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Abstract:

In this article we use Academy Award nominations for acting to explore how artistic achievement is situated within collaborative context. The context of individual effort is particularly important in film since quality is not transparent and the project-based nature of the field allows us to observe individuals in multiple contexts. Controlling for the actor's personal history and basic traits of the film we explore two basic predictions. First, we find that status, as measured by asymmetric centrality in the network of screen credits, is an efficient measure of star power and mediates the relationship between experience and formal artistic consecration. Second, we find that actors are most likely to be consecrated when working with elite collaborators. We conclude by arguing that selection into privileged work teams is a locus of cumulative advantage.

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One notable feature of cultural fields is that they are characterized by a hierarchy of quasi-moral value, which implies a set of mechanisms through which individual works, authors, genres, and even entire artistic fields are consecrated as worthy (Becker 1978; DiMaggio 1981; Bourdieu 1993; Motti 1994; English 2005; Baumann 2001, 2007). Awards, prizes, and honors for the "best artwork" or the "best artist" are among these consecrating institutions (Cowen 2000; Anand and Watson 2004; English 2005). Some person (or work closely associated with a person) is consecrated by an award and that person gets her name engraved on the trophy, gives the acceptance speech, and thereafter finds her career transformed (Lincoln 2007). Nobel-winning scientists find that they are subsequently given better access to resources and find both that their work is evaluated more favorably and that they are considered the real force in any collaboration (Merton 1968; Zuckerman 1996). Likewise, journalists treat "medals and trophies as a legitimate measure--perhaps the only legitimate measure--of a person's cultural worth" (English 2005:22).

This emphasis on individual winners affirms the romantic ideology of art as the heartfelt expression of the artist (rather than the collective achievement of the artistic team or broader art world). While especially pronounced in lifetime achievement awards, all awards following the best of a profession formula imply "overemphasis on individual achievement and individual authorship" (English 2005:86). This very mismatch between the essentially collaborative nature of most arts and the essentially individualistic nature of most awards allows us the analytical leverage to see how individual achievements are assessed when the critical observer only has access to the collaborative efforts within which these achievements are embedded. As will be

explored throughout this paper, we do not see individual talent unproblematically but through the glass darkly of social context and team effort. In this article we attempt to explain individual artistic consecration using two aspects of the context of cultural production: social status and team spillovers.

The Academy Awards

Among the very most prominent awards are the Academy Awards or "Oscars." Not only are they comparable in prominence and media attention (if not dignity) to the Nobel Prizes, but they are the most prominent cultural prize by a wide margin (Levy 2003; English 2005). The various traditions and fetishes introduced by the Oscars – public nominations, sealed envelopes, spectacular televised ceremonies with the nominees in attendance – have been so widely imitated by other entertainment awards (and even high culture awards, like the Booker) that the Oscars can fairly be called the prototype for the institutionalization of the entertainment award as spectacle (English 2005). The Oscars have concrete implications for the box office, with films that win best picture earning an estimated extra 12.7 million dollars (Nelson, Donihue, Waldman, and Wheaton 2001). Likewise, winning an Oscar can dramatically increase the fees a previously obscure Hollywood worker can demand (Gumbel, Lippman, Bannon, and Orwall 1998). "The very nomination for an Oscar can have a pervasive impact on artists' careers, expanding their visibility and exposure" (Levy 2003:90). The ceremony itself has been a very lucrative undertaking since NBC (and later ABC) began paying for the broadcast rights in 1952 and this source of revenue is a major motivating force for the proliferation of awards and awards broadcasts since 1970 (English 2005). Through such mechanisms, the Oscars are now the basis

for an entire "awards season" industry of entertainment, gossip, and fashion journalism as well as secondary awards whose primary interest is the extent to which they project the *real* winners – a sort of cinema Advent to the Hollywood Christmas that is Oscars night.

Generally, awards make claims as to the field's legitimacy and boundaries (Anand and Watson 2004). However it is worth noting that there are other means to institutionally consecrate a field. The organization of cultural production is an important factor in the institutionalization of prestige, as elevated fields tend to be only loosely coupled to the market and proximately focused on the aesthetic interests of the artistic community itself (Becker 1978; DiMaggio 1981; Bourdieu 1993). Likewise, several studies have shown how even within such consummately commercial mass entertainment fields as film and rock music, critics create artistic value by drawing distinctions between more and less artistic works and workers (Motti 1994; Baumann 2001, 2007). While the sociological literature on cultural consecration has been dominated by such mechanisms as nonprofit organization and critics, awards represent a clear and understudied mechanism by which fields and works are consecrated, often through the collective action of key figures within the field itself (Anand and Watson 2004; English 2005).

The Academy of Motion Picture Arts and Sciences (AMPAS) was founded in 1927 as a professional honorary organization of 36 members (since expanded to approximately 6,000 motion picture professionals). Although AMPAS began bestowing awards from its inception, for its first decade this was only one of several functions. The early film industry had a low reputation stemming from anti-immigrant sentiment about both producers and customers and this bad reputation was only exacerbated by a series of sex scandals (Levy 2003; Baumann 2007). By the 1920s the industry faced censorship and other regulatory threats. To reassert the industry's

legitimacy, Louis B. Mayer led the moguls in creating two institutions: the Hays Office (precursor to the Motion Picture Association of America) as a semi-voluntary censorship board and AMPAS as a combination of cultural organization, trade group, and labor arbitration system led by Hollywood's business and creative elite. By the mid 1930s independent unions like the Screen Actors Guild had supplanted AMPAS' labor functions. This threatened AMPAS with obsolescence but in 1939 Frank Capra reorganized the Academy to focus exclusively on cultural and artistic concerns to the exclusion of political and economic issues. (The trade group functions abandoned by AMPAS would later be adopted by the Motion Picture Association of America which now aggressively pursues Hollywood's political interests on issues like copyright.)

Academy nominations are made by Academy members of the relevant branch, such that writers nominate writers, actors nominate actors, and so on from among "eligible" films (Levy 2003). An independent accounting firm tallies the completed nomination ballots and selects the top five selections per award as the official nominees. A second and final round of balloting is given to the entire Academy. All Academy members, regardless of branch, decide the winners. Compared with Hollywood in general, the Academy is very small. For instance, as of 2002, there were 1,315 members of the acting branch, which makes it approximately 2 percent of the membership of the Screen Actors Guild (Levy 2003:46-47). Since the Academy membership is recruited from prior nominees, AMPAS is a true academy, in the sense of an elite body where the incumbent membership recruits new members.

The Oscars are the most concrete and deliberate form of the more general phenomenon of stardom in cultural fields. As mass communication technology allows the infinite reproduction of

cultural works, there is no upper limit to the popularity of cultural works and cultural workers. This has the effect of creating a massive level of inequality known as the "superstar effect" (Rosen 1981). Although the original formulation explained stardom as an exponential function of talent, later empirical work suggests that celebrity is as much stochasticity as meritocracy (Hamlen 1991). Therefore current superstar theories focus on cumulative advantage mechanisms such as network externalities (Adler 1985) or information cascades (Salganik, Dodds, and Watts 2006) whereby random advantages become self-perpetuating. Since awards like the Oscars have beneficial career effects (Lincoln 2007), they are almost certainly a cumulative advantage mechanism for the creation of stardom in Hollywood, and by implication the generation of inequality separating the stars from lesser actors.

In this article we propose that the context of artistic labors provides an additional mechanism for explaining individual success, as measured by consecration with an Oscar nomination. The project-based nature of film implies both the proximate influence of teams and the formation of larger networks (Faulkner and Anderson 1987; Watts and Strogatz 1998; Zuckerman 2004). One's past transactions with peers may both reveal and shape the general perception of one's place in the pecking order. That is, does your having outranked Robert DeNiro in the credits of a past film imply that you are the sort of person whom all voters will take seriously? Second, films see the input of many artists, including directors, screenwriters, and co-stars, which allows us to test whether the efforts of top workers spill over onto their team members. In other words, does having Robert DeNiro as a costar make one more likely to be nominated for an Oscar? In the following sections we explore literature on status and team spillovers.

Reputation and Status

Status is important in many fields as it provides a ready rubric for actors to quickly assess potential trading partners.[1] Economists use the concept of "reputation" to describe a track record of honorable behavior and high quality output that trading partners use to estimate the possibility of fraud or incompetence (Axelrod 1980; Wilson 1985). Sociologists use the term "status" to denote a concept that is similar in that it is used by trading partners to evaluate quality but distinct in its more embedded origins in the actor's set of associations. Status may be related to more direct measures of quality but it also contains an irreducible element of charisma. Under certain conditions, underlying talent will set the seed of how others conceive of the actor, but over time measurement error and self-perpetuating dynamics of association and deference may partially decouple status from talent (Gould 2002; Salganik et al. 2006). Thus status can be an important intervening variable between talent and reward (Podolny 2001). In Hollywood actors routinely use rubrics of reputation as part of their assessments of the quality of trading partners (Faulkner and Anderson 1987; Bielby and Bielby 1994, 1999). Likewise we would expect status to color their evaluations of the quality of performances.

Status is often measured by constructing a directed graph of deferential interactions, though it is ambiguous whether such interactions directly create status or merely reflect it. While status is often measured as a social network variable, its explanatory power for outcomes does

[1] In the sense that we use it "status" means personal esteem and is conceptually distinct from Weber's discussion of status groups, although they may overlap in two senses. First, others may use ego's apparent membership in a status group to inform their estimate of ego's status. Second, membership in status groups may provide social closure and structure to social networks in such a way that has implications for ego's status.

not follow the logic of social capital flowing directly through the network. Podolny (2001) uses the contrasting metaphors of networks as pipes, through which social capital flows, and prisms, through which status is refracted. Power does not come from the continuing relationship between ego and alter but the memory of the interaction in the conceptions of others and/or from the underlying power dynamics that led alter to defer to ego. At the least directed graph centrality is an *indicator* of status, itself a latent variable, and at most it actively *creates* status as an example *pour les autres*, but whatever it may be it is not a set of persistent relations through which resources and information flow.

In Hollywood status is displayed by position in the billing block in exactly the same way that investment banks show status through placement in "tombstone" debt offerings (Podolny and Phillips 1996:463). Of course credit rank primarily represents prominence within the film, which itself reflects the casting director's assessment of star power. In addition there is an element to pure power and reputation as when Judi Dench had only eight minutes of screen time in *Shakespeare in Love* (1998) but nonetheless was one of only five names on the film's poster and won an Oscar for her performance as Queen Elizabeth I. For all professions except writers (whose credits are controlled by their union), credits are negotiated between the professional and the studio, and include not just the order of listing but such details as typeface, opening versus end credits, whether the credit appears on the screen by itself or as a "shared card credit," and even whether an actor's picture must appear on all advertising (Resnik and Trost 1996). A particularly keen point is that actors do not judge this deference in absolute terms, but according to the "most favored nation" principle that no other professional receives greater honor. For instance, a powerful Hollywood professional may not be offended at a poster with just the name

and release date of a film, but would be if that poster included the name of another professional without giving equal prominence to ego. In effect, getting higher credit listing than an alter demonstrates ego's higher status. Since rank order in credits represents both the casting director's estimate of the actor's star power and the bargaining power the actor is able to exert in negotiating rank it should be a good measure of status (or "star power") and this should be an important predictor of Oscar nomination.

H1: High-status actors are more likely to be consecrated with an Oscar nomination.

Team Spillovers

Stinchcombe distinguishes between industries in which "individual talent is clearly a complementary factor of production [whereas] in others it is more nearly additive" (1963:806). He hypothesizes that wage inequality will be greater in the former than in the latter industries. He gives the example that if Alec Guinness is thrice as talented as the typical actor, this will have a much greater effect on a film's quality than the efforts of a comparably prodigious house painter on a home's appearance. This implies that Guinness' compensation will be much higher above the median for actors than a talented house painter's compensation will be above the median for painters.[2] As predicted by Stinchcombe, the variance in salaries for academics at research institutions is greater than that at teaching institutions (Abrahamson 1973). Likewise, industries characterized by complementary productivity exhibit greater productivity when using

[2] Note that whereas Stinchcombe (1963) and related models assume that we benefit from association with high quality peers, the "weakest link" or "O-ring" theory notes that one can suffer from association with low quality peers in situations where risk-averseness is desirable so as to avoid catastrophic failure (Jacobs 1981; Kremer 1993).

incentive structures sensitive to this characteristic (Petersen 1992). Ironically, the Stinchcombe model has been forgotten by sociology contemporaneously with the widespread interest of parallel models in economics.

In economics, a literature growing out of the theory of the firm addresses the complementarity of production inputs such as physical capital, human capital, and raw (unskilled) labor (Griliches 1969). The first specification of the problem to teams of labor was Alchian and Demsetz (1972) who use the example of two men lifting an object too heavy for either to lift alone to conjecture that the productivity of a team may be greater than the sum of its parts. In parallel to these theories of the firm were concerns in labor economics beginning with a theory piece (echoing earlier arguments from sociology; Stinchcombe and Harris 1969) arguing that professional managers may have multiplicative productivity with other inputs (Rosen 1982). Since then spillover models influenced by this articulation have been used in development economics (e.g., Kremer 1993), labor economics (e.g., Battu, Belfield, and Sloane 2004), sports economics (e.g., Idson and Kahane 2000), and cultural economics (e.g., Caves 2000).

For our purposes the key implication is that "when complementarity exists between labor inputs, individual productivity may be poorly measured by treating the individual worker separately from the character of the organization, or team, within which he works" (Idson and Kahane 2000:345). In practice this should mean that workers will do their best work when they

work in the company of skilled peers.[3] This property has been exploited in several studies to use compensation as a proxy for productivity in measuring peer effects (e.g., Cardoso 2000; Idson and Kahane 2000; Battu et al. 2004). The best studies tend to be of professional sports, where fine-grained measures of both compensation and productivity are available and there are good *a priori* reasons to expect the relevance or irrelevance of peer spillovers. For instance, as expected there are strong effects of teammate skill on points per shot in basketball (Kendall 2003). This can be safely interpreted as a spillover since the effect is especially strong for position dyads with frequent interaction and is absent in basketball free throws and in baseball batting, two situations where teammates can provide no tangible assistance. Likewise, good teammates help Tour de France bicyclists reach better ranks (Torgler 2007) and German soccer players score more goals (Torgler and Schmidt 2007).

As to the particular case of films, the theoretical literature has occasionally speculated that complementarity will be important but it has yet to face an empirical test. Was Stinchcombe (1963) right that Alec Guinness dramatically improves any film in which he appears, and can we go further and say that, for instance, *Star Wars* (1977) was the highlight of Mark Hamill's career because he shared most of his scenes with the old pro? Consider the actor Robert Forster, who has had a long but mostly obscure career as a character actor appearing primarily on television

[3] Note though that spillovers can backfire if observers are conscious of these dynamics and therefore discount their estimates of the contribution of the least-skilled worker in a team, as when junior scientists receive little credit for co-authoring with laureates (Merton 1968). Furthermore some studies that find spillovers involve situations for which it is implausible to allege complementarity because work is parallel rather than collaborative, as with fruit pickers (Bandiera, Barankay, and Rasul 2005). This literature argues that social expectations of diligence are the key mechanism, with workers conforming to the locally modal level of productivity.

and in extremely low budget horror and crime films. Yet in 1998 he was nominated for the best supporting actor Oscar for the role of bail bondsman Max Cherry in *Jackie Brown* (1997). The film was written and directed by Quentin Tarantino who had previously been nominated for directing and original screenplay (winning the latter) for *Pulp Fiction* (1994). Likewise, Forster's co-stars included prior nominees Samuel L. Jackson and Robert DeNiro. That Forster's career immediately regressed to the mean after *Jackie Brown* only serves to demonstrate how much his nomination for that film benefited from Tarantino, Jackson, and DeNiro. Extreme cases like this, where a relatively unknown character actor gets nominated after working with an elite team, are rare. However, even actors who are themselves major stars may benefit from working with strong teams. For instance, Leonardo DiCaprio is an A-list actor by any reckoning but his first nomination came from collaboration with an Academy- nominated director (Lasse Hallström) and his second with Hollywood's top director (Martin Scorsese) and an Academy-nominated writer (John Logan). In this respect, we hypothesize that actors are more likely to be nominated for Academy Awards when they work with past Academy Award nominees.

H2: Actors who collaborate with elite peers are more likely to have their own contribution consecrated with an Oscar nomination.

Data

We use data from the Internet Movie Database (IMDB) to investigate the effect of collaborative context on the likelihood that a cultural worker will have his or her contributions recognized and consecrated. With these data, we construct two data sets. First, our full data set

includes all credited actors in feature-length, English-language, non-pornographic films from 1917-2005. This data set includes 247,926 actors in 44,454 films. We use this data set to calculate the covariates. Second, the analytic subset of the full data set is limited to top ten credited actors in Academy Award eligible films from 1936-2005. We use this subset as the risk set for our regression models. It describes 147,908 performances by 37,183 actors in 16,392 films.

Table 1 lists the variables to be used in the analysis. All variables are time-varying.

INSERT TABLE 1 ABOUT HERE

Academy Nomination. The dependent variable is the log-odds of an actor being nominated for an Academy Award. We count all Academy of Motion Picture Arts and Science (AMPAS) nominations from 1936 to 2005 in English language, feature length films for the categories of "Best Actor in a Leading Role," "Best Actress in a Leading Role," "Best Actor in a Supporting Role," and "Best Actress in a Supporting Role." Only actors in films deemed *eligible* by the AMPAS are considered "at-risk" of nomination. Films are considered eligible for an Academy Award if they are over 40 minutes long, meet minimal technical standards for quality, and were advertised and screened for paid admission for at least one week in a Los Angeles County commercial motion picture theater. We obtained nomination ballots listing the eligible films for all years from the AMPAS Special Collection Archives located at the Margaret Herrick Library, Fairbanks Center for Motion Picture Study in Los Angeles.

Furthermore, we consider only the top ten roles in each film to be at-risk of nomination. Although it is not unheard of for actors ranked lower than ten in the credits to be nominated, it is very rare. By limiting the sample to the top ten roles, we greatly reduce the sparseness of the event while still including 99.2 percent of the nominees for the lead categories and 95.5 percent of the nominees for the supporting categories. We have experimented with including lower ranked performances and the results are similar.

Although the first Oscars were for films released in 1927, we begin the analysis with films released in 1936 as this is when the acting awards reached their current form. In the first two years, the Academy lacked "official" nominations and only had lists of those "discussed" for the award. Furthermore, from 1927 to 1935 the Academy had only two categories for acting, "Best Actor" and "Best Actress." Additionally, there were five cases during this period where an actor's nomination was not tied to a particular film, but rather several films they performed in that year. To bracket these early irregularities we begin our analysis in 1936 with the maturation of the nomination system for the acting awards. However including earlier years in the analysis gives essentially the same results.

Each nomination is attached to one film performance. Although no one has ever been nominated in the same category for two different films in a given year, it is theoretically possible, and there have been several cases where an actor was simultaneously nominated in the lead category for one film and the supporting category for another, as with Jamie Foxx in *Ray* (2004) and *Collateral* (2004). Likewise many films have produced multiple nominations, for instance Geena Davis and Susan Sarandon were each nominated for lead actress for their performances in *Thelma and Louise* (1991).

Human Capital. At the most basic level, actors should be nominated for Oscars based on their acting ability or skill. Therefore, we incorporate two human capital measures in the model. First, we include a variable for past acting nominations received to date. Second, we include a past acting measure for the number of films the actor has been in to date. This variable is important in the literature as experienced actors are offered more jobs (Zuckerman, Kim, Ukanwa, and von Rittmann 2003). Likewise, if actresses do not impress the Academy within their first five movies, they have a slim chance of ever being nominated in the future (Levy 2003). We use a linear spline with knots at the 5^{th} and 20^{th} films to allow for actors (and especially actresses) peaking at some point and then declining. These cutpoints were determined by looking at the odds of nomination at each number of past films and noting the points at which the slope changes. Unlike most of the other variables, which are based on five-year windows, we include the actor's entire career to allow for "up or out" dynamics.

Status (Credit Centrality). Our first hypothesis is about status, as measured by centrality in a graph of deferential interactions (e.g., Podolny 1993; Benjamin and Podolny 1999). Conceptually, status for Hollywood actors should be equivalent to "star power." Centrality efficiently summarizes the actor's status as it shows not just how many peers have deferred to the actor but how high status these deferents are themselves and therefore makes status recursively transitive. Alternative measures of network power such as betweenness are inappropriate for

measuring status because deference is more important than brokerage or information flow.[4] Our measure of the actor's status is alpha-centrality, which is similar to eigenvector centrality but is more appropriate for directed graphs (Bonacich and Lloyd 2001). We assume that ties last for five years, but the variable is robust to the exact size of the window.

An alter is defined as choosing ego when ego outranks the alter in the credits of a film.[5] In other words, when you accept a position in the credits of a film, you are choosing everyone listed above you as your superior, and everyone listed below you chooses you as their superior. Centrality is distinct from ego's average rank in the credits since the key fact is not how many, but which alters ego outranks. For instance, in the film *The Godfather, Part II* (1974) the first three names in the credits are, in order, Al Pacino, Robert Duvall, and Diane Keaton. This is coded as Keaton choosing both Duvall and Pacino, Duvall choosing Pacino, and Pacino himself choosing no one. Bruno Kirby is further down the credits, so he chooses all three of the leads. Being chosen by Duvall does far more for Pacino's centrality than does his being chosen by Kirby because in the scope of the entire IMDB network, Duvall is frequently chosen by other actors whereas Kirby is only seldomly.

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[4] Even though it is inappropriate for measuring star power, betweenness could have other applications to Hollywood, with the power it implies having implications for such issues as continued ability to find work or ability to transcend typecasting.

[5] Note that we base the metric on the full sample of all credited performances rather than the analytic subsample. This allows ego to receive deference not only from lower ranked co-stars but from bit players as well which has the practical impact of greatly reducing the number of performances in the analytic subset with centrality scores at or close to zero. We have experimented with calculating centrality using only the analytic subset as a network. Centrality based on the analytic subsample has a .7 correlation with centrality based on the full sample and the two versions behave similarly in the regression models.

We validated this metric by comparing the centrality of all 328 film actors who appeared on the cover of *Entertainment Weekly* from 1997-2005 to the general population of film actors active in this period. We found that these prominent actors had much higher centrality than average, with their group mean at 1.7 standard deviations above the general mean. The only major difference between the *Entertainment Weekly* and centrality measures of stardom is that centrality favors men whereas women were equally likely to appear on the magazine cover. However since all of our models control for gender this is not a concern.

Peer Spillovers. Although the first level unit of analysis is the actor, the second-level is the film which ties actors, writers, and directors in a collaboration. Each film is measured as a unique collaboration and attaches several traits to each of its participants. Our second hypothesis centers on the credentials of the cast and crew involved in the collaboration. We test this hypothesis through specifying the number of co-stars, writers, and directors with prior nominations. We use past nominations only to avoid endogeneity. Although many actors also write and direct films, we only include past award history for the occupation the individual performs in the current collaboration. For instance, Ben Affleck has never been nominated for an acting Oscar, but he won an Oscar in 1998 for original screenplay. We thus treat Affleck as a top writer but not as a top actor. For all films Affleck wrote after 1998, the actors appearing in that film may receive a spillover for the vicarious human capital of using Affleck's writing.[6] However, an actor who co-stars in a film with Affleck (not written by him), will not receive that spillover.

[6] In fact, well after we originally wrote this speculation into early drafts of this paper, Affleck co-wrote his second screenplay, *Gone Baby Gone* (2007) and one of the actors in this film, Amy Ryan, was nominated for her performance.

Of the 37,183 actors in the analytic subset, 723 have written and/or directed at least one of the Oscar eligible films in which they also starred. This raises the question of whether an actor who is also a prior directing or writing nominee benefits from a "team spillover" by acting under his own direction or using his own screenplay, much as self-collaboration between writers, directors, and producers defines the organization of Hollywood (Baker and Faulkner 1991). In fact the ontology of self-collaboration proves to be largely irrelevant in practice as only three actors have ever been nominated for acting in films which they also wrote or directed after having previously been nominated for writing or directing: Laurence Olivier for *Richard III* (1955), Warren Beatty for *Heaven Can Wait* (1978) and *Reds* (1981), and Clint Eastwood for *Million Dollar Baby* (2004). The analysis is completely robust to dropping these three actors. In other cases, such as Orson Welles' quadruple nomination (best picture, director, original screenplay, and lead actor) for *Citizen Kane* (1941), the nominations are simultaneous and so the actor is not considered to benefit from working with a *prior*-nominated writer and director.

Controls. Since there are a fixed number of nominations available, by necessity the volume of competition is relevant to ego's chances of nomination. Therefore we control for the number of eligible films in a given award year. Likewise, we include a binary variable for actresses because there are fewer roles for women than men in Hollywood (for every performance in our data by a woman there are two by men), but the same number of nominations and awards. We further explore gender differences in Appendix A.

Since the Academy seems to prefer certain genres, we include a set of control dummies for the genres of drama, biography, and comedy (Levy 2003:148).[7] Note that in the IMBD genre codes are not mutually exclusive and most films have multiple genres so, for instance, many so-called dramas are really hybrids of drama and other genres. We include a binary variable indicating that a major firm controlled the film's first-run American distribution rights. These firms include all variations and subsidiaries of Viacom/Paramount, Metro-Goldwyn Mayer/ Loew's, Fox, Warner Bros., Radio-Keith-Orpheum, Sony/Columbia, Disney, United Artists, MCA/Universal, and Orion (Compaine and Gomery 2000; Vogel 2001). The variable describes which company distributed the film to theaters and advertised it. Especially in recent decades this company may not have originally produced the film, but only purchased or licensed it. Release date is measured as day of the year for the Los Angeles or general release of the film.[8]

Since films with larger budgets have more resources they may be more likely to be noticed by the Academy and thus ideally we would include budget as a control. Unfortunately studios are loath to release budget figures and so the IMDB has enormous levels of missing data for this variable. The IMDB has budget data for about 10 percent of our "eligible films" and a cursory spot-check shows that many expensive films have missing data and thus it would be inappropriate to impute values of zero. We experimented with including the budget variable by

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[7] We experimented with including the full set of IMDB genre codes and it had no impact on the results. Likewise, we also experimented with specifying MPAA ratings and month of release to no effect. These specifications are available on request.

[8] The IMDB is missing release date for 3% of Oscar-eligible films. In these cases we imputed values by drawing from a uniform distribution. This imputation introduces measurement error which should raise the standard error of release date slightly but leave the coefficient and effects on other variables essentially the same.

first using the Bureau of Labor Statistics Consumer Price Index deflator to make figures comparable across years and then breaking the variable into a dummy set of quartiles with missing data as the omitted category. Including this dummy set in our models did not appreciably change the other effects. As suggested by the fact that the most expensive films in the data are historical epics like *Cleopatra* (1963), large casts are expensive. Since the IMDB data on credited roles is much higher quality than its budget data, we use cast size as a proxy for budget in the presented models. Likewise the major distributor variable helps proxy for budget and the restriction to eligible films screens out most truly obscure and tiny films. Results including the budget dummy set are available on request.

Analysis and Results

We are attempting to predict which performances will be nominated for an Academy award for acting. In all models the log-odds of an Oscar nomination is the outcome and the unit of analysis is the performance with the universe constrained to the top ten credited roles in Oscar eligible films. To the extent that one is interested in an actor being nominated for an Oscar in a time period (rather than a film), one can conceive of this paper as estimating nomination given the prior condition that one appears in the top ten roles of a non-obscure film. An outcome approximating this precondition is modeled in Zuckerman et al. (2003).

Table 2 presents a correlation-variance-covariance matrix for the variables used in the models. As previously mentioned, this subsample of eligible nominees includes 147,908 performances by 37,183 actors in 16,392 films.

INSERT TABLE 2 ABOUT HERE

From 1936 to 2005 there were a total of 1,326 nominations and 279 wins; therefore a bit under one percent of at-risk performances are nominated and it is even rarer to win. Out of the 1,326 post-1936 nominations, 766 actors had at least one nomination. Meryl Streep has the most nominations (13) and Katherine Hepburn has the most wins (4).

An issue that complicates our modeling is that performances are not independent but exhibit cross-classified clustering with our 147,908 performances containing multiple observations of our 37,183 actors and 16,392 films. Ideally we would have modeled both types of autocorrelation. Unfortunately this is unfeasible since observed combinations of the classes are extremely sparse with any given actor appearing in less than one percent of all films and any given film having less than one percent of all actors in its cast. Such a data structure makes any analysis that would attempt to fully account for all auto-correlation under-identified. Therefore we are forced to settle for approximation and triangulation.

We experimented extensively with various specifications. First, we alternated between random effects by film or by actor. Second, we alternated between specifying random effects by one class and bootstrapping on the other. The results were largely robust with effects maintaining direction and significance across specifications, though of course parameters associated with a class decreased in significance slightly when random effects are specified for that class. As all results are basically consistent regardless of how and by what class we model auto-correlation, we focus on presenting results for models with random effects for film. We settle on this specification for two reasons. First, very little auto-correlation is associated with actors but a

moderate amount is with films. Second, since our key hypothesis treats human capital, a set of actor-level traits, as a theoretical baseline, and peer spillovers, a set of film-level traits, as the object of our most novel hypothesis, this specification gives a conservative bias to our hypothesis testing. Were a perfect estimation possible, it would probably leave the effects of film-level parameters (e.g., peer spillovers) unchanged and slightly reduce the effects of actor-level parameters (e.g., human capital). Alternate specifications are available on request.

We begin our analysis in table 3 with a nested set of models that introduce new sets of variables:

Model 1: controls + film random effects

Model 2: controls + human capital + film random effects

Model 3: controls + human capital + status + film random effects

Model 4: controls + human capital + status + peer spillovers + film random effects

Please see Appendix A for a variation on model 4 that splits the sample by gender and models lead vs. supporting nominations as competing risks; Appendix B for a model that distinguishes between writers who worked openly vs. through "fronts"; and Appendix C for a model that allows key variables to interact with period.

Results from the baseline model are presented as model 1. The effects of each of these control variables are strong and in the predicted direction. An actor is most likely to be nominated in a year with few films per year, and thus few other actors competing for nominations, likewise female actors have a better chance of being nominated for any given role than males since there are fewer roles and thus less competition for a fixed number of nominations. Actors are also most likely to be nominated for films that are are dramatic and/or

biographical in genre and were released late in the year. These baseline effects maintain their strength and direction in all subsequent models. Performances in films distributed by major studios are much more likely to be nominated. However unlike the female and dramatic genre effects, the benefit of major studio is attenuated (although still strong) as more variables are introduced in successive models. This implies that much, but not all, of the reason that major studio films accrue disproportionately more acting nominations is because they recruit top actors and put them in teams with other elite workers.

INSERT TABLE 3 ABOUT HERE

Model 2 adds human capital variables to the baseline. The acting experience variable is specified as a linear spline so the coefficients should be read as marginal but cumulative. For instance to calculate the effects of experience for an actor who has worked on seven films, multiply the "past films 0-5" coefficient by five and multiply the "past films 6-20" coefficient by two and take the sum of these two multiples. As expected from previous research (Levy 2003; Zuckerman et al. 2003), the odds of Oscar nomination increase with the actor's experience in the film industry up to a point then level off and eventually decline slightly. Although these results are based on a spline, similar results obtain if one specifies experience as a quadratic or a dummy set. A history of Academy nominations strongly predicts future Academy nominations, an illustration of Merton's (1968) Matthew Effect. Ideally, we would be able to perfectly model stable aspects of human capital with fixed-effects but because of the nature of the dependent variable this would severely constrain the scope of the analysis and the interpretation.

Nonetheless as discussed several paragraphs below we use fixed-effects as a robustness check and arrive at similar results.

Model 3 adds in asymmetrical centrality in the credit network (which is a measure of status). Credit centrality strongly predicts nomination, supporting hypothesis 1. A one standard deviation increase in credit centrality is roughly equivalent to having a major film distributor and a two standard deviation increase is equivalent to having a prior nomination. Of equal note is that "past films 0-5" now drops out and remains out in all subsequent models (and similarly alternate specifications of age also drop out against status). We interpret this not as experience being a spurious effect of centrality but of centrality mediating the effects of experience. If there are two actors who both start out playing small roles and one remains a character actor whereas the other moves up to playing leading roles (with respectable supporting co-stars) then they will have the same amount of experience but the persistent character actor will have much lower centrality than the actor who is now taking leading roles. However since few actors debut into starring roles it is meaningful to think of experience as providing the opportunity for increasing status (as measured by centrality), or to view it more substantively, as the development of "star power." Unfortunately the IMDB lacks detailed data on other dimensions of actor quality such as dramatic training, diction, or physical attractiveness. However if such aspects of actor quality were available, we speculate that their effects would also be largely mediated by the intervening variable of status or "star power." Being a prior Oscar nominee still has a large effect when credit centrality enters the model, but this is consistent with our interpretation since having a prior Oscar nomination is conceptually very similar to credit centrality. In both cases ego's fellow

actors are acknowledging ego's star power as someone who deserves the deference of outranking other actors in the credits or being honored with an Oscar nomination.[9]

In model 4, we add spillover effects from collaborating with prior-nominated workers.[10] Elite co-stars, writers, and directors all significantly affect an actor's likelihood of being nominated net of the focal actor's human capital and status. This supports hypothesis 2, which predicted that top peers would make one more likely to be nominated. The model's results show that it is good to work with an elite team but does not reveal the mechanisms behind this pattern. Writers, directors, and co-stars likely vary in how they can contribute to the actor's consecration. The most basic distinction should be between spillovers offered by co-stars and those from behind-the-camera talent. Co-stars can potentially offer chemistry through the interaction of the performance. Directors and actors may have a relationship parallel to that of orchestra conductors and their musicians in which musicians expect the conductor to not only have technical competence at music but a clear ambition and ability to communicate it (Faulkner 1973). Writers provide both the story within which the actor's performance is situated and the

[9] Since status is measured through social networks and Oscar nominations are determined by (a subset of) peers, an alternative interpretation of centrality might be that it is not measuring status but connection to voters. However we experimented with using nominations for the Golden Globes (which are not a peer award) and the results were similar. Likewise our results were robust to treating recent collaborations with prior nominees as a proxy for network ties to the Academy. Thus we can state with a fair degree of certainty that our findings of status and spillover effects are not spurious effects of past collaboration ties to the nominating peers. To use Podolny's (2001) terminology we are certain that our "prisms" are not really "pipes."

[10] To test for changes associated with changes to Hollywood's organization over time we experimented with an alternative to model 4 that interacts the key effects with period. The status effect and spillovers from writers and directors are appreciable and statistically significant in all periods, although spillovers from co-stars are not significant in the blockbuster era (post-1975).

dialogue that is constitutive of it – the more plausible these are the greater the room for the actor's performance. Finally, elite collaborators regardless of occupation will attract attention and legitimacy to the film. In Appendix B we use the blacklist as a natural experiment to explore the distinction between spillovers of prestige and of talent. That analysis is inconclusive but it suggests that even secret collaborations can have substantial spillovers and thus (at least for writers) spillovers are mostly of talent rather than prestige. Note though that writers lack any direct equivalent to either actor marquee value or director auteurship.

The greatest spillover coefficient is for directors, but this is in part because a film can only have one Oscar-nominated director but several Oscar-nominated writers. Furthermore the Academy has just one directing award but two categories for writing (and between 1940 and 1956, three categories) so any given directing nomination may signify greater talent and prestige than any given writing nomination. Indeed, when one takes into account the range of the variables the effects of directors and writers are more comparable, though directors remain more important. Co-stars have less of an effect than writers and directors. This distinction appears to be because co-stars provide both spillovers and competition and these partially cancel out. This interpretation is supported by Appendix A, where we treat lead and supporting nominations as competing risks and show that prior-nominee co-stars are very beneficial for supporting nominations but a wash for lead nominations.

To help get a sense of how the effects work together, we compared the effects in model 4 at the median to that at the 95th percentile for several of the variables. [11] Holding everything else constant, such a boost in credit centrality increases the log-odds by .55. Changing centrality as well as acting experience and ego's prior Oscar nominations increases the log-odds by 1.38. In other words, the median performance in the median film has about a 0.58% chance of being nominated whereas an exceptional actor appearing in the same film has about a 1.00% to 2.26% chance of being nominated. For an actor with a prior nomination, high centrality, and exactly five prior films, the predicted probability is about 5.34% if the actor appears in the median film. If we contrast a median actor in a median film to a similar actor in a film at the 95th percentile for peer spillovers (with the film being otherwise at the median) the predicted probability shifts from about 0.58% to 4.42%. Finally, if we place an exceptional actor in a film with exceptional spillovers this increases the log-odds by 4.00, for a predicted probability of about 24.16%. Thus spillovers matter about as much as the observed aspects of individual status and accomplishment.

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[11] Although we can say precisely how much a change in values shifts the log-odds, it is more difficult to say what the change in the predicted probability will be since assuming the a random effect of zero gives predicted probabilities that are an order of magnitude lower than the empirical nomination rate of 0.9% for the performances in the analytic dataset. To estimate an adjustment we generated models with and without the random effects (which had similar coefficients but different intercepts) and created predictions where all traits are at the median. The difference between the two predictions was 2.02 on the logit scale and we found that adding this figure to the model 4 predictions gives more reasonable predicted probabilities. This adjustment is for the illustrative purpose of calculating the predicted probabilities only with the intercept and all other figures in the regression tables being unchanged. Absent the adjustment there would be no ordinal change in the predicted probabilities but all of them would be much lower (indeed implausibly low).

Further note that the proportion of the binary variable “drama” is just barely over .5 and so the median is one. If the vignettes instead assume a value of zero for “drama” the predicted probabilities will be much lower.

However since good actors with weak spillovers and weak actors with good spillovers both have weak chances of getting nominated, it is really most appropriate to say that an actor needs both exceptional personal status *and* exceptional spillovers to have an appreciable chance at an Oscar nomination. Another way to read this is that exceptional actors are most likely to be nominated when they work with exceptional peers, a theme to be explored in model 5.

In model 5, we present fixed effects models by actor as a robustness check against the error modeling strategy used in models 1-4 of specifying random effects for film.[12] Fixed effects models allow each actor to have a different intercept, fully accounting for any stable characteristic of the actor and thus excluding the possibility of omitted variable bias for any stable trait of the actor. However fixed-effects models can only estimate off cases with variance in the outcome. Thus fixed effects models can not simply ask the question addressed in models 1-4, "what aspects of films and actors get a performance nominated for an Oscar?" but rather the narrower question of "among those actors who at some point are nominated for an Oscar, what were the traits of the films for which they were nominated?"

INSERT TABLE 4 ABOUT HERE

Model 5 is similar to model 4 but to avoid colinearity and perfect prediction problems with the fixed-effects it is limited to actors with at least one nomination. Likewise, to avoid regression to the mean issues, actors are dropped after their first nominations and the model omits the number

[12] In addition we experimented with a model using fixed-effects by film and substantive independent variables by actor. This model has a similarly constrained interpretation but it confirms that status is a strong predictor.

of prior films spline.[13] The film-level effects in model 5 are consistent with those in model 4. Hypothesis 1 continues to be supported, despite the fact that the fixed-effects capture all stable aspects of the actor – including those that we lack measures for. If centrality were entirely reducible to fixed or fairly stable traits like physical attractiveness it would have no effect net of the fixed-effect. That a large centrality effect persists is consistent with our interpretation of individual talent as providing the opportunity for the development of star power which in turn is what directly affects the likelihood of consecration.

We argue that between status and actor fixed-effects we are capturing all of the fixed and much of the time-varying aspects of actor star power. Therefore the parsimonious explanation for the remaining effects for film-level variables is that they are real and not reducible to selectivity effects such as the sorting of good actors to work with good teams. In particular, as predicted by hypothesis 2, it remains very beneficial to work with elite co-stars, directors, and writers. The consistency of the film-level results whether one models substantive actor traits (and film random effects) or actor fixed-effects give us strong confidence that the results are robust to specification. Despite the very different specifications in both cases we see that actors are most likely to be nominated for Oscars when they both have high status and are working with an elite team.

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[13] Since we limit the analysis to first nomination we must omit the "ego's prior nominations" variable. Likewise, we omit the acting experience variables because when the population is limited to only actors who experience nomination and they exit after their first nomination, the acting experience variables have no substantive interpretation but behave as a countdown to the inevitable event. This can be conceived of as a special case of a survival analysis with no censoring and where age is a predictor variable.

Conclusion

This paper finds that both personal and contextual level factors shape an actor's chances of being culturally consecrated. At the level of the actor, we find strong effects for status, as measured by centrality in the asymmetric network of screen credits. Our interpretation is not that members of the Academy acting branch are actually tallying who outranks who in screen credits, let alone calculating eigenvectors, but rather that credit centrality is an efficient summary of status or star power. Furthermore, since centrality renders experience insignificant and remains strong with actor-fixed effects, we interpret status as mediating the effects of more tangible talents and accomplishments. This is consistent with some of the cumulative advantage literature which argues that status is endogenous and partially autonomous from objective quality (Gould 2002; Salganik et al. 2006).

At the contextual level we find that the prestige and merits of a film actor's collaborators, particularly the writer and director, greatly increase her own chance of recognition. Collaborations are ubiquitous in many fields, as is well-noted in the networks literature since most large public datasets use collaborations to measure ties. However with few exceptions (e.g., Uzzi and Spiro 2005) this is often treated as a nuisance rather than a source of intrinsic interest. In this paper we show that the immediate collaborative context is an important determinant of individual accomplishment. This finding ties into a growing economic literature and a dormant sociological literature on intra-team spillovers (e.g., Stinchcombe 1963; Saint-Paul 2001).

Parsing out exactly *why* it is beneficial to work with good peers is difficult. Most of the literature has assumed that it is an effect of skill complementarities. For complex collaborations where it is difficult to measure individual effort parsing out each worker's marginal contribution

of value becomes an intractable problem. Therefore each worker's productivity is in part determined by the aggregate production and if top workers bring up this aggregate then all team members benefit (Alchian and Demsetz 1972). An alternative interpretation would be to view spillovers as about prestige and reputation rather than entirely of skill and talent. That is, the actor's immediate collaboration may give the particular performance legitimacy in much the same way that the actor's long-term pattern of association reflect and/or constitute the actor's status. We can return to our familiar case of Robert Forster as an example. The conventional skill spillover interpretation would be that Forster benefitted from working with Tarantino because it meant he finally got to work with a decent script. In contrast the prestige spillover interpretation would be that first, Academy members figured that if Tarantino chose to work with Forster then Forster must be a diamond in the rough and second that Tarantino's fame meant that, unlike most of Forster's films, Academy voters actually saw *Jackie Brown* (1997). Unfortunately it is almost impossible to cleanly identify spillovers of skill versus those of prestige and so the distinction must remain speculative until some future study disentangles them. Our analysis in Appendix B suggests that spillovers are mostly of skill but the numbers involved are too small to be conclusive. While the micro-mechanisms of spillovers are not entirely understood, such a lacunae should not obscure the basic finding that spillovers matter.

Since collaborations with high-quality peers help determine an individual's success, the process by which collaborations form is an important intervening mechanism for individual life-chances. In the period from the Second World War to the mid-1970s, it may have been adequate to note that there was a persistent wage premium to "core" workers at large capital-intensive employers over "periphery" workers of smaller firms (Beck, Horan, and Tolbert 1978; Katz,

Summers, Hall, Schultze, and Topel 1987). However in the post-industrial economy, large firms are still important, but increasingly less so as work is increasingly flexible and organized around teams rather than firms (Hollister 2004; Lazear and Shaw 2007). Under such decentralized conditions a mechanism for inequality is not so much *for* whom, but *with* whom a worker will labor.

Much of the theoretical and empirical literature in economics emphasizes matching of workers by skill (Kremer 1993; Saint-Paul 2001), with matching in marriage markets being a common analogy (Becker 1973). Most of these models predict that high quality labor inputs will not only sort together but attract the best inputs of other kinds, such as cheap access to finance capital. In such circumstances such homogenously excellent teams will see success greater than the sum of their individual excellence, and likewise homogenously mediocre teams will see failure greater than the sum of their individual mediocrity. As predicted, corporate demography compatible with sorting workers into firms by productivity highly predicts inequality (Sørensen and Sorenson 2007).

While team sorting is fairly unfamiliar to the recent sociology literature it is closely analogous to the residential segregation literature. Neighborhood effects are directly or indirectly emergent from the neighbors themselves (Massey and Denton 1993). When one lives among the affluent one has access to their social capital, the labor markets and consumer amenities created by their entrepreneurship and consumption, state benevolence ensured by their political power and tax base, rising property values brought on by the desire of others to enjoy such pleasant company, and various other positive externalities. In contrast, living among the impoverished implies not only a vacuum of such desirable features, but exposure to crime. Just as sociology

has long recognized that our neighbors expose us to externalities, we ought to extend this understanding to our co-workers. Likewise, as sociology has recognized that it follows that sorting into neighborhoods is an important intervening mechanism for life-chances, so should we understand sorting into work teams.

Several sociological studies have examined team formation in Hollywood and found extremely strong evidence of sorting among writers, producers, directors, cinematographers, and actors (Faulkner and Anderson 1987; Zuckerman 2004). Furthermore, there is evidence that sorting is partially mediated by both brokerage and ascribed characteristics (Bielby and Bielby 1999, 2002). More generally, by studying both how advantaged collaborations form and what benefits they accrue, one can ultimately explain the distribution of resources through many fields and industries. Indeed, the sorting and spillover mechanism may even be able to explain the third-world poverty trap (Kremer 1993). From our perspective, there is a very good reason that Academy Award acceptance speeches are so long—they should be because an actor's collaborators are largely responsible for his achievement. Likewise, if the rest of us had occasion for acceptance speeches, due humility would suggest a similar practice.

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Table 1. Variables to be used in the analysis

Variable		Mean	Std. Dev	Range
Oscar nomination	performance was nominated for an Oscar	0.009	0.094	[0, 1]
Film	id # of film in which the performance occurs, level-two cluster variable	n/a	n/a	[1, 16,392]
Baseline variables				
Year	year of release for the film	1967	21	[1936, 2005]
Films per year	# of Oscar eligible films released in year (in 100s)	2.633	0.934	[1.21, 4.3]
Genre: Drama	IMDB genre codes include "drama"	0.508	0.500	[0, 1]
Genre: Comedy	IMDB genre codes include "comedy"	0.318	0.466	[0, 1]
Genre: Biography	IMDB genre codes include "biography"	0.027	0.164	[0, 1]
Major distributor	film's first-run American theatrical release was by a major studio	0.690	0.463	[0, 1]
Cast size	# of credited actors in the film	24.621	18.026	[1, 382]
Release date	date (in year) of film's general or Los Angeles premiere	191.261	103.488	[1, 366]
Female	performance was by an actress	0.301	0.459	[0, 1]
Human Capital				
Past Films 0-5	linear spline 0-5, number of films the actor has been in prior to year	3.647	1.960	[0, 5]
Past Films 6-20	linear spline 6-20, number of films the actor has been in prior to year	6.374	6.601	[0, 15]
Past Films >20	linear spline 21 and up, number of films the actor has been in prior to year	8.443	21.058	[0, 248]
Past nomination	actor is a prior Oscar nominee	0.084	0.277	[0, 1]
Status (Credit Centrality)	actor's asymmetrical centrality in the network of credits over the prior five year period	81.743	14.246	[0, 100]
Spillovers				
Co-stars with past nominations	co-stars with prior Oscar nominations for acting	0.703	0.993	[0, 8]
Director with past nominations	director has prior Oscar nomination for directing	0.117	0.322	[0, 1]
Writers with past nominations	writers with prior Oscar nominations for writing	0.231	0.514	[0, 4]

Table 2. Correlation-Variance-Covariance Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Oscar nomination	**0.01**	0.00	0.00	0.00	0.00	0.00	0.06	0.57	0.00	0.01	0.02	-0.01	0.00	0.05	0.01	0.00	0.00
2. Films per year	-0.03	**0.87**	-0.04	-0.05	-0.01	-0.02	-6.81	-3.17	-0.01	0.31	1.41	4.26	-0.02	2.97	-0.16	-0.02	-0.01
3. Genre: Drama	0.07	-0.09	**0.25**	-0.08	0.01	0.01	0.78	2.27	0.01	-0.06	-0.25	-1.00	0.01	-0.34	0.08	0.02	0.02
4. Genre: Comedy	-0.02	-0.12	-0.32	**0.22**	-0.01	0.02	1.47	0.21	0.01	0.01	-0.05	-0.42	0.00	0.55	0.01	0.00	0.00
5. Genre: Biography	0.05	-0.03	0.12	-0.08	**0.03**	0.00	0.35	0.61	0.00	0.00	-0.01	-0.06	0.00	0.04	0.01	0.00	0.00
6. Major distributor	0.04	-0.05	0.04	0.08	0.03	**0.21**	1.23	0.96	0.00	0.06	0.08	-0.41	0.01	1.11	0.08	0.02	0.03
7. Cast size	0.03	-0.40	0.09	0.18	0.12	0.15	**324.94**	101.65	0.12	-2.04	-16.24	-63.57	0.26	30.09	2.84	0.40	0.35
8. Release Date	0.06	-0.03	0.04	0.00	0.04	0.02	0.05	**10709**	0.28	-4.85	-9.43	-41.18	0.89	-1.94	7.36	2.39	2.34
9. Female	0.04	-0.03	0.03	0.05	0.00	0.00	0.01	0.01	**0.21**	-0.11	-0.53	-1.59	0.01	-0.39	0.01	0.00	0.00
10. Past Films 0-5	0.03	0.17	-0.06	0.01	-0.01	0.07	-0.06	-0.02	-0.12	**3.84**	8.63	11.43	0.11	17.10	0.16	0.01	0.05
11. Past Films 6-20	0.03	0.23	-0.08	-0.02	-0.01	0.03	-0.14	-0.01	-0.17	0.67	**43.57**	72.83	0.48	47.21	0.35	0.03	0.16
12. Past Films >20	-0.01	0.22	-0.10	-0.04	-0.02	-0.04	-0.17	-0.02	-0.16	0.28	0.52	**443.45**	0.79	74.60	-0.42	-0.07	0.00
13. Past nominations	0.13	-0.07	0.06	0.01	0.03	0.07	0.05	0.03	0.05	0.20	0.26	0.13	**0.08**	0.74	0.04	0.01	0.02
14. Status (credit centrality)	0.04	0.22	-0.05	0.08	0.02	0.17	0.12	0.00	-0.06	0.61	0.50	0.25	0.19	**202.96**	1.45	0.23	0.58
15. Co-stars with past nominations	0.06	-0.17	0.15	0.03	0.07	0.18	0.16	0.07	0.02	0.08	0.05	-0.02	0.16	0.10	**0.99**	0.09	0.13
16. Director with past nominations	0.09	-0.05	0.13	-0.02	0.09	0.14	0.07	0.07	0.01	0.02	0.02	-0.01	0.11	0.05	0.27	**0.10**	0.04
17. Writers with past nominations	0.05	-0.02	0.09	0.02	0.06	0.14	0.04	0.04	0.01	0.05	0.05	0.00	0.11	0.08	0.26	0.27	**0.26**

TABLE 3

LOGISTIC REGRESSION MODELS OF ACADEMY AWARD NOMINATIONS, 1936 - 2005

	MODELS			
VARIABLE	1	2	3	4
Baseline				
Films per year (100s)	-0.287 ***	-0.272 ***	-0.400 ***	-0.390 ***
	(0.056)	(0.058)	(0.060)	(0.062)
Genre: Drama	2.127 ***	2.062 ***	2.109 ***	1.936 ***
	(0.125)	(0.128)	(0.131)	(0.134)
Genre: Comedy	0.004	-0.022	-0.046	-0.030
	(0.110)	(0.113)	(0.115)	(0.117)
Genre: Biography	1.311 ***	1.277 ***	1.311 ***	1.144 ***
	(0.172)	(0.175)	(0.179)	(0.180)
Major distributor	1.125 ***	0.952 ***	0.847 ***	0.544 ***
	(0.117)	(0.120)	(0.123)	(0.126)
Cast size	0.004	0.003	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Release date	0.007 ***	0.006 ***	0.007 ***	0.006 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Female	0.849 ***	0.837 ***	0.873 ***	0.864 ***
	(0.062)	(0.068)	(0.069)	(0.069)
Human Capital				
Past Films 0-5		0.144 ***	0.023	0.025
		(0.026)	(0.029)	(0.029)
Past Films 6-20		0.016 *	0.005	0.005
		(0.008)	(0.008)	(0.008)
Past Films >20		-0.007 **	-0.008 **	-0.008 **
		(0.002)	(0.002)	(0.002)
Past nominations		1.904 ***	1.774 ***	1.739 ***
		(0.078)	(0.079)	(0.081)
Status (Credit Centrality)			0.049 ***	0.047 ***
			(0.005)	(0.005)
Spillovers				
Co-stars with past nominations				0.163 ***
				(0.041)
Director with past nominations				1.224 ***
				(0.110)
Writers with past nominations				0.359 ***
				(0.075)
Intercept	-10.134 ***	-10.999 ***	-14.177 ***	-14.083 ***
	(0.286)	(0.308)	(0.490)	(0.497)
ρ_{film}	0.538	0.542	0.556	0.550
Log Likelihood	-6148.926	-5670.363	-5619.257	-5502.304

NOTE. *N performances* = 147,908. N films = 16,392.
Standard errors in parentheses.
* $P < .05$, ** P < .01, *** P < .001, two-sided z-tests.

TABLE 4

LOGISTIC REGRESSION MODEL OF CONTEXT OF ACADEMY AWARD NOMINATIONS AMONG THOSE ACTORS NOMINATED AT LEAST ONCE, 1936-2005 WITH ACTOR FIXED-EFFECTS

VARIABLE	5
Baseline	
Films per year (100s)	-0.536 ***
	(0.095)
Genre: Drama	1.377 ***
	(0.154)
Genre: Comedy	-0.077
	(0.135)
Genre: Biography	0.691 ***
	(0.188)
Major distributor	0.146
	(0.145)
Cast size	0.004
	(0.003)
Release date	0.004 ***
	(0.000)
Status (Credit Centrality)	0.098 ***
	(0.012)
Spillovers	
Co-stars with past nominations	0.134 **
	(0.044)
Director with past nominations	0.735 ***
	(0.115)
Writers with past nominations	0.162 *
	(0.079)
Log Likelihood	-975.864

NOTE. N= 6,655 performances by 624 actors. Standard errors in parentheses.
Because of the perfect prediction problem, only actors who are nominated at least once are included.
For the same reason, the variables female, past nomination, and the "past films" spline had to be omitted.
* $P < .05$, ** $P < .01$, *** $P < .001$, two-sided z-tests.

Appendix A: A More Nuanced Version of the Oscar Nomination Event

While in the main narrative of this paper we modeled the odds of Oscar nomination as a single event for a single population, there are really two populations, each of which faces two competing events. Men do not compete with women for Academy acting nominations so it is appropriate to split the sample by gender. This not only makes the model more realistic, but it effectively allows an interaction between gender and every other independent variable allowing one to see whether artistic achievement is defined by different criteria for men and women (Simonton 2004) and whether men and women face different career dynamics (Levy 2003; Lincoln 2007). Furthermore, there are two types of nomination: lead and supporting. There is no firm *a priori* basis for distinguishing "lead" vs. "supporting" performances and indeed, the Academy has nominated performances for what is intuitively the "wrong" category on several occasions (Levy 2003:81-85). Thus the most realistic model is to treat supporting and lead nominations as competing events for which all subset performances of the appropriate gender are eligible. In addition to these fundamentally empirical concerns such an approach can help illuminate the robustness and contingencies of our theoretical concerns.

Model A1 does this for men and model A2 for women. Both models use multinomial logit with random effects by film specified within the gllamm (Generalized Linear Latent And Mixed Model) module for Stata (Rabe-Hesketh, Skrondal, and Pickles 2004; Rabe-Hesketh and Skrondal 2005). Since similar unobserved aspects of films should be relevant to both the lead and supporting outcomes, we constrain the model to a shared random effect for both outcomes to avoid giving excessive weight to a random intercept in a model with rare events. The results are presented in table A.

INSERT TABLE A ABOUT HERE

The more realistic equivalent to model 4 shown in models A1 and A2 is largely consistent with the flatter version. A few specific comparisons are worth noting. In the simpler version of the same analysis presented in model 4, all experience effects were mediated by status except for an "aging out" effect. In the more complex analysis presented here this effect only applies to men's chances at lead roles. This contrasts with findings from the literature that aging women are especially prone to be shunted aside (Levy 2003; Lincoln and Allen 2004; Simonton 2004). The discrepancy between the literature and our findings probably has two sources. First, effects of women's career trajectories may be mediated by the variables in our specification, such as status. Second, the literature has tended to focus on first nomination and older women who get nominated are more likely than older men to already be prior nominees.

Major distributors are important for both genders, but especially for men, implying that women are less disadvantaged by appearing in small pictures, which is consistent with the finding that best picture nominations are more highly associated with nominations for best actor than best actress (Simonton 2004). Credit centrality and previous nomination are associated with nominations in both categories, but the effect is particularly strong for leading nominations, suggesting a career trajectory where character actors graduate to being moderately high status and finally to being at the pinnacle of Hollywood.

The most important deviations from model 4 found in models A1 and A2 are in spillovers. Working with elite writers and directors are equally important for men and women and lead and supporting nominations. The difference comes in considering spillover effects from Academy-nominated co-stars. Having prior-nominated co-stars has no effect on the odds of

getting a lead nomination. However for both men and women, elite co-stars are very beneficial for getting a supporting nomination. Although the coefficient appears to be the same size as the writer effect and smaller than the director effect, when one considers the distributions of the variables the total effect of co-stars is closer to that of the director. The distinction in the effect on the two outcomes is probably that elite co-stars are competition for the lead nomination, counter-balancing any positive spillovers they might provide, whereas in terms of going for a supporting nomination there is no downside to appearing alongside a prestigious co-star. Robert Forster appears to exemplify this dynamic as despite having more screen time in *Jackie Brown* (1997) than either of his prior nominee co-stars (Robert DeNiro and Samuel L. Jackson), Forster was nominated for best *supporting* actor.

Appendix B: The Hollywood Blacklist as a Natural Experiment in the Nature of Spillovers

In 1947 the House Committee on Un-American Activities (HUAC) held hearings on alleged Communist propaganda in Hollywood. Ten screenwriters served jail time for contempt of Congress because they refused to either testify or invoke the fifth amendment defense against self-incrimination. (They claimed that the first amendment right to free association implied a right to keep political affiliations a secret, a legal theory which the courts had rejected). This episode sparked the Hollywood blacklist in which right-wing social movements, HUAC, and the studios cooperated to identify Hollywood workers who had ever associated with the Communist Party or Communist front organizations and prevent them from working in Hollywood.[1] Blacklisted workers could only be reaccepted by the Hollywood mainstream if they publicly recanted and accused specific others with whom they had been associated in the past (Navasky 1980). With such notable exceptions as nine of the Hollywood Ten, few Hollywood workers were still associated with the Communist Party by the late 1940s. Nonetheless, many people who were former members or fellow travelers were blacklisted when they refused to testify on a point of principle.

The blacklist was particularly severe for writers because of all the workers in Hollywood, writers were the most likely to have associated with the Communist Party during the Popular

[1] During the Popular Front period (1934-1939) the Communist Party made common cause with liberals and progressives on such issues as labor disputes, race relations, and anti-fascism. Much of this cooperation occurred in front organizations whose leadership were mostly Communist Party members or fellow travelers but with liberal rank and file members who were often ignorant of the front organization's Communist affiliation. During the blacklist, right-wing social movements collected names from old petitions sponsored by these front organizations and many liberals who never had any direct connection to the Communist Party were thereby blacklisted.

Front period (Radosh and Radosh 2005). However, while the blacklist disproportionately affected writers, the experience of being blacklisted was potentially less severe for a writer than an actor since it was possible (albeit difficult) for blacklisted writers to work secretly, either by adopting a fictitious pseudonym or by having a real person (usually either a friend of the writer or a relative of the producer) act as a "front" for the writer (McGilligan and Buhle 1997; Buhle and Wagner 2004). For instance, Dalton Trumbo maintained a prolific output during the blacklist by working through six different fronts, two of whom won Oscars on his behalf. After each of these nominations Trumbo began working with a new front to avoid suspicion.

Although it is difficult to prove conclusively, it seems that the specific identity of fronts and pseudonyms were *not* common knowledge if for no other reason than a well-organized anti-Communist social movement which included former FBI agents and other investigators was enforcing the blacklist and would have publicized and punished indiscreet fronts. Furthermore, there are telling coincidences. For example, *Hellcats of the Navy* (1957) starred Ronald Reagan and was made during the period in which Reagan was touring the country to give speeches against Communism to workers at General Electric factories. It is hard to believe that Reagan would have made the film if he knew that the film's screenwriter "Raymond T. Marcus" was really a pseudonym for Bernard Gordon, who was blacklisted after he was named in HUAC hearings as a former member of the Communist Party. Thus it seems that the efforts of blacklisted writers to earn a living by working under assumed names provides a natural experiment as to the nature of spillovers since these writers could only offer their talent but not their prestige to the actors who appeared in their films.

Between 1986 and 2000, the Writers Guild of America made strenuous efforts to document the front system and reallocate screen credits to the blacklisted writers who actually contributed to these films (Writers Guild of America 2000). Based on this research we identified 29 films in which a screenwriter with a prior Oscar nomination contributed to a film under a pseudonym or using a front. We then decomposed the variable "writers with past nominations" variable into writers working under their own names and writers using fronts or pseudonyms. If spillovers are mostly of prestige there should be no benefit from working with elite but uncredited writers, but if spillovers are mostly of talent then the variables should have comparable effects. Finally we limited the data to the period of the blacklist (1948-1972) and reran our fully-specified random effects model.[2]

INSERT TABLE B ABOUT HERE

The coefficients for spillovers from "open" and "secret" contributions are similar, and in fact that of "secret" contributions is larger. However because so few films involved secret contributions by writers with prior Oscar nominations, the standard error is very high and the effect is not statistically significant. Thus the natural experiment of blacklisted writers working through pseudonyms suggests that spillovers are primarily of talent rather than prestige, but because of the very limited size of the natural experiment this evidence should be understood as tentative.

[2] The blacklist is usually said to have ended when Stanley Kubrick insisted that Dalton Trumbo be given a writing credit for *Spartacus* (1960). However the WGA's research found that a few blacklisted writers continued to use pseudonyms as late as 1972. Limiting our analysis to 1948-1960 provides the same results as running it over 1948-1972.

Appendix C: Periods in Hollywood History

Although the analyses presented in the main narrative of the paper pool together films from 1936 through 2005, this span encompasses three fairly distinct periods for the Hollywood film industry. From very early in its history Hollywood developed "the studio system," wherein the film industry was dominated by vertically-integrated firms. This system unraveled with the California labor case *DeHavilland v. Warner Brothers* (1944) and the federal antitrust case *US v Paramount* (1948). Following the studio system was a long transitional period where Hollywood operated as a project-based industry, but in such respects as release patterns it still resembled the studio system. This began to change when *The Godfather* (1972) became the first film to earn over a hundred million dollars (Baker and Faulkner 1991). Shortly thereafter Hollywood became obsessed with replicating this success and entered the blockbuster era which was characterized by writer-director filmmakers and "opening wide" on hundreds of screens.

Thus Hollywood history can roughly be divided into the studio era (1936-1948), a transitional period (1949-1972), and the blockbuster era (1973-2005). In table C we allow key variables to interact with period to test how sensitive the paper's findings are to these changes in Hollywood industrial structure and business practice. (We do not specify additive effects for a period dummy set because performances do not compete for nominations with performances from other years, therefore any additive effects of a period dummy set are captured by the variable "films per year"). Since one of the major historical issues dividing the periods was the strength of the major studios, we interact the "major" distributor dummy with period. The effect of major studio is strong in all periods, though not surprisingly it is strongest during the studio

system. Likewise, status (centrality in the credit network) has strong effects in all three periods, with a slight tendency to be more powerful in recent times.

The spillover effects of working with prior-nominated writers and directors are significant in all three periods. However spillovers from prior-nominated co-stars are significant in the first two periods (the studio system and transitional period) but not during the blockbuster era. Note that while writer and director spillovers are somewhat stronger during the studio system, this is entirely attributable to the lagged specification (we only measure spilloers from colleagues with a prior nomination). When the specification includes both prior and newly nominated team members, very similar coefficients prevail for each period. (These alternative specifications are available on request).

We attribute this problem with the lagged specification to a greater preponderance in later periods of writing and directing nominees who practice high concept approaches. High concept artists often suffer regression to the mean after a great achievement whereas craftsmen tend to be very consistent (Galenson 2006). This implies that whereas a great past achievement (as indicated by Oscar nomination) is informative about the current efforts of a craftsman, knowing this is not very informative about the current efforts of a high concept artist. For instance, it's not surprising that two actors were nominated for working with Shyamalan on *The Sixth Sense* (1999), but neither he nor any of his above-the-line collaborators have been nominated for any of the films he made since then. The authors are currently working on another paper in which we demonstrate this shift and link it to the decline in the studio system, especially the rise of free agency since the *DeHavilland* case.

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TABLE A

MULTINOMIAL LOGISTIC REGRESSION MODELS OF ACADEMY AWARD NOMINATIONS, 1936 - 2005

VARIABLE	A1 ACTORS		A2 ACTRESSES	
	SUPPORTING	LEAD	SUPPORTING	LEAD
Baseline				
Films per year (100s)	-0.194 *	-0.414 ***	-0.304 **	-0.526 ***
	(0.085)	(0.093)	(0.093)	(0.097)
Genre: Drama	1.860 ***	1.732 ***	1.771 ***	1.843 ***
	(0.200)	(0.211)	(0.209)	(0.223)
Genre: Comedy	0.139	-0.134	0.028	-0.290
	(0.163)	(0.179)	(0.167)	(0.181)
Genre: Biography	0.824 ***	1.228 **	0.787 **	1.091 ***
	(0.231)	(0.224)	(0.260)	(0.255)
Major distributor	0.887 ***	0.614 **	0.315	0.353
	(0.205)	(0.204)	(0.180)	(0.190)
Cast size	0.002	-0.001	-0.002	-0.009 *
	(0.003)	(0.003)	(0.004)	(0.004)
Release date	0.005 ***	0.006 ***	0.005 ***	0.006 ***
	(0.001)	(0.001)	(0.001)	(0.001)
Human Capital				
Past Films 0-5	-0.019	0.101	0.054	0.016
	(0.052)	(0.071)	(0.046)	(0.058)
Past Films 6-20	0.028 *	-0.010	-0.012	-0.008
	(0.014)	(0.015)	(0.015)	(0.015)
Past Films >20	-0.003	-0.017 ***	-0.007	-0.010
	(0.003)	(0.004)	(0.008)	(0.007)
Past nominations	1.032 ***	2.410 ***	1.182 ***	2.339 ***
	(0.144)	(0.145)	(0.155)	(0.156)
Status (Credit Centrality)	0.027 **	0.073 ***	0.020 **	0.062 ***
	(0.008)	(0.012)	(0.007)	(0.010)
Spillovers				
Co-stars with past nominations	0.216 ***	-0.105	0.351 ***	-0.052
	(0.053)	(0.061)	(0.055)	(0.065)
Director with past nominations	1.101 ***	1.160 ***	1.021 ***	1.021 ***
	(0.144)	(0.151)	(0.154)	(0.161)
Writers with past nominations	0.267 **	0.232 *	0.339 **	0.308 **
	(0.099)	(0.104)	(0.106)	(0.111)
Intercept	-13.030 ***	-16.673 ***	-11.010 ***	-14.078 ***
	(0.723)	(1.010)	(0.671)	(0.883)
ρ_{film}	.457		.491	
Log Likelihood	-3492.966		-3033.662	
N Performances	103,433		44,475	
N Films	16,296		15,596	

NOTE. Standard errors in parentheses.

* $P < .05$, ** $P < .01$, *** $P < .001$, two-sided z-tests.

TABLE B

LOGISTIC REGRESSION MODELS OF ACADEMY AWARD NOMINATIONS

WITH BLACKLISTED WRITERS WORKING THROUGH "FRONTS", 1948-1972

VARIABLE	
Baseline	
Films per year (100s)	-0.597 ***
	(0.109)
Genre: Drama	2.297 ***
	(0.247)
Genre: Comedy	0.386
	(0.234)
Genre: Biography	1.091 **
	(0.345)
Major distributor	0.322
	(0.203)
Cast size	-0.022 *
	(0.010)
Release date	0.007 ***
	(0.001)
Female	0.831 ***
	(0.115)
Human Capital	
Past Films 0-5	-0.056
	(0.047)
Past Films 6-20	-0.012
	(0.013)
Past Films >20	-0.010 *
	(0.004)
Past nominations	1.758 ***
	(0.141)
Status (Credit Centrality)	0.047 ***
	(0.007)
Spillovers	
Co-stars with past nominations	0.229 **
	(0.072)
Director with past nominations	1.530 ***
	(0.194)
Writers with past nominations	0.343 **
(working openly)	(0.131)
Writers with past nominations	0.975
(working through a front)	(0.686)
Intercept	-13.404 ***
	(0.753)
ρ_{film}	0.595
Log Likelihood	-1945.330
N Performances	58293
N Films	6607

Standard errors in parentheses.

* $P < .05$, ** $P < .01$, *** $P < .001$, two-sided z-tests.

TABLE C

LOGISTIC REGRESSION MODELS OF ACADEMY AWARD NOMINATIONS WITH INTERACTIONS BY PERIOD

VARIABLE		VARIABLES (CONTINUED)	
Baseline		*Status (Credit Centrality)*	
Films per year (100s)	-0.401 ***	(1936-1948)	0.039 ***
	(0.070)		(0.006)
Genre: Drama	1.919 ***	(1949-1972)	0.047 ***
	(0.134)		(0.006)
Genre: Comedy	-0.059	(1973-2005)	0.049 ***
	(0.118)		(0.006)
Genre: Biography	1.079 ***	*Spillovers*	
	(0.181)	Co-stars (1936-1948)	0.358 ***
Major distributor (1936-1948)	0.949 **		(0.090)
	(0.360)	Co-stars (1949-1972)	0.236 ***
Major distributor (1949-1972)	0.446 *		(0.067)
	(0.197)	Co-stars (1973-2005)	0.004
Major distributor (1973-2005)	0.533 **		(0.059)
	(0.184)	Director (1936-1948)	1.456 ***
Cast size	0.001		(0.235)
	(0.003)	Director (1949-1972)	1.491 ***
Release date	0.006 ***		(0.180)
	(0.000)	Director (1973-2005)	0.855 ***
Female	0.869 ***		(0.167)
	(0.069)	Writers (1936-1948)	0.512 **
Human Capital			(0.162)
Past Films 0-5	0.026	Writers (1949-1972)	0.344 **
	(0.029)		(0.122)
Past Films 6-20	0.006	Writers (1973-2005)	0.250 *
	(0.008)		(0.120)
Past Films >20	-0.008 **		
	(0.002)		
Past nominations	1.723 ***		
	(0.082)		
Intercept	-14.193 ***		
	(0.511)		
ρ_{film}	0.549		
Log Likelihood	-5484.974		

NOTE. *N performances* = 147,908. N films = 16,392.
Standard errors in parentheses.
* $P < .05$, ** $P < .01$, *** $P < .001$, two-sided z-tests.