 (0.141)	0.158 (0.101)	0.277*** (0.102)	
Connectivity			-0.597*** (0.083)	-0.381*** (0.086)	
Mean repeated ties	-0.040*** (0.013)	-0.031** (0.013)	-0.062*** (0.013)	-0.040*** (0.013)	
Mean audience size	0.031** (0.012)	0.047*** (0.014)			
Mean audience tenure	-0.046*** (0.006)	-0.201*** (0.028)			
Audience turnover	0.094*** (0.026)	0.155*** (0.039)			

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Table 4 (continued)

Piecewise Exponential Regression Models of Exit Rates of Feature Film Producer Organizations—Robustness Checks*

Variable	Model 13	Model 14	Model 15	Model 16
Component connectivity	-0.020 ^{***} (0.005)			
Average network density		-0.057 ^{**} (0.026)		
Oldtimer ratio			0.043 ^{***} (0.007)	
Prior exits			0.003 ^{**} (0.002)	
Newcomer ratio				0.911 ^{***} (0.223)
Prior entries				0.001 (0.002)
Log-likelihood	-16201.32	-16201.906	-16184.671	-16214.015
Observations (firm/year spells)	9,316	9,316	9,316	9,316
Chi-square vs. null	7076.84 ^{***}	7071.13 ^{***}	7152.88 ^{***}	7039.98 ^{***}
AIC	32458.64	32459.81	32423.34	32482.03
Chi-square vs. model 1 (same obs)	93.92 ^{***}	92.75 ^{***}	127.22 ^{***}	68.53 ^{***}
AIC of model 1 (same obs)				

• $p < .10$; •• $p < .05$; ••• $p < .01$.

* Standard errors are in parentheses.

audience overlap has a negative effect on producers' exit rates.

To test the robustness of the analyses, we estimated additional models, presented in table 4. Due to the use of a three-year window in analyzing ties, observations for the period 1912–1914 could have biased our results. Model 8 checks sensitivity to this time window, estimating exit rates by omitting the first three years of observation, and shows our results are unaffected by the estimations made for the abbreviated observation period. Model 9 replicates the full model by restricting the analysis to non-integrated production companies. Previous results are unchanged. In the film industry, producer organizations may be created for the production of a single film. Lack of information in the data sources on organizational goals prevented us from distinguishing between organizations that did not make a second film because the first one was not successful and organizations that purposely were designed for single productions. Model 10 attempts to address this issue by including a dummy variable to control for producer organizations that made more than one film. Organizations that made at least two films have lower exit rates, but we continue to find support for our hypotheses. Model 11 includes a measure of cumulative size. We find that controlling for the number of previous films made over the life of the organization does not affect producer exit—cumulative size probably causes the lack of significance of the first time piece. Model 12 addresses the concern that legitimation is better represented as a time-varying function (Hannan, 1997). We included a variable measuring industry age to control for time trends. This specification indicates that industry age reduces exit, but it leaves our previous findings unaffected. Models 13 and 14 provide alternative specifications to network connectivity. Model 13 replaces our connectivity variable with the components-based connectivity

measure $1/C$, where C is the number of network components. Consistent with hypothesis 1, this variable has a negative and significant effect on exit, suggesting that increasing (or decreasing) connectivity in the communication network between audience and candidates—as indicated by lower (or higher) values of C —enhances (or harms) candidates' survival. Model 14 replaces the measure of network connectivity with a variable gauging the average degree of the network. A higher degree of vertices suggests a more connected network because vertices have more ties. Accordingly, we used the average degree of all vertices as an alternative proxy for the interconnectivity of the domain. The effect on exit is negative and significant, in line with our original measure, but compared with these alternative specifications, our chosen measure produces better fit, as suggested by the LR tests and AIC values of models 13 and 14 vs. model 5. The next two specifications present alternative measurements of the audience turnover variable and combine a measure of population dynamics with one of density. Traditionally, density dependence processes are alternatives to population dynamics (Baum and Shipilov, 2006). While density dependence focuses on levels of density itself, population dynamics focus on how current founding and failure rates are related to changes in density (Tucker et al., 1988). Recent trends in ecological studies have abandoned analysis of population dynamics effects, but some authors argue that the issue deserves further examination (Baum and Shipilov, 2006). Our alternative measurement revisits prior work on population dynamics by creating a direct link between transitory flows and the density of audience members but uses audience rather than population dynamics and considers an interpretation of the turnover process that is distinct from resource availability or the use of vicarious information (Kalnins, Swaminathan, and Mitchell, 2006). Model 15 replaces the variables measuring the age of distributor organizations with the lagged proportion of distributor organizations that exit the network. More member exits induce higher audience discontinuity and in turn increase exit rates. Consistent with this prediction, turnover still has a positive and significant effect on producers' exit rates. Model 16 presents another measurement of turnover, the proportion of new entrants in the audience. Increasing entry is expected to intensify discontinuity in audiences. In accordance, an increasing rate of entry into the audience increases the exit of producer organizations, but the observed effects of audience turnover may instead reflect turnover in the focal population. To control for this, models 15 and 16 add the number of prior exits and entries of producer organizations, respectively, and leave our main findings unaffected. In unreported analyses, we added the effect of competitive intensity measured by age-size interactions (Barnett, 1997), but the results did not modify the findings we present. As firms exit the population, their ties to distributors dissolve, thus altering the properties of the network to which they belong. To partially account for this endogenous process of network causation in separate analyses, we estimated our full model using multiple time frames for the connectivity measure. We employed two-, three- and four-year lags, and the results were robust to all such specifications.

DISCUSSION AND CONCLUSIONS

The macro changes that produce legitimation are just starting to receive systematic analysis (Hannan, Pólos, and Carroll, 2007: 298). Institutional scholars and organizational ecologists have recently begun to converge on the idea that legitimacy originates from consensus among certain agents (an audience) on which features and behaviors of an organization (a candidate) should be viewed as appropriate and desirable within a widespread system of social codes. An audience-based theory of legitimation posits that various social audiences develop expectations about what organizations can or should do and accordingly evaluate organizational action. Candidate organizations that pass the code test are legitimated in the social environment. One of the consequences is that they enjoy greater survival.

Two central but undeveloped features of this theory concern how the audience is structured and evolves in tandem with the organizations it scrutinizes and how interactions between audiences and candidates shape the formation of consensus around codes (Hannan, Pólos, and Carroll, 2007: 302–303). This study examines three main conditions under which audiences reach and maintain consensus: (1) network connectivity, which facilitates the transmission of social norms about appropriate behavior and signals membership acceptance criteria, (2) tie repetition, which allows audiences to reinforce informed opinions about candidates' conformity to expectations; and (3) audience turnover, which affects the stability of the application of social codes, thereby increasing candidates' uncertainty about default codes. In the context of the U.S. film industry, we analyzed the exchange ties between feature film producer and distributor organizations. We considered distributor organizations as audience members for the producer organizations, seeking to release their films and found that the first two conditions increase producers' survival in the market, while the third reduces it.

Our analysis of patterns of exchange between feature film producer and distributor organizations offers evidence that the formation and operation of social codes depends on the network connecting organizational populations and their audiences. This has an important implication for ecological theory. First, legitimation is a process driven not only by numerical proliferation (or density) of organizations; its roots are also to be found in the interactions among these organizations. Moreover, legitimation must not be considered static; it has a dynamic nature. Current ecological theory considers legitimation a process that takes place during a population's early history. Secured once and for all during a population's youth, legitimation tends to be inert and becomes increasingly "sticky" (Hannan, 1997). Our analysis shows that the process of legitimation does not end with the crystallization of codes during the emergence of the organizational form.

Legitimacy can be assessed at different levels and on different dimensions (Ruef and Scott, 1998). During the early life of a population, the legitimation process mainly assesses the legitimacy of a new organizational form, which the candidates are responsible for imprinting according to audiences'

expectations (Perretti, Negro, and Lomi, 2008). Once an organizational form is established, the legitimation process shifts to a different level and mainly assesses the legitimacy of the candidates to obtain resources from the social environment. Even if the organizational form is established, the codes that audiences develop to assess candidates' claims to existing resources may change without replacing the existing form. A film producer organization that was once granted resources in the 1930s probably would not in the 1960s, not necessarily because the organizational form or the product features were radically different (a movie was still a movie, projected in large-screen theaters, with actors, directors, etc.), but because the codes about what a producer should be had changed. At this level, legitimacy refers to a laborious process in constant development. Also, while existing accounts of the legitimation process focus on direct contact among audience members, we show that social codes can develop via contact with candidate organizations. In this sense, an audience-based interpretation of legitimation integrates with research on interorganizational networks indicating that social codes can develop and transfer in a mediated way (Romo and Schwartz, 1995; Uzzi, 1999; Zuckerman, 1999, 2003; Phillips and Zuckerman, 2001).

Our study has further ramifications for ecological theory. First, it adds to research on community ecology (Ruef, 2000; Sørensen, 2004), whose studies mainly focus on density-based measures of resource flows between forms of organizations. Although this literature has stressed the importance of looking at the web of relations within and across communities' members (e.g., Wade, 1995), the structural and behavioral characteristics of this network have not been explicitly examined. Our findings highlight the presence of processes that link interdependent populations and have effects on vital rates that are distinct from density, namely, the structure of the exchange networks between buyer and supplier organizations. Focusing on the communication network between organizational populations and their audiences and, in particular, the conditions fostering the formation and diffusion of consensus, we shed light on the process by which standards like technical design can become taken for granted.

Second, the use of ecological models has attracted interest as well as criticism. Baum and Powell (1995) have argued that legitimation is a process only weakly related to ecological measures like density and that changes in density are proxies for other processes, such as the evolution of a population's interdependencies with its environment. Baum and Oliver (1992) used similar arguments to justify the lack of support for density dependence in the population of day care centers in Toronto: after controlling for the relational density of institutional linkages between day care centers and governmental agencies, initial increases in population density showed only competitive effects. Baum and Oliver (1992) attributed this finding to the population's increasing embeddedness in its environment and concluded that relational density is a more direct specification of legitimating effects. In the absence of left-truncated schemes, our examination of population density and relational embeddedness lends sup-

port to both density-based and non-density-based mechanisms driving the legitimation process (Sine, Haveman, and Tolbert, 2005).

Third, some organizational populations show complex evolutionary trajectories in which a decline in density is followed by a resurgence. Ecologists have developed various explanations—including density delay, time-dependent heterogeneity, and resource partitioning—for what is considered an anomaly relative to predictions of the density-dependence model. The population of feature film producer organizations experienced such a resurgence. According to resource partitioning, when the number of organizations declines, the market share held by a few firms often increases. In a highly concentrated industry, specialist organizations often find small pockets of resources on which they can exist (Carroll, 1985). This, in turn, leads to lower mortality and, eventually, to a larger population. Our study suggests another mechanism for resurgence based on the structural and relational characteristics of interorganizational ties. This mechanism has the advantage of allowing reversibility without imposing strict time-dependent assumptions (Hannan, 1997).

At a broader level, our study also contributes to the dialogue between ecological and social network research on organizations. On the one hand, ecology informs network studies by demonstrating that embeddedness in social contexts has meaning beyond direct ties and can be a function of membership in an ecological community (Hannan, Pólos, and Carroll, 2007). On the other hand, network studies inform ecology by bringing evidence that the system of connections to the environment can influence organizational dynamics beyond the discrete segmentation of populations. The network therefore represents a context, not a mere juxtaposition of ties (White, 1992).

Despite support for the hypotheses, this study has important limitations that in turn suggest directions for future work. First, our study examines the conditions under which consensus is more likely to be reached, strengthened, and preserved, but without directly measuring consensus. We inferred the existence of agreement within the audience on the candidates to accept or to exclude if the identified conditions were satisfied altogether. Also, we did not measure codes directly, even though the qualitative evidence presented in the paper provides a glimpse into what those codes looked like in our setting during the study period and how they shaped agents' behavior (Bordwell, Staiger, and Thompson, 1985). More fine-grained data on the relationships between producer and distributor organizations, such as data on contractual deals, public discourse, and actual resource flows from distributors to producers, but also a different research design, perhaps a combination of textual and historical analysis, would make it possible to overcome some of the limitations of the study. Second, questions about the generalizability of our findings can only be answered by examining other contexts. Organizations in the film industry operate in a context fraught with great uncertainties, both on the supply and demand side (Faulkner and Anderson, 1987). This results in self-reinforcing dynamics of embeddedness in

which producers and distributors establish strong ties even in the face of negative returns to such relationships (Sorenson and Waguespack, 2006). Repeated ties therefore may be a more cogent factor in explaining life chances here than in other contexts. The film industry has also witnessed shifts in the structure of market exchanges. Horizontal ties between producers have increased substantially since the 1970s, and an analysis extending to more recent periods could examine horizontal rather than vertical ties. Third, the study examines only a simple set of network characteristics. The choice of connectivity, repeated ties, and turnover in the buyer network directly reflects our interest in studying the influence of organizational network structures beyond the effect of ecological mechanisms. Future studies might address alternative exchange forms and their potential effects. Fourth, in this study, we did not analyze the joint impact of the network mechanisms that influence audience consensus. Exploratory analyses suggest that connectivity and repeated ties moderate the deleterious effect of audience turnover on exit. Higher embeddedness can indeed mitigate the loss of specific exchange partners but maintain the structure of roles and identities. Examining such interaction effects represents an interesting avenue for future research. Yet these findings also require additional empirical validation, and the underlying theoretical mechanisms have to be investigated more deeply. In this context, future research could also investigate if network structure interacts with density dependence. A study that connects the analysis of network ties with ecological dynamics may shed light on relevant open problems, for example, the fact that density dependence assumed that legitimation effects are symmetric across the two sides of the peak in the density distribution. These represent fruitful areas for further investigation that we hope will contribute to a better understanding of the complex and fundamental relationships linking organizations to their environment.

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