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Organizational dynamics in social networks : contracts and reputations in the film industry

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Chapter 3:

The interaction between reputational status and collaboration in the project-based film industry⁶

Summary:

This chapter applies an evolutionary social network approach to study the interaction between status and collaboration in the Dutch film industry. We estimate the effects of commercial and artistic reputational status on the evolution of collaboration networks while controlling for network structure and constant actor attributes. We find that artistic – not commercial – reputational status, based on individual past performance, is a strong predictor of tie formation. Composite reputational status, that takes into account reputational status spillover effects from past collaboration partners has an effect in respect to artistic reputation, but not to commercial reputation. In contrast to what earlier studies suggested we found little evidence for homophily selection between actors with similar reputational status.

⁶ This chapter is based on a paper submitted to the special issue of Organization Science; 'Attaining, maintaining and experiencing status in organizations and markets.'

Introduction

The status of a producer is an important carrier of information in exchange relations when beforehand it is difficult to determine the value or quality of the product involved in the exchange (Podolny, 1993, 1994). Exchange relations include not only relations between buyers and sellers but also relations between actors who collaborate, each bringing in their abilities and effort. Status can be based on position in social networks (Granovetter, 1973; Burt, 1992), constant actor attributes such as sex (Ridgeway, 1991), and changing attributes such as reputation. High status actors, and more specifically actors with favorable reputations, are more attractive as exchange partners (Milgrom & Roberts, 1986; Fombrun & Shanley, 1990). Status can result not only from an individual's reputation based on the focal individual's own past performance, but in addition, also from the status of an individual's current and past exchange partners (Podolny, 1993; Benjamin & Podolny, 1999). The latter implies a – reputational – status spillover effect.

Besides high status, more specifically, similarity in status increases the tendency of actors to form collaborative ties (Festinger, 1954; Ibarra, 1992; Podolny, 1994). The formation of ties based on similar status is a specific form of a more general tendency towards homophily selection (McPherson, Smith-Lovin & Cook, 2001). Building on Podolny (1993) we distinguish between two types of reputational status – individual reputational status and composite reputational status, the combination of the reputations of both the focal actor and that of the actors with whom the focal actor collaborated in the past – that could lead to homophily selection. Distinguishing between these two possible types of reputational status-based homophily selection, while controlling for constant attributes and network position, will inform us about the importance of reputational spillover. Additionally, this paper will distinguish between artistic and commercial reputation (Delmestri et al., 2005) to study the possibility that

homophily selection and spillover effects are different if they are based on the one dimension of reputational status rather than the other.

We will apply the actor driven social network analysis program SIENA - Simulation Investigation for Empirical Network Analysis - that is specifically designed for estimating actor-driven network evolution while controlling for (past) network structure and position (Snijders, 2005; Steglich, Snijders & West, 2006). Social network analysis has been applied at many different levels, such as between individuals, within organizations and between organizations (Borgatti & Foster, 2003; Brass, Galaskiewicz, Greve & Tsai, 2004). Recently there have been calls for approaches that focus more on the evolution or dynamics of social networks (Gould, 2002; Kilduff, Tsai & Hanke, 2006; Ahuja, Soda & Zaheer, 2007). Precisely such a dynamic approach can distinguish between reputational status and positional status that can change over time, and constant attributes of status.

The empirical setting of this paper is the Dutch film industry. The film industry is a popular empirical setting for studying social networks (Sorenson & Waguespack, 2005; Delmestri, Montanari & Usai, 2005; Cattani & Ferriani, 2008). It is particularly interesting for the purpose of this paper because the success of a film is very difficult to predict (Caves 2002). This makes it difficult to determine the value of the production inputs or skills of film professionals, which in turn increases the importance of reputational status in project selection or collaboration. At the same time, status in the sense of network position plays an important role because job opportunities and recommendations are dispersed through informal networks (Jones 1996). This paper starts with reviewing the literature on status and collaboration. This is linked to the context of project-based organization and, more specifically, the film industry. This will lead to the formulation of a number of hypotheses with regard to the effects of reputational status on tie formation in the film industry. The results will be discussed to round off the paper.

Theoretical framework

Collaboration and status

Firms and individuals collaborate with each other. Ideally, they would be perfectly informed about the quality of what the other has to offer and of the value that can be created using the other's inputs. However, there can be a high degree of uncertainty about the value of the other's inputs or, in the terminology of Podolny (2001), a high "altercentric uncertainty". When inputs are extremely heterogeneous and in oversupply it will become harder to evaluate their quality beforehand and to make decisions about whom to collaborate with. This will make it more likely that reliance is placed on the status of the provider of those inputs.

Status can originate from constant attributes, as well as positional attributes and other changing attributes, among which reputation figures dominantly. First, constant attributes of status are given and can not be changed such as sex, age and race (Ridgeway, 1991; Ibarra, 1992). Second, positional status is derived from the network structure and an actor's position within this network. There is ample research linking structure of, and position in, social networks to performance, such as career success (Granovetter, 1973; Coleman, 1990; Seibert, Kraimer & Liden, 1991; Burt, 1992; Podolny & Page, 1998). In addition, positional status plays an important role because firms that are close to each other within a network of prior alliances are more likely to form an alliance themselves (Gulati, 1995a). Third, reputational status denotes status that can change over time and is derives from individual-specific reputation and reputation of past exchange partners.

Individuals or organizations that have a favorable reputational status are found to be more successful, for example, in attracting investors and customers (Milgrom & Roberts, 1986; Fombrun & Shanley, 1990). Podolny (1994) considers both the reputation of an actor, and the status of exchange partners as constituting elements of

the focal actor's status: '...a market actor's status has a dual foundation in both its past demonstrations of quality and the status of its exchange partners' (Benjamin & Podolny, 1999: 564). Reputational status is always relative; it is superior, inferior or equal to the status of comparable actors (Deepphouse & Carter, 2005; Rindova, Williamson, Petkova & Sever, 2005). Jensen and Roy (2008) argued that status serves to construct the set of potential partners, and reputation subsequently allows the focal actors to choose between the members of this set. Prior research has shown that under uncertain market conditions, reputational status plays an important role in the formation of ties (Podolny, 1994; Chung, Singh & Lee, 2000). In an uncertain environment where information on past performance is publicly available, reputational status can therefore be expected to be an important predictor of collaborative tie formation.

Status similarity leading to collaboration

Apart from the general effect of being attracted to other actors with a good reputation, individuals are more attracted to others that have a similar status (Festinger, 1954). In an inter-organizational context, alliances or collaboration among firms can - besides complementary capabilities - be explained by status similarity. Status similarity is a strategically and economically motivated selection dynamic that is an important determinant of collaboration between exchange partners (Festinger, 1954; Podolny, 1994). Gould provides an explanation for this phenomenon by stating that high status individuals will not select low status individuals because the latter are unlikely to return or reciprocate on an equal level in the future (Gould, 2002).

Status similarity as a predictor of collaboration between organizations or individuals is a specific example of a more general tendency. In social network analysis, studies show that tie formation between similar people occurs at a higher rate than among people that are dissimilar (For a review see McPherson et al., 2001). They include sex, age and race (see for instance Ibarra, 1992). The term homophily selection is used to refer to the process in which actors choose to have ties with another because

they are similar in sharing certain individual attributes. These attributes can be constant or variable. Constant attributes are fixed and not the result of choices of behavior of individual actors. Variable attributes do result from past choices and behavior of individual actors and include reputational status. Collaboration between actors of similar status can therefore be the result of homophily selection on the basis of reputational status.

Collaboration leading to status similarity

Where the preceding arguments seem to suggest that actors with similar reputational status seek to collaborate, there is also another possible dynamic at play. Exchange relationships can be based on actors affiliating with higher status others (Podolny & Phillips, 1996) and increasing their own status by doing so. In turn, these high status partners to the exchange want to be compensated for putting their reputation at risk by affiliating with lower status others, in order to make it worthwhile. These status spill-over dynamics can be explained as specific forms of mutual investment where status is the resource being exchanged.

An specific context in which status, both in the sense of individual reputation and status through affiliation, is especially apparent are capital investment decisions (Milgrom & Roberts, 1986; Fombrun & Shanley, 1990) Status spillover through affiliation can be found in situations where highly reputed organizations affiliate themselves with start-up organizations in order to attract investor capital. Outside investors providing capital to young start-ups run large risks because of uncertainty in terms of both the future success of innovative products and the managerial capabilities of the new organization. An established organization that affiliates itself with this new start up gives a signal to investors to provide capital to this new venture, as bad performance of the new venture will provide a risk of reputation loss by the affiliating entity in case the start up fails (Stuart, Hoang & Hybels, 1999). In other words, the affiliation serves as risk insurance.

Another context in which status spill-over through affiliation plays an important role is the job market (Stigler, 1962; Spence, 1973; Frank, 1985). The hiring decision in the job market takes place in a situation of incomplete information about the productive capabilities of the employee (Stigler, 1962). The status of an individual in the form of past employment or education increases the chances of career success (Spence, 1973). On the other hand, the status of the firm or organization is also an aid in attracting more and better applicants. Besides attracting more and better applicants, highly reputed organizations can additionally benefit from the fact that prospective employees are willing to accept lower compensation in exchange for status. Employees are willing to accept this in exchange for perceived or actual status spill-over effects derived from having been affiliated with that organization from which they expect to benefit in future job search (Frank, 1985).

If such reputational status spill-over occurs, it would have an impact on processes of homophily selection. Actors would seek to collaborate with other actors on the basis of similarity on the sum of reputational status derived from past performance of the focal actor and that of the actors the focal actor has collaborated with. A particularly suitable setting for studying the effects of reputational status on tie formation, and status-based homophily selection and spillover effects, are project-based industries that can be viewed as dynamic social networks of freelancers forming temporary alliances.

Research setting: The film industry

A specific form of alliance formation or collaboration is the project-based organization (PBO). A PBO can be defined as a temporary organization of independent professionals that is disbanded once the project, for which purpose it was specifically

set up, is completed. This type of organization is typically found in industries where organizations or individuals work in unstable and uncertain environments, such as, the construction (Eccles, 1981) and film industry (DeFillippi & Arthur, 1998). In project industries, career success is largely determined by getting access to increasingly challenging projects (Bechky & O'Mahoney, 2006). These projects can be regarded as short-term alliances or collaborations. In the formation of a PBO and the selection of its members, status plays an important role. Status is an indication of a potential project participant's individual skill, access to resources, and ability to collaborate in teams (Jones, 1996). Especially reputational status, in the sense of individual performance and that of affiliates in past projects, is an important signal of quality (Spence, 1973). Therefore, one would expect reputational status to be a strong predictor of tie formation between professionals in project-based industries.

The empirical setting in which we study status dynamics and alliance formation or collaboration is the film industry. Social networks are widely studied in the film industry (Zuckerman, 2004; Sorenson & Waguespack, 2005; Ferriani, Corrado & Boschetti, 2005). This industry is particularly interesting because the industry is largely based on temporarily PBOs consisting of independent or freelance professionals. Studies about social networks in the US film industry focus, for example, on the relation between strength of ties and performance of films (Sorenson & Waguespack, 2005). More important for this paper is that social networks and status are strongly linked (Jones, 1996; DeFillippi & Arthur, 1998). For example, directors in the Italian film industry with a favorable commercial reputation and strong ties with producers and distributors, have a positive effect on the commercial success of a film. In addition, artistic success is related to a director's favorable artistic reputation and weak ties with other creative project members (Delmestri, Montanari & Usai, 2005).

These studies, however, largely neglect how these ties are formed in the first place. As discussed briefly above, Jensen and Roy (2008) distinguished between status and reputation to highlight the two stage process of pre-selection and eventual choice. In their specific empirical object they argued that relations are very stable. The film

industry is different in the sense that it is largely organized on the basis of short-term projects and relations are typically unstable. Film professionals are concerned about the status of those with whom they will collaborate, as this choice will not only influence the success of the project but also increase the chances of the project being financed. Individual reputational status, in other words, plays an important role in identifying valuable human resources that are selected to become members of the PBO (Jones, 1996; DeFillippi & Arthur, 1998). One would therefore expect that individuals with a positive reputational status have a higher chance of forming collaborative ties. In the film industry, reputational status can be derived from both commercial and artistic success of films.

Hypothesis 1a:

In the project-based film industry characterized by high uncertainty, commercial reputational status, derived from individual past performance, has a positive effect on collaborative tie formation.

Hypothesis 1b:

In the project-based film industry characterized by high uncertainty, artistic reputational status, derived from individual past performance, has a positive effect on collaborative tie formation.

In addition to an individual's own reputation, reputational status is derived from the reputation of an individual's exchange partners (Podolny, 1993, 1994). We therefore argue that an individual's reputation is affected by those with whom he or she collaborated in the past. This allows us to measure reputation spillover effects.

Hypothesis 2a:

In the project-based film industry characterized by high uncertainty, commercial reputational status, derived from both individual past performance and that of past collaboration partners, has a positive effect on collaborative tie formation.

Hypothesis 2b:

In the project-based film industry characterized by high uncertainty, artistic reputational status, derived from both individual past performance and that of past collaboration partners, has a positive effect on collaborative tie formation.

Films have a better chance of getting financed if there is a package of high status director, producer, scriptwriter and leading cast (Rosenberg, 2004: 80). This would suggest that film professionals collaborate in projects with others that have a similar status as this will increase the chances of reciprocity (Gould, 2002). This is to a certain extent confirmed in the US film industry where producers and directors that collaborate in projects have a similar number of credits and, more importantly, similar cumulative returns in past projects (Faulkner & Anderson, 1987). However, a cumulative return over all past projects might not be adequate to measure commercial reputation, as it does not reflect the notion of recent collaborations and performance as having a stronger effect on status. On the other hand "you are as good as your last movie" might be a slight exaggeration. Reputational status based on success in recent projects can be expected to be a strong determinant of one's attractiveness as a provider of inputs.

Hypothesis 3a:

In the project-based film industry characterized by high uncertainty, homophily selection between actors with similar commercial reputational status, derived from individual past performance, has a positive effect on collaborative tie formation.

Hypothesis 3b:

In the project-based film industry characterized by high uncertainty, homophily selection between actors with similar artistic reputational status, derived from individual past performance, has a positive effect on collaborative tie formation.

Again, in addition to an individual's own reputation, reputational status – both commercial and artistic – can also be derived from the reputation of an individual's exchange partners (Podolny, 1993, 1994). An individual's reputational status is affected by the reputation of those with whom one collaborated in the past. Therefore one could argue that homophily selection on reputational status is based on this composite type of reputational status.

Hypothesis 4a:

In the project-based film industry characterized by high uncertainty, homophily selection between actors with similar commercial reputational status, derived from both individual past performance and that of past collaboration partners, has a positive effect on collaborative tie formation.

Hypothesis 4b:

In the project-based film industry characterized by high uncertainty, homophily selection between actors with similar artistic reputational status, derived from both individual past performance and that of past collaboration partners, has a positive effect on collaborative tie formation.

Besides reputational status, similarity on certain constant attributes of status such as sex may also have an effect on tie formation in film projects. In addition, network position also plays an important role because job opportunities and recommendations are dispersed and accessed through informal networks (Jones, 1996). In what follows we will therefore distinguish between past network structure and

constant actor attributes such as age, sex and education that we use as control variables in explaining tie formation besides the changing actor attributes of commercial and artistic reputational status. We will focus on the impact of these two dimensions of reputational status on collaboration dynamics among directors, producers and scriptwriters in the film industry.

Methodology and data

Methodology

Studying the relation between constant attributes of status, positional status and reputational status in the formation of collaborative ties, makes the application social network analysis appropriate. There has been ample research linking structure of, and position in, social networks to career success (Granovetter, 1973; Coleman, 1990; Seibert, Kraimer & Liden, 1991; Burt, 1992; Podolny & Page, 1998) and alliance formation (Gulati, 1995a). Social network analysis can provide a more in-depth understanding on the underlying causalities by applying a more dynamic or evolutionary approach that includes an agency perspective on how ties are formed in the first place (Gould, 2002; Kilduff, Tsai & Hanke, 2006; Ahuja, Soda & Zaheer, 2007). In our analysis of status dynamics in the Dutch film industry we therefore apply the social networks analysis computer program SIENA, which is an acronym for Simulation Investigation for Empirical Network Analysis.

SIENA statistically estimates models for network evolution by combining a panel data and actor driven approach (Steglich, Snijders & West, 2006; Steglich, Snijders & West, 2006; Steglich, Snijders & Pearson, 2007; van de Bunt & Groenewegen, 2007; Snijders, Steglich, Schweinberger & Huisman, 2008). By comparing several snapshots of a social network over time it can model social network evolution. The core

feature of SIENA is that it can distinguish between the impact of both individual actor attributes and network structure on tie-formation at the same time (Snijders, Steglich & van de Bunt, 2009). SIENA uses simulation to compare random network dynamics with actual network evolution using probabilities of tie formation. SIENA can estimate the effect of particular actor attributes on the tendency to form ties. Moreover, it can also estimate homophily selection or the likelihood of actors to form ties based on similar individual actor attributes. These can be either constant, for example sex, or changing, for example reputation (Snijders et al., 2008). This allows researchers to disentangle the interrelated dynamics of positional status, constant attributes of status and reputational status on collaborative tie formation. For a more detailed mathematical treatment of SIENA the reader is referred to Snijders, Steglich and Schweinberger (2007). For more information on the technical details of the algorithm the reader is referred to Snijders (2001).

This paper uses non-directed network data where ties between two actors are either present or absent. This means that we do not have information on who took the initiative to form a tie. Networks that are directed have more information on status and reputation that can be derived from the network structure than those that are non-directed. We use the initiative-confirmation model approach, as a specific model option within SIENA, where actors voluntarily and unilaterally form ties. One actor is assumed to take the initiative to establishing or dissolving a tie. When proposing a tie the receiving actor has to confirm, when dissolving a tie this confirmation is not required (Snijders et al., 2008). This suits the reality of the film industry in which a proposal for collaboration is initiated by an individual and starts only under a condition of agreement and cannot be forced. Collaboration stops unilaterally when one of the two decides to dissolve a tie. In the film industry, the initiative to form a collaborative tie can be taken by all three roles of director, producer and scriptwriter.

Data and operationalization

Network data

At the social network level our data consists of a two-mode network linking all directors, producers and scriptwriters of Dutch films produced from 1992 to 2008. In order to control for international minority co-productions, where the non-Dutch part of the film crew is dominant, we only selected film projects where at least two of the three key roles of director, producer and scriptwriter were Dutch. The network data was obtained from the Dutch film database – www.nfdb.nl – and cross checked with the Internet Movie Database – www.IMDb.com. Our focus is on the three roles of director, producer, and scriptwriter because these are the key roles in film projects (Puttnam, 2004: 18). In addition, the original idea for a screenplay or film project can be initiated by each of these three roles. As the topic of our case is the film industry, the reader should be aware that the term actors should not be confused with actors in the sense of cast members or stars.

For each role in a film project we only coded a single actor in order to avoid bias towards films with many actors, roles with many actors, and actors with many roles. Individuals that performed more than one role in their career are coded only for their most prominent role. This resulted in a sample of 233 film projects, 108 directors, 61 producers, and 57 scriptwriters. In addition, because we include only a single director, writer, or producer in each film project, relations between actors with similar roles are coded with structural zeros. Coding structural zeros between actors informs SIENA that ties between these actors cannot be formed. This means that we control for the fact that it is impossible for within-role ties to be formed.

SIENA is not capable of directly estimating 2-mode or affiliation networks that link individuals (x-axis) through shared projects (y-axis). We therefore converted our 2-mode networks - of actors indirectly linked through film project - into 1-mode networks, linking individuals directly, instead of through projects. Before converting to a 1-mode

network we first selected four waves of network data. We used four overlapping windows of films with a seven year interval, 1992-1999, 1995-2002, 1998-2005 and 2001-2008. The first window of 1992-1999 is used exclusively for constructing reputational status variables for our baseline network 1995-2002. This means that we have three so-called waves of network data. We chose the particular interval of seven years because on average an actor is involved in a film project once in every seven years. We chose overlapping networks because ties that are formed in the second half of each window would seem to dissolve faster when using non-overlapping networks.

SIENA requires the overall network to consist of a constant set of actors. It can however, deal with entry and exit of actors by specifically coding their entry and exit. We used the year of the actors' first and last credit at IMDb.com to code for entry and exit. In addition, we assumed that an actor retired from the industry after having passed the age of 65 unless the actor has a credit at a higher age in IMDb. In that case the year after the last credit is used as the retirement year.

Actor attribute data

Besides the network waves we constructed individual actor attributes. Actor attributes can be either constant or changing. Constant status attributes, such as sex, do not change. Changing attributes, such as reputational status, can be different between network waves. We constructed changing individual actor attribute variables for measuring the effect of reputational status on future tie formation, and a tendency towards homophily selection. We constructed two purely individual variables for both commercial and artistic reputational status. In addition, in order to test status spillover effects, we used these individual actor attribute variables to construct a composite variable for both commercial and artistic reputational status. This composite variable consists of 0.5 of the focal actor's individual reputation and, 0.5 of the reputation of the actors with whom he or she collaborated. The latter is an equal weight of the other two roles. For example, a producer has an individual score of 2, the directors he collaborated

with an average of 3, and the scriptwriters an average of 4. His composite reputational status is then $(0.5 \times 2) + (0.25 \times 3) + (0.25 \times 4) = 2.75$.

Commercial reputational status. Commercial reputational status is derived from the average commercial success of the last three film projects in which actors participated in the previous network wave. We use a proxy for commercial success at the film level using budget and the box-office data. Commercial success of a film is a return on investment measure (1) that is operationalized as 50% of the cumulative box-office as a proxy for film rental revenues from film theatres (Blume, 2004: 338), minus 5% of the budget for print and advertising, minus the budget, divided by the budget.

$$\text{Commercial success of film} = \frac{0.5(\text{Boxoffice}) - 0.05(\text{Budget}) - \text{Budget}}{\text{Budget}} \quad (1)$$

The five percent for copies, marketing and promotion is the minimum percentage the Dutch Filmfund demands that Dutch film makers spend (Filmkrant, 2002). Budget data is obtained from the Dutch Filmfund, the government agency that subsidizes most Dutch films. Budget data of films that did not receive government subsidies were obtained from various Internet sources. Missing budget data is coded as the average budget over all films ($n=23$, or 9% of the films). Box-office data is obtained through the Dutch Association of Film Distributors – Nederlandse Vereniging van Film distributeurs. New entrants in the network that do not have a reputation are coded with the average reputation within the specific entry wave. In each wave there are on average 28 new entrants (roughly 12% in each wave). We code them as having an average reputation as this is the least biased. They may, for example, have a strong reputation in making television series, when they made the switch to film, or no experience and thus no reputation.

Artistic reputational status. Second, the changing actor attribute variable of artistic reputation is based on film critics' reviews in the four major national Dutch newspapers: Volkskrant, NRC, Algemeen Dagblad and Telegraaf. For artistic reputation we use the average score of the 5-star ratings of the last three film projects in which

actors participated in the previous wave. We collected these reviews from the website of the Filmkrant – www.filmkrant.nl –, a Dutch magazine dedicated to film. Films that were not reviewed were coded using the average review of all other films in the dataset ($n=7$, or roughly 3% of the films). We coded new entrants as having an average artistic reputation in the entry wave for the same reason as commercial reputation.

Controls. The main controls that we include are the actor attributes for age, sex, and education. We collected age and sex information through IMDb and a myriad of online sources if not available on IMDb. Education in this paper is coded as whether or not an actor has graduated from the Dutch Film Academy, the most prominent film school in the Netherlands. These data were obtained through the Film Academy, the Dutch Film Database and several Internet sites to fill in missing data. These three actor attributes serve as our control variables to test homophily selection effects of constant attributes of status. In addition, we constructed dummies for directors and producers to control for role differences between producers, directors and scriptwriters.

Results

SIENA needs a certain threshold amount of variation in ties between the network waves to be able to estimate the parameters. The Jaccard index is used to measure the amount of change in the network. Jaccard values should be higher than 0.3 (Snijders et al., 2008). Our Jaccard indexes over the subsequent network waves are 0.394, and 0.475 and therefore sufficient to estimate the model. Good convergence of the model indicates whether the simulated values deviate from the observed values. All parameter estimates need to be close to 0 and preferably smaller than 0.1 to indicate good convergence (Snijders et al., 2008). All the variables converged well to below 0.1 indicating a good fit.

Table 2 shows the results of the models estimating homophily selection based on commercial reputational status and a control model and table 3 shows them for artistic reputational status. In the control model (models 1 and 4), under the network dynamics parameters, we see the rate scores for each period (1) 3.47 and (2) 3.86 indicating the average number of tie changes per actor between two consecutive waves. The parameter 'degree (density)' (3) is -1.66 and negative indicating low network density. This means that when there is an opportunity for a tie change the odds of a tie being present as opposed to absent is $\exp(-1.66) = 0.19$. The most important element of SIENA as an actor-oriented mode is the evaluation function. The evaluation function can be regarded as the attractiveness of the network for a given actor and is a weighted sum of effects. The contribution of each single tie variable on whether or not a tie is formed is a log odds ratio (Snijder et al., 2008).

In models 2 and 5 we estimated the effects of *individual* reputational status on collaborative tie formation for both commercial and artistic reputational status. The parameter 'individual artistic reputation' (14) in model 5 is positive with 0.24 and can be interpreted as actors that participated in artistically successful film projects in the past are more likely to form collaborative ties for new film projects. The parameter is significant only for individual artistic – not for commercial – reputational status. Past artistic success, in other words, has a positive effect on forming collaborative ties and provides support for hypothesis 1b. Commercial success (14) in model 2 is not significant and therefore there is no support for hypothesis 1a.

In models 3 and 6 we tested a similar model but here we used a *composite* reputational status measure (16) to estimate its effect on the formation of collaborative ties. Besides pure individual reputational status, the composite includes the reputation of past collaboration partners. This allows us to test reputational spillover effects. The composite artistic reputational status effect in model 6 is significant and confirms hypothesis 2b. The value of 0.25 is slightly higher than the pure individual effect.

TABLE 2
Parameter Estimates of Film Collaboration Network Evolution and Commercial Reputation

	Control			Individual			Composite		
	Model 1			Model 2			Model 3		
	Estim.	St. error	p-value	Estim.	St. error	p-value	Estim.	St. error	p-value
Network dynamics									
1	3.47	0.44	< 0.001 ***	3.51	0.51	< 0.001 ***	3.45	0.40	< 0.001 ***
2	3.86	0.50	< 0.001 ***	3.90	0.50	< 0.001 ***	3.89	0.48	< 0.001 ***
3	- 1.67	0.15	< 0.001 ***	- 1.67	0.16	< 0.001 ***	- 1.66	0.15	< 0.001 ***
Structural effects									
4	1.92	0.12	< 0.001 ***	1.93	0.12	< 0.001 ***	1.93	0.12	< 0.001 ***
5	- 0.21	0.05	< 0.001 ***	- 0.22	0.05	< 0.001 ***	- 0.22	0.04	< 0.001 ***
Actor attributes: constant status									
6	- 0.02	0.01	< 0.001 ***	- 0.02	0.01	< 0.001 ***	- 0.02	0.01	< 0.001 ***
7	0.92	0.34	0.008 **	0.93	0.61	0.126	0.91	0.36	0.012 *
8	- 0.03	0.17	0.882	- 0.04	0.14	0.783	- 0.01	0.19	0.987
9	0.23	0.12	0.044 *	0.25	0.12	0.035 *	0.23	0.13	0.062
10	- 0.23	0.17	0.160	- 0.20	0.16	0.220	- 0.20	0.17	0.233
11	0.11	0.09	0.208	0.11	0.11	0.285	0.11	0.09	0.235
12	- 0.09	0.20	0.641	- 0.07	0.20	0.702	- 0.07	0.19	0.707
13	0.90	0.27	< 0.001 ***	0.91	0.29	< 0.001 ***	0.90	0.27	< 0.001 ***
Actor attributes: Individual commercial									
14				0.89	0.51	0.080			
15				1.28	0.91	0.159			
Actor attributes: Composite commercial									
16				0.53	0.47	0.267			
17				0.51	0.69	0.459			

* p < .05, ** P < .01, *** p < .001

TABLE 3
Parameter Estimates of Film Collaboration Network Evolution and Artistic Reputation

	Control			Individual			Composite						
	Model 4			Model 5			Model 6						
	Estim.	St. error	p-value	Estim.	St. error	p-value	Estim.	St. error	p-value				
Network dynamics													
1	Rate period 1	3.47	0.44	< 0.001	***	3.46	0.42	< 0.001	***	3.47	0.45	< 0.001	***
2	Rate period 2	3.86	0.50	< 0.001	***	3.89	0.52	< 0.001	***	3.91	0.48	< 0.001	***
3	Degree	- 1.67	0.15	< 0.001	***	- 1.65	0.15	< 0.001	***	- 1.65	0.15	< 0.001	***
Structural effects													
4	Transitive triads	1.92	0.12	< 0.001	***	1.94	0.11	< 0.001	***	1.95	0.11	< 0.001	***
5	Sqrt degree of alter	- 0.21	0.05	< 0.001	***	- 0.23	0.05	< 0.001	***	- 0.23	0.04	< 0.001	***
Actor attributes: constant status													
6	Age	- 0.02	0.01	< 0.001	***	- 0.02	0.01	< 0.001	***	- 0.02	0.01	< 0.001	***
7	Age similarity	0.92	0.34	0.008	**	0.91	0.33	0.006	**	0.93	0.36	0.010	*
8	Sex	- 0.03	0.17	0.882		- 0.02	0.15	0.905		- 0.02	0.15	0.895	
9	Same sex	0.23	0.12	0.044	*	0.23	0.10	0.026	*	0.23	0.10	0.030	*
10	Filmacademy	- 0.23	0.17	0.160		- 0.24	0.16	0.129		- 0.24	0.16	0.144	
11	Same filmacademy	0.11	0.09	0.208		0.11	0.10	0.227		0.12	0.10	0.219	
12	Director role	- 0.09	0.20	0.641		- 0.07	0.23	0.770		- 0.06	0.18	0.722	
13	Producer role	0.90	0.27	< 0.001	***	0.94	0.27	< 0.001	***	0.94	0.21	< 0.001	***
Actor attributes: Individual artistic													
14	Individual artistic reputation					0.24	0.11	0.028	*				
15	Individual art. rep. similarity					0.73	0.37	0.051					
Actor attributes: Composite artistic													
16	Composite artistic reputation					0.25	0.12	0.042	*				
17	Composite art. rep. similarity					0.49	0.39	0.211					

* p < .05, ** p < .01, *** p < .001

The composite effect of commercial reputational status, on the other hand, is not significant and therefore there is no support for hypothesis 2a. For artistic reputational status, the effect of the composite measure is slightly stronger compared to the individual measure. For commercial reputational status, however, the composite measure for testing status spillover effects is smaller, and the significance lower, than for the individual measure.

In models 2 and 5 we estimated homophily selection effects based on *individual* reputational status similarity to test whether actors with a similar – artistic or commercial – reputational status are more likely to establish collaborative ties. The parameter 'individual commercial reputation similarity' (15) in model 2 was not significant. We therefore do not find a homophily selection effect for that parameter and hypothesis 3a has to be rejected. 'Individual artistic reputation similarity' (15) in model 5 however, is nearly significant with a p-value of 0.051 and therefore close to providing support for hypothesis 3b.

In models 3 and 6 we estimated homophily selection effects based on *composite* reputational status similarity to test whether actors with a similar – artistic or commercial – reputational status derived from both their own reputational status and that of past collaboration partners, are more likely to establish collaborative ties. Both the parameters 'composite commercial reputation similarity' (17) in model 2 and 'composite artistic reputation similarity' (15) in model 5 are not significant. We therefore do not find support for hypothesis 4a or hypothesis 4b.

In the control model (model 1 and 4), the main control variables – age, sex and education – measure the effect of constant actor attributes of status. First we estimated the effect of each of these on the tendency to form collaborative ties. We see that 'age' (6) has a negative significant effect on tie formation. Older film professionals have a smaller tendency to form collaborative ties. We included two role dummies to distinguish between producers, directors and scriptwriters. The positive parameter for 'producer role' (13) should be interpreted as producers being more prone to form ties than directors or scriptwriters. This can be explained by the fact that producers often work at larger production companies or in larger teams and can therefore engage in more projects. Directors and scriptwriters mostly work by themselves and only on one project at a time.

Concerning homophily selection, the effects 'age similarity' (7), 'same sex' (9) and 'same filmacademy' (11) estimate the tendency to form ties with similar others. 'Age similarity' (7) is positive, high and very significant. Actors, in other words, strongly prefer to form collaboration ties with others that are of a similar age. Additionally, 'same sex' (9) is also positive and significant. In other words, males prefer to collaborate with males, and females with females. There is no significant homophily selection effect for filmacademy. Filmacademy is an effect for estimating status effects of education.

Discussion and conclusion

In this paper we studied the influence of status, especially reputational status, on the evolution of the Dutch film industry's collaboration network. In industries that are characterized by high uncertainty, status is an important carrier of information that serves as an aid in determining the value or quality of potential exchange partners products (Podolny, 1993, 1994). In the film industry that is characterized by high uncertainty (Caves, 2002) the status of film professionals therefore plays an important role in collaborative tie formation. Moreover, the Dutch film industry is almost exclusively project-based, making the collaboration network of freelancers highly dynamic. In our study of the film industry we specifically focused on collaboration dynamics between producers, directors and scriptwriters.

We also focused on reputational status that is based on the success of the past film projects in which an actor participated. Here we distinguished between commercial reputational status that is derived from box-office performance, and artistic reputational status that is derived from film critics' reviews. Next to these changing actor attributes we also estimate control variables for constant actor attributes that possibly contribute to status: age, gender and education. In addition, when estimating the effects of actor-specific status attributes on the formation of collaboration ties, there is a need to control endogenous network effects. Network structure and position

are known to have an influence on tie formation (Granovetter, 1973; Burt, 1992) and therefore need to be controlled for in order to isolate effects of exogenous actor specific status attributes. We applied the social network analysis software SIENA, which models actor-driven network evolution while controlling for network structure and position (Snijders, 2001; Snijders, Steglich & Schweinberger, 2007).

First, we estimated the effect of an individual's reputational status on collaborative tie formation. We found that actors with high artistic reputational status are more likely to form collaboration ties in future projects. We did not find evidence of the same phenomenon for commercial reputational status. Besides looking for the effects of individual reputational status, we also considered composite reputational status, by also taking into account the reputation of past collaboration partners (Podolny, 1993; Benjamin & Podolny, 1999). We found that the effect of composite artistic reputational status is significant and of comparable size as individual reputational status. With respect to commercial reputation the composite variable is not significant and the effect smaller than for the individual variable. In other words, we found evidence of artistic reputational status spillover, but none in respect to commercial reputational spillover.

Second, we tested whether film professionals are more likely to form ties with others that have a similar – reputational – status (Festinger, 1954; Podolny, 1994). We found no evidence of film professionals with a similar reputational status, neither individual nor composite, tending to form collaborative ties. In other words, homophily selection (McPherson et al., 2001) on the basis of reputational status derived from either artistic or commercial success is not significant. This is a surprising result, given the arguments for status based homophily selection in the literature and the evidence found in earlier studies.

We did find homophily selection for the control variables age and gender. There is a strong effect of film professionals of similar age selecting each other to collaborate on film projects. Finally, there is a significant effect of homophily selection on the basis of gender confirming earlier studies (Ibarra, 1992). Film professionals of the same sex have a strong tendency to form collaboration ties. However, in respect of age and sex it is not clear whether these variables really function as signals of status in the sense this term is used in the literature discussed above. Age could be a status attribute if it

signals experience and level of skill. Sex is even less likely to function in this way in the Dutch industry. Therefore, we can only conclude that there is evidence for homophily selection on the basis of these attributes, but not that these results give conclusive proof of status-based homophily selection.

Third, the composite reputational status variables that measure reputation spillover effects from past collaboration partners (Podolny, 1993) on future tie formation, have only a slightly larger effect for artistic reputational status, and a much smaller and less significant effect for commercial reputational status.

At the same time there is a significant effect of network position, in the sense of closeness, on tie formation. In other words, one is more likely to form collaborative ties with film professionals to which one is indirectly connected. This is in line with similar findings at the inter-organizational level (Gulati, 1995a).

Our study has a number of limitations. We did not estimate tie-formation effect for each specific dyadic relation. Distinguishing between roles might show that each role – director, producer and scriptwriter – has different objectives in each dyadic relation, and therefore could also have different tendencies towards affiliation in order to benefit from either commercial or artistic reputational status spillover effects (Podolny & Phillips, 1996). For example, producers with a high commercial reputational status might aim to form ties with directors with a low commercial but high artistic reputational, as a form of investment. Finally, our network data is non-directed which means that we only have information about the presence or absence of a collaboration tie. We do not know about who took the initiative to form collaboration ties. Directed networks would allow for measuring additional reputation and status effects such as reciprocity.

Looking at the results as a whole, we found a strong effect of artistic reputational status on tie formation and at the same time a lack of strong homophily effects on the basis of reputational status. Film professionals that participated in artistically successful films in the past have a higher likelihood to form collaborative ties and have a higher chance of making new films in the future. The same relation did not hold for past commercial success. Two different explanations can be proposed for this. First, it is possible that artistic success is more strongly associated with personal qualities, while commercial success is more readily ascribed to collective efforts. This

would explain that the tendency to want to collaborate with higher status actors is less pronounced if status is measured along the commercial dimension. However, the reputational spillover results obtained in this study suggest otherwise.

Secondly, this effect may also have to do with the specific institutional environment of the Dutch film industry where most films receive state subsidies. Film subsidies are legitimized by cultural policy objectives aimed at stimulating artistic expression. An artistically favorable reputation could be more valuable for potential exchange partners as this will increase the chances of receiving funding from the state to finance new film ventures (Stuart et al., 1999). It is likely that such effects will be present in other settings where state subsidies play an important role. These explanations may also help to understand the lack of strong homophily effects, let alone homophily effects caused by reputational spillover. The number of films made in the Netherlands is not large and in the relatively small pool of involved professionals it may cause the strong attractiveness of associating with actors with high artistic reputation to crowd out other motivations and processes. The same small size of the pool of professionals suggests also that they will know each other sufficiently well to make reputational spillover relatively unimportant. It would be interesting to study whether artistic reputational status is also a stronger predictor of collaboration in film industries that are more market driven, such as Hollywood. In that context it might be that commercial reputation plays a more important role in tie formation and homophily selection, while the effect of artistic reputational status may be absent or weaker.