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The performance effects of uniplex, multiplex and diverse social ties: A study of Bollywood film production

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Abstract

In development projects, diverse social ties (multiple affiliations to multiple agents) may moderate the effects of uniplex ties (single affiliations to single agents) and multiplex ties (multiple affiliations to single agents). Extant research on social capital has paid scant attention to these conditional effects of social ties. The paper contributes with new knowledge by investigating the performance effects of uniplex, multiplex, and diverse ties in Bollywood film production projects. In a mixed-method study, we demonstrate that diverse ties among Bollywood filmmakers enhance the positive performance effects of uniplex ties, and reverse the negative effects of multiplex ties. We investigate the mechanisms behind these effects. While uniplex ties allow for resource pre-emption, diverse ties facilitate resource search. Furthermore, multiplex ties signify self-selection based on loyalty (?dharma?), leading to resource iteration. While such resource iteration creates lock-in effects for most filmmakers, those holding diverse ties are able to turn it into a strategic advantage.

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THE PERFORMANCE EFFECTS OF UNIPLEX, MULTIPLEX AND DIVERSE SOCIAL TIES:

A STUDY OF BOLLYWOOD FILM PRODUCTION

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ABSTRACT

In development projects, diverse social ties (multiple affiliations to multiple agents) may moderate the effects of uniplex ties (single affiliations to single agents) and multiplex ties (multiple affiliations to single agents). Extant research on social capital has paid scant attention to these conditional effects of social ties. The paper contributes with new knowledge by investigating the performance effects of uniplex, multiplex, and diverse ties in Bollywood film production projects. In a mixed-method study, we demonstrate that diverse ties among Bollywood filmmakers enhance the positive performance effects of uniplex ties, and reverse the negative effects of multiplex ties. We investigate the mechanisms behind these effects. While uniplex ties allow for resource pre-emption, diverse ties facilitate resource search. Furthermore, multiplex ties signify self-selection based on loyalty (*dharma*), leading to resource iteration. While such resource iteration creates lock-in effects for most filmmakers, those holding diverse ties are able to turn it into a strategic advantage.

INTRODUCTION

Research on performance effects of social ties is booming, spanning from early experiments with small worlds of ties (Milgram, 1967) over surveys of personal acquaintances (Granovetter, 1973) to the recent multitude of social network analysis aided by contemporary statistical methods and calculation power (Ahuja, 2000; Barabasi & Albert, 1999; Polidoro, Ahuja, & Mitchell, 2011; Reinholt, Pedersen, & Foss, 2011; Yang, Lin, & Peng, 2011). Even if agents hold a multitude of different ties, the literature has typically studied one type of social ties at a time. There is little discussion of differences between an agent's uniplex ties (ties with single affiliations to other agents) and multiplex ties (ties with multiple affiliations to other agents). Furthermore, there has been little investigation of the effects of tie diversity, i.e. combination of different ties between different agents.

In order to contribute with new insights into the performance effects of combinations of social ties, we investigate and compare the effects of uniplex, multiplex and diverse ties, and build theory on the mechanisms creating these effects. We choose the filmed entertainment industry as empirical setting. In this industry, new products are developed in temporary projects, and because every new project needs to coordinate shifting combinations of resources, social ties of project participants have significant effects on project performance (Cattani & Ferriani, 2008; Cattani, Ferriani, Negro, & Perretti, 2008; Ferriani, Cattani, & Baden-Fuller, 2009).

We specifically study the Bollywood filmed entertainment industry in Mumbai (India). Here, family dynasties are widespread, and therefore filmmakers are

connected through different types of social ties, including project collaboration ties and family relations. We apply a mixed-method empirical design. First, extant theory is used in conjunction with qualitative data from 58 on-site interviews to generate four hypotheses about how Bollywood filmmakers' uniplex, multiplex and diverse social ties influence their performance in film development projects. Subsequently, these hypotheses are tested using self-collected quantitative data on social ties between 925 Bollywood filmmakers (directors, producers, and main cast) and the economic performance of the 454 film projects they were involved with in the period 2002-2006.

We investigate uniplex social ties in the guise of family relations to Bollywood filmmaking dynasties. We find that filmmakers holding such ties experience better project performance because uniplex ties help them acquire critical resources through pre-emption. These positive effects are enhanced by diverse ties: when filmmakers holding uniplex ties also hold many ties to their filmmaking peers built through past project collaborations, they possess superior information about resource quality and availability. Then, we investigate multiplex ties in the guise of family members collaborating in film projects. We find that filmmakers holding multiplex ties experience low performance because of a self-selection mechanism: blind loyalty (what we label *dharma*) makes filmmakers adverse to abandoning projects that include family members, even if these projects perform poorly. These negative effects are reversed by diverse ties: when filmmakers with multiplex ties hold many ties to their filmmaking peers, and, more significantly, to external stakeholders to the filmed entertainment industry, they are able to signal their collaboration with family members in a way so it is perceived as a valuable brand.

The paper is structured in the following way. First, we present the background for our analysis, in the guise of theory on social ties and how they influence performance. Next, we provide an overview of our empirical setting: the filmed entertainment industry in Bollywood. A section outlining our method design and data sources follows before we present our qualitative evidence and develop our hypothesis. Then, we test these hypotheses quantitatively, followed by sections containing discussion and conclusions.

THEORETICAL FOUNDATION

There is growing evidence that economic agents' social ties to each other provide access to critical resources and positively influence the performance of their business ventures (Davis & Eisenhardt, 2011; Ketchen, Ireland & Snow, 2007). We shall consider three such types here: Uniplex, multiplex and diverse.

Table 1. Types of social ties

	Definition	Examples
Uniplex social tie	Focal agent holding one affiliation to another agent	Family relation Friendship Business partnership Club membership
Multiplex social tie	Focal agent holding multiple affiliations to another agent	Business partnership with a family member Friendship with a fellow club member
Diverse social ties	Focal agent holding multiple affiliations to multiple other agents	Business partnership with some agents and friendship with other agents

Uniplex, multiplex and diverse ties

Uniplex social ties represent one type of affiliation between two agents, and research on such ties is booming. One overall discourse here is discussing the quality of the affiliation. Granovetter's work on tie strength (1973; 1992) is prominent here. Loose (and often mediated) weak uniplex ties, such as club memberships or work acquaintanceships, are typically flexible and hence offer rich opportunities for sharing information. By comparison, strong uniplex ties, such as family relations and close friendships, are unmediated and long-standing and tightly coupled (Granovetter, 1973; Weick, 1979). Hence, they constitute credible commitments (Williamsson, 1983) and allow for mutual learning (Uzzi 1996, Ring and van de Ven, 1984) and interpersonal or interorganizational trust (Ben-Porath, 1980; Coleman, 1988; Granovetter, 1992). Furthermore, strong uniplex ties may provide access to resources of other agents, either directly or, if the tie is to a particularly prominent (reputable) person, from third parties who are impressed by the "reflected glory" expressed by the tie (Cialdini et al, 1976; Kilduff and Krackhardt, 1994).

Another discourse in the research of uniplex social ties is analysis of social structure, mapping and testing the effects of position in social networks of uniplex ties. Networks based on weak ties are often large and far-reaching and agents who are central in weak ties networks in the sense s/he holds comparatively many weak ties to other agents possesses superior information, and an agent who is central in the sense s/he can connect to any other agent in the network with comparatively few middlemen, can mobilize other agents easier (Burt, 1992). Centrality in networks based on strong ties may provide power: an agent who holds ties to resourceful other agents may prevent others from accessing this agent by acting as gatekeeper (Ryall & Sorenson, 2007).

The literature has paid less attention to multiplex ties, i.e. different simultaneous affiliations between the same agents (e.g. when two agents are through both family membership and business partnership)(Barden & Mitchell, 2007; Granovetter, 1973). There is some evidence, however, that high achievers tend to hold multiplex ties (Cotton, Shen, & Livne-Tarandach, 2011). This may be because multiplexity intensifies commitment, interaction, and reflected glory between agents, strengthening trust and resource mobilization relative to a uniplex tie (Gould, 1991; Gulati, 1995). It is noteworthy that while multiplexity typically strengthens a tie, not all strong ties are multiplex (Granovetter, 1973).

On the combinations of different types of social ties an agent may hold, extant research is comparatively silent. Notably, there has been little investigation of tie diversity, i.e. different ties between different agents (e.g., when a manager is

tied to one person by family membership and another person by business partnership).

Social ties, resources, and performance

Social ties of managers have particular relevance in industries with high rates of new product development, where firms innovate in an Schumpeterian sense, i.e. combining and recombining knowledge and other resources from external sources (Ahuja, 2000; Lausen and Salter, 2006; Phelps et al., 2010; 2012). A prominent example of innovation through non-local search and resource recombination is temporary projects (Hobday, 2000). Projects is a long-standing way of organizing innovation (Hobday, 2000), but recently, much scholar attention has been dedicated to what determines the performance of innovation projects, for example, in service industries (Gann and Salter, 2000) or creative industries (Lampel and Shamsie, 2003).

Social ties may have significant effects for combination of resources. When key resources are scarce, uniplex ties may facilitate resource search (Granovetter, 1973), and managers who hold central positions in networks of such ties are better at identifying resources because they have superior information about what resources are available (Ahuja, 2000a; Owen-Smith and Powell, 2004). This is collaborated by empirical studies of innovation projects. Through their temporary collaboration, participants to such projects build uniplex ties to each other, and evidence from a range of predominantly US industries shows that agents who hold central positions in affiliation networks constituted by such uniplex ties perform better in subsequent projects (Uzzi, 1997; Ahuja, 2000b; Owen-Smith and Powell, 2003; Cattani and Ferriani, 2008; Ferriani et al., 2009; Andersen, 2012).

While some uniplex ties may facilitate information about resources, other ties may secure access to them, because social ties are channels for the exertion of influence and power (Koka and Prescott, 2002; Zaheer and Bell, 2005). Reputation effects arising from strategic uniplex ties — i.e., to particular, prominent agents — may help in acquiring resources. Social ties may also facilitate the process of managing resources. For example, in an innovation project, ties between project participants may lower transaction costs (Uzzi, 1996; Yin, 2001; Jack, 2005). This effect is likely to be stronger for multiplex ties than for uniplex ties, due to the stronger interdependence and trust between agents with multiple affiliations.

We still know little about how the performance effects of uniplex and multiplex ties compare, and how they may combine. Moreover, the performance effects of tie diversity have been largely unexplored. In order to contribute to building such knowledge, we now turn to an empirical study.

EMPIRICAL SETTING

As empirical setting, we choose the filmed entertainment industry, because it is based on innovation projects with shifting participants and consequently has a high incidence of social ties between participants to past projects. We specifically study Bollywood, where other types of social ties arise from the prominence of families in the industry. In the following, we introduce this setting.

The filmed entertainment industry

Like all so-called creative industries, the filmed entertainment (motion pictures and TV) industry develops products with symbolic content (Hirsch, 2000; Caves, 2000) through constantly recombining pre-existing resources in the guise of creative labor (holding aesthetic, narrative or design-oriented skills), finance, and marketing and distribution channels. The filmed entertainment industry has a niche market oriented ("art") segment that resembles the small-scale creative industries (such as painting, design, or architecture) in developing products with a high degree of novelty. However, the dominant industry segment targets mass markets and aims at developing products that align with consumer tastes and are only incrementally differentiated from contemporary bestsellers. Mass markets have high demand uncertainty and hit/flop dynamics (Goldman, 1983; de Vany, 2004), and to increase films' chance of success, most are developed on the basis of tested and proven formulas — for example Hollywood's action, comedy, and romance formulas (Wasko, 2003; Elberse and Eliashberg, 2003). However, tastes change rapidly and consumers herd to watch particular new aesthetics, narrative styles, or star casts. Hence, even films adhering to formulas strive at incorporating current inspiration and trends, and this makes commercial success contingent on combining the right strategic resources.

Of the range of resources needed to develop a film, finance, marketing and distribution channels are necessary, but human resources are often more strategic. In the preproduction phase of development, writers and directors create the story and script and may also help to attract finance. In the production (shooting) phase, the most strategic resources are cinematographer, art director and main cast (star cast may also help to attract other resources). In the postproduction phase, the most strategic resources are editors and composers. The combination of these resources is done in temporary product development projects, and as mass markets for filmed entertainment have short product cycles, the industry is characterized by high product development rates and high incidence of film projects. Rather than in the integrated studios known in the first half of the 20th century, film projects are now undertaken in vertically disintegrated collaborations between independent companies and freelancers, often clustered geographically in cities such as Los Angeles, Mumbai, and London. Film projects are set up and managed by modest-size production companies, typically employing only one or few project managers (producers) as well as support staff such as accountants. For each project, these companies access external resources from financiers, specialized service suppliers, and freelancing creative and technical labor with specialized skill profiles and roles (Baker and Faulkner, 1991; Bechky, 2006).

How these diverse resources, particularly human resources, are combined in a film project is not trivial. Products are generally open-ended and unpredictable; budgets and deadlines change, and roles and resources often need to be reshuffled to minimize losses. As investments sunk are significant, potential losses are substantial if a project has to be abandoned. Furthermore, many production companies want to access the same strategic resources (a popular scriptwriter, an stylish art director, or a high-grossing actress) at any given time. Consequently, competition for these resources is high. This means that the social ties of a project's participants is potentially very important for its performance.

Earlier studies of the filmed entertainment industry have focused on the effects of social ties for performance. More specifically, such research has investigated the performance effects of affiliations between a film project's key filmmakers (such as producer or director) and participants to earlier film projects. There is evidence that if a project's key filmmakers have high centrality in an association network of past project collaborations, his/her project has higher chance of structuring the strategic resources needed to produce a hit film (Usai, 2001;

Faulkner, Lampel and Shamsie; Delmestri, 2005; Uzzi and Spiro 2005; Sorenson and Waguespack, 2006; Cattani and Ferriani, 2008; Ferriani et al., 2009; Pontikes et al., 2010). Thus, this research has focused on (weak) uniplex ties, ignoring the effects of strong uniplex ties, multiplex ties, and diverse ties.

Bollywood

Hollywood was the first national film industry that invested in lavish production values and built scale advantages in marketing and distribution. Consequently, Hollywood became dominant on North American and European markets already in the 1930s (Bakker, 2005). Later-moving national film industries need to catch up to Hollywood in order to gain any significant presence on global markets (Hoskins et al., 1997; Lee and Waterman, 2007). Apart from the UK film industry, which to a large extent is intertwined with Hollywood and benefits from global English-language preferences, only Bollywood, the complex of film and related entertainment in Mumbai, India, has been able to catch up (Lorenzen, 2009).

Bollywood originates from 1912, roughly the same time as Hollywood, and its annual output — around 150 films by the middle of last century and 250 today — is also comparable to that of its North American competitor, although the low Indian purchase power mean that Bollywood revenues are modest relative to western film industries. The recent growth rates of Bollywood, however, surpass those of Hollywood. It is largely due to Bollywood that entertainment now is India's second biggest growth sector. While Bollywood releases 15% of Indian films, it accounts for 40% of India's film industry revenues, with a current annual growth rate between 10 and 20%. Mainstream Bollywood films now have production values and postproduction designs that are competitive on global markets, and Bollywood's exports grew by 450% between 1998 and 2005. In 2009, exports accounted for 15% of total revenues. Today, Bollywood is the largest foreign exporter to the US entertainment market, and successful films are currently screened in up to 75 US cinemas, some earning in excess of USD 1 million in their opening weekend, making them appear in the top 20 box office charts (FICCI and PWC, 2006; Lorenzen and Täube, 2008; Lorenzen, 2009; FICCI and KPMG, 2010).

Like Hollywood and other large-scale filmed entertainment industries, Bollywood's has a high occurrence of film projects, and in designing such projects, producers and directors take advantage of their uniplex social ties built through past project collaborations. However, compared to Hollywood, Bollywood is special because of its high incidence of family relations. Consequently, the empirical setting of Bollywood allows us to study combinations of weak and strong uniplex ties, multiplex ties, and diverse ties. Below, we outline how we design the empirical study of Bollywood.

METHOD AND DATA

As described above, our research field is at an intermediate stage of development. While theories of uniplex social ties are substantial, research on multiplex and diverse ties is less developed, and efforts have been few at theorizing the relationship between social ties, resources, and performance (for discussions, see Blyler and Coff, 2003; Starkey and Tempest, 2010). In order to develop such theory, we take advantage of the comparative strengths of both quantitative and qualitative research methods. More specifically, we undertake three studies: a range of key informant interviews, 30 case studies, and a quantitative analysis of attributional and relational data through a multinomial

logit specification. Each of these three studies applies the procedures for enhancing validity prescribed within its paradigm (Craswell, 2003): the two qualitative studies uses a triangulation of interview and secondary data for an open-ended exploration of questions arising from gaps in extant knowledge, and the quantitative study uses large-scale archival data to carry out a closed-end test of hypotheses.

This combination of methods constitutes integration, rather than merely triangulation. Interpreting and subsequently testing relationships between variables, the three studies use each other's results (rather than merely data) (Tashakkori and Teddlie, 2003; Bryman, 2007): qualitative insight into Bollywood yielded by key informant interviews and case studies is used to develop hypotheses about the performance effects of social ties in Bollywood, as well for calibrating the design of the quantitative study. Subsequently, the quantitative study is used for testing these hypotheses.

Key informant interviews

The first of the three studies consists of a qualitative investigation of Bollywood through key informant interviews, with the purpose of taking the first step towards building hypotheses about the performance effects of social ties. The interviews were designed both to provide a fundamental understanding of the economic and social structure of Bollywood, including not just social ties, but also the role of institutions, industry structure and demand characteristics, identify relevant types of social ties for investigation, and point to potential effects which may be studied more closely in our case studies.

We undertook interviews with key informants chosen in virtue of their position as prominent businessmen, investors, managers of industry associations and organizations, or observers of the recent twenty years' development of Bollywood. All interviews were done on-site in Mumbai, during the period 2005-2011. To control for bias, we selected key informants with different perspectives (educational and social backgrounds and length of experience), and we also triangulated the main findings from the interview data with archival data in the guise of the series of industry analyses published by KPMG and PWC since 2005. Table 2 provides an overview of the key informant interviews.

Table 2. The key informant interviews

	Data source	**Collection process**
Main data	**Key informant interviews: Industry experts and prominent local actors**	Primary data. 21 interviews, each 70-140 minutes, with 17 informants. Purposive sample of industry observers with knowledge of historical and present institutions, demand, and industry structure: Presidents of industry associations, film school, certification board, film development agency, journalists, financiers, managers of the largest Bollywood distribution companies, managers of corporations entering Bollywood, plus son of Bollywood's best-known director-producer V. Shantaram (active 1921-1986), magnate director-producer Yash Chopra (active since 1957), and Ramesh Sippy, the director of Bollywood's biggest hit (active since 1968). Open-ended, short unstructured protocol. Taped, transcribed or summarized.
Triangulation data	**Government reports on Bollywood's recent developments in industry structure and institutions**	Archival data. Full sample of all industry reports published by CII; FICCI; IBEF; KPMG; PWC; and USIBC in the period 2005-2010. Summarized.

The interviews show that Bollywood filmmakers hold numerous social ties affecting film project performance. Notable strong ties are family relationships, permeating the filmed entertainment industry in Mumbai. We also found various weak ties: acquaintanceships between filmmakers built through past project collaborations as well as ties to external stakeholders of the filmed entertainment industry, such as advertising and record companies. The latter is of particular importance because of the synergies between the Indian filmed entertainment and the music industry. The most popular recorded music in India consists of film soundtracks, and most of the popular music artists release their output mainly as film songs. Until the 1990s, revenues from sales of soundtracks were substantial, and the sale of the publishing rights to a film's soundtrack would secure up to a third of its production budget. Soundtracks and music videos, released a month before a film's opening, would also constitute the core of many films' PR strategy. Today, piracy has eroded the revenues from soundtracks, and TV and other media play a larger role for PR than soundtracks. However, when a film is able to release its soundtrack on a major Indian record label, it is still a strong signal that its producer is well connected to the music industry.

Case studies

The second study is used for a closer qualitative exploration of the effects of social ties suggested by our key informant interviews, as well as building propositions about the mechanisms underlying them. The purpose is to build hypotheses for subsequent testing.

This study consists of in-depth case studies of 30 films. These cases are purposefully sampled. Due to the high number of films produced in Bollywood annually, we cannot realistically study a stratified sample of projects, and the relevant sampling principle should hence be either maximum variation cases or extreme cases (Gerring, 2007; Dul and Hak, 2008). We chose the latter, in terms of the ten highest earning Bollywood films for each of three subsequent years 2003, 2004, and 2005. This deliberately biased case sampling allowed as a structured discussion of how the results are generalizable to the rest of Bollywood (Flyvbjerg, 2006). For example, if social ties affect the case study projects, they are likely to impact projects outside Bollywood's commercial and resourceful core even more. In order to choose the projects at the top of the performance scale, we need a finer-grained method than the ranking categories used in our quantitative study (see below). We identify the top ten earners for 2003-2005 by deducting production costs (listed on www.ibosnetwork.com) from box office collections in the year of release (listed on www.ibosnetwork.com and www.imdb.com) for the top 35 box office grossing films (all territories) for each year. The selected projects are outlined in Table 3 below.

Table 3. The 30 case studies

Film title and rank (year)
Bunty aur Babli #1 (2005), No Entry #2 (2005), Sarkar #3 (2005), Salaam Namaste #4 (2005), Black #5 (2005), Garam Masala #6 (2005), Kyaa Kool Hai Hum #7 (2005), Page 3 #8 (2005), Bluffmaster #9 (2005), Kaal #10 (2005)
Dhoom #1 (2004), Veer Zaara #2 (2004), Hum Tum #3 (2004), Masti #4 (2004), Hulchul #5 (2004), Main Hoon Na #6 (2004), Murder #7 (2004), Mujhse Shaadi Karogi #8 (2004), Lakshya #9 (2004), Ab Tak Chappan #10 (2004)
Koi.. Mil Gaya #1 (2003), Munna Bhai MBBS #2 (2003), Baghban #3 (2003), Andaaz #4 (2003), Tere Naam #5 (2003), Hungama #6 (2003), Kal Ho Naa Ho #7 (2003), Bhoot #8 (2003), Chalte Chalte #9 (2003), Jism #10 (2003)

We undertake an analysis of each film project based on archival data and semi-structured interviews with the producers (in some cases, also directors) of these films. To control for bias, we triangulate the findings from these case studies with interviews with randomly picked (both high and low performing) filmmakers active before and after the period 2003-2005. All interviews were done on-site in Mumbai, during the period 2006-2011. Table 4 provides an overview of the data sources for the case studies.

Table 4. Data sources used for the case studies

	Data source	**Collection process**
Main data	**Case studies of the 30 best performing film projects 2003-2005**	Primary data. 18 interviews, each 50-160 minutes, with 18 informants. Interviews with producers and directors in 15 production companies were undertaken, covering 23 of the case projects. Replicated design, semi-structured 500-word interview protocol. Taped and transcribed.
Triangulation data	**Interviews with randomly picked filmmakers active in the period 2000-2005**	Primary data. 19 interviews, each 25-120 minutes, with 15 informants. Randomly picked sample of filmmakers (producers, directors, PR people, actors, scriptwriters) in both high- and low-performing film projects before and after 2003-2005. Semi-structured interview protocol. Taped, transcribed or summarized.

The interviews were semi-structured, revolving around how the projects were designed and managed and which mechanisms impacted project performance. While our coding of interview data is aided by the theory (reviewed earlier) on social ties, we take a structured middle position between grounded theory and theory-determined coding (Dey, 1993), allowing themes and insights not treated in extant theory to arise. The coding of interview transcripts results in categories related to various types of social ties (ties arising from past project collaboration; family relations across Bollywood; project collaboration between family members), as well as various activities of combining resources (search; acquisition; management and use), as illustrated in Table 5 below.

Table 5. Structure and coding of interview data in the 30 case studies

Themes discussed in interviews	**Coding categories**	**Examples of answers (quotes)**
Producer's/director's project collaborations (present and past) with other Bollywood filmmakers	Association ties from past project collaborations	"The body of work that we have, is something which very, very few can match. And with that comes the knowhow, with that comes the experience, and the contacts." "My credibility … could match [because]… my production house has done almost thirty films."
Producer's/director's/main cast's nonbusiness ties (family and other) to other Bollywood filmmakers	Family relations across Bollywood	"I've been born into a film family, so I've been eating, sleeping films, cinema." "Because my father was in the business and my mother was in the business, my uncles were in the business so from the childhood I've been living in the studios and laboratories and my experience is to my advantage."
Producer's/director's/main cast's nonbusiness relation to other project participants	Project collaboration between family members	"We're like an excellent clan." "Everything is done in the family." "I've had one film at any given time with a family member and the other beyond or outside the family."
Producer's/director's a priori information about main cast, finance, scripts, studio dates, distribution/marketing functions	Resource search	"I just pick up the phone and call him, and he will probably say yes … You just send an SMS and say 'You want to have brunch on Sunday?' or 'It's a long time since you came to my house for food!'" "A producer can pick up the phone and know in less than 15 minutes whether Aamir is in town and whether he is available".
Access to main cast, finance, scripts, studio dates, distribution/marketing functions	Resource acquisition	"Whoever all the actors in my films … would work … at no price." "Two films I give to one of my friends, one film I gave to another friend of mine, and one film I used myself." "Warner Brothers and the studios take almost 6 months to do one agreement. It would simply take me 2 minutes."
Deployment and utilization of main cast, finance, scripts, studio dates, distribution/marketing functions	Resource management and use	"A strategy of making strong use of the brand of the producers." "The biggest star of this country … paid for his own travel."

Quantitative analysis of attributional and relational data

In the third study, we estimate econometric models to test associations between uniplex, multiplex, and diverse ties and filmmakers' probability of contributing to low versus high performing projects. As the filmed entertainment industry is characterized by temporary projects and high labor mobility, several earlier studies of network dynamics are based on film industry data (Usai, 2001; Faulkner, Lampel and Shamsie; Delmestri, 2005; Sorenson and Waguespack, 2006; Cattani and Ferriani, 2008; Ferriani et al., 2009; Pontikes et al., 2010; Andersen, 2012).

We utilize archival data on key filmmakers' contribution to and performance of all Bollywood film projects over a five-year time period. The Internet Movie Data Base (IMBD), widely used for the purpose of social network analysis of Hollywood, is ineffective for a similar analysis of Bollywood, because its listing of Indian films is not sufficiently systematic. For that reason, we build a unique database of Bollywood films by combining data provided by Indian Motion Pictures Producers' Association (courtesy of Vinay and Priti Sinha), the database Indian Film Trade (courtesy of the Mumbai film school Whistling Woods International), and film data assembled by the Mumbai film trade journal Screen World (courtesy of Rajendra Ojha). The database covers all Hindi language films certified by the Mumbai branch of the National Board of Film Certification. As virtually all certified films are subsequently released on the market, the database hence represents all Bollywood film projects that are brought to fruition. The data includes names of companies and individuals participating to the development of each film, as well as an assessment of its box office performance done by four leading Bollywood film magazines.

For our analysis, we selected a population of the 920 films released in the period 2001-2006. This is the longest possible recent time period with good data on each film's performance and key project participants. This is also a period in which Bollywood experiences a significant growth of turnover, exports, and investments. We limit our study to four key participants per film project: producer, director, and the two main casts (top billed male and female). In the population, there are 1,772 such filmmakers, the least active of whom participate to just one project during the study period, whereas the busiest participates to 23.

This amounts to a total of 3,496 project participation incidents (counted as one filmmaker working on one project). We map the project collaboration ties between all filmmakers in our population (working together on one film project equals one collaboration tie).[1] Thus, we find a handful of small isolated network components, as well as one much larger component. For this component, we lack performance data for some projects, and we use participation in projects released in 2001 and 2002 to create a robust association network. We want to calculate comparable network positions for all participants and consequently, we reduce our sample by omitting the projects whose participants were not a part of the main network component (approximately 5% of all projects). This resulting network comprises 454 film projects with 1,680 incidents when a total of 925 producers, directors, and cast members collaborated in projects in the period 2003-2006.

We develop one dependent variable:

Performance. Performance is measured for each film project, and range from 1 to 5 (5 being the highest) subsequently assigned to all filmmakers participating to the project***.*** Because Bollywood does not systematically report box office earnings, we estimate film performance based on the assessment of box office

[1] For examples of previous use of mapping an association network on the basis of past project collaboration, see Cattani, G., & Ferriani, S. 2008. A Core/Periphery Perspective on Individual Creative Performance: Social Networks and Cinematic Achievements in the Hollywood Film Industry. ***Organization Science***, 19(6): 824-844, Delmestri, G., Fabrizio Montanari , Alessandro Usai 2005. Reputation and Strength of Ties in Predicting Commercial Success and Artistic Merit of Independents in the Italian Feature Film Industry ***Journal of Management Studies***, 42(5): 975-1002, Ferriani, S., Cattani, G., & Baden-Fuller, C. 2009. The relational antecedents of project-entrepreneurship: Network centrality, team composition and project performance. ***Research Policy***, 38(10): 1545-1558, Sorenson, O., & Waguespack, D. M. 2006. Social Structure and Exchange: Self-confirming Dynamics in Hollywood. ***Administrative Science Quarterly***, 51(December): 560-589, Usai, A., Guiseppe Delmestri and Fabrizio Montanari. 2001. Human capital, Social Capital and Performance: An Empirical test from an Entrepreneurial Project-Based Industry. ***SDA Bocconi, Research Division Working Paper***, 44(01)..

performance made by Bollywood magazines, which we transform into a scale of ordered categories from 1 to 5. We label the categories "non-starter at the box office", "break-even", "some good remarks", "all good remarks", and "all good remarks and awards to prove it"[2]. This is done by two independent coders (one research assistant and one PhD student). When labeling diverged, the authors made the final decision. Though categories are ordered, the parallel regression assumption does not hold, as we cannot expect a one unit shift between categories to be consistent across the scale.

We develop four key (independent) variables:

Uniplex ties. A filmmaker's uniplex ties are measured by the number of his or her family relations to Bollywood film dynasties. Two independent coders (one academic expert on Bollywood and one Bollywood filmmaker) code each filmmaker's family relations by birth or marriage to all other filmmakers in the sample, as well as to Bollywood dynasties that are not represented in the sample.[3] 133 out of the 925 filmmakers in the sample hold ties to a total of 86 families. As family membership is reciprocal, all related agents are equally connected and it makes little sense to measure centrality (and as family relations arise through birth or marriage, they change so slowly that our measurement does not benefit from rolling windows). Hence, we simply count the number of Bollywood families each project participant is affiliated with. As robustness check, we rerun all models with uniplex ties as a dummy variable in stead (1 denoting membership of Bollywood filmmaking families).

Multiplex ties. A filmmaker's multiplex ties are measured by a dummy variable obtaining the value 1 when he or she collaborates with family members in a film project. Filmmakers involved in projects with more than one member of the same prominent family were assigned the value 1. When two or more project participants hold multiplex ties, the performance of that project is ascribed to all its participants. Consequently, filmmakers who participate to such a project but hold no multiplex ties themselves could also obtain the value 1 for this variable.

We investigate tie diversity by how the two types of ties described above interact with other tie types. We develop two variables to capture such other tie types:

Ties to peers. A filmmaker's ties to other filmmakers are is measured by his or her centrality (expressed as a percentage) in the association network of past project collaborations. A central position in this network is achieved through obtaining a high number of social ties to previous collaboration partners (Reinholt et al., 2011). Calculating centrality, we use three year windows (two years for observations in 2003) and a one year time lag assuming that network position in year t affects probability in year t+1. Having ties to central actors in a network provides efficient access to more other actors than having ties to peripheral actors (Owen-Smith & Powell, 2004). To capture this distinction, we measure centrality as the normalized eigenvector centrality. For the association network (adjacency matrix) A, the eigenvector centrality of filmmaker i (ci) the eigenvector closeness centrality measure is calculated by the algorithm:

$$c_i = a \sum A_{ij} c_j$$

[2] The assessments done in the Bollywood magazines are predominantly concerned with box office performance and only pay very little attention to artistic performance. Bollywood film are similar, and are mainly granted based on box office performance.

[3] As the sample covered five years of filmmaking, one or several members of almost all active Bollywood dynasties were included in the sample. Only a few of the older and largely inactive dynasties were not represented in the sample. Nevertheless, they were still coded.

where α is a parameter with reciprocal eigenvector value. The eigenvector centrality of each filmmaker therefore depends on the eigenvector centrality of its associated filmmakers (c_j). Both the size of the filmmaker's network as well as the quality and reachability of the ties are included in the measure. Normalized eigenvector centrality is the scaled eigenvector centrality divided by the maximum difference possible. For an example of other use of this variable, see (Ferriani et al., 2009).

Ties to external stakeholders. We also investigate a filmmaker's ties to external stakeholders to the filmed entertainment industry. We select an example of such stakeholders, record companies, and measure a filmmaker's ties to this category of stakeholders by a dummy variable obtaining the value 1 when he is able to get his film's soundtrack released on one of the 13 major record labels (identified by a Bollywood expert from the 34 labels listed in our sample).[4]

In order to investigate the effects of tie diversity, we interact the *uniplex ties* and *multiplex ties* variables with the *ties to peers* and *ties to external stakeholders* variables.

Furthermore, we develop three control variables: ***Project maximum centrality****.* The centrality of one project participant can potentially spill over and provide benefits to other, less central participants (Andersen, 2012). Consequently we control for the maximum level of centrality in the association network of past project collaborations by any project participant for each project. We measure this as eigenvector centrality.

Role in the production process*.* Role in the production process could mediate the use of resources (Baker & Faulkner, 1991) and we consequently control for each filmmaker's role as either producer, director, leading male and female cast in our models. Director is reference category.

Release year*.* Following standard procedure within research on the filmed entertainment industry, we control for release year to control for systematic variations across the studied period (Cattani & Ferriani, 2008; Cattani et al., 2008; Ferriani et al., 2009).

Tabel 6 below shows the descriptive statistics for main effects of dependent, key, and control variables. Correlations among independent variables and variance inflation factors show no indication of multicollinearity issues.

Table 6. Description of our quantitative data.

Variable	Obs	Mean	Std. Dev.	Min	Max
M_logit_ra~5	1680	1.865476	1.047871	1	5
within_pro~m	1680	.0827381	.275568	0	1
Bolly_klan	1680	.2047619	.4443825	0	3
eigenvector	1680	.0413172	.0575873	4.92e-09	.2931611
eigen_with~s	1680	.0045759	.022729	0	.2341218
music_top	1680	.4684524	.4991523	0	1
music_top_~n	1680	.0488095	.2155338	0	1
max_eigen	1680	.081751	.0799368	6.32e-08	.2931611
producer	1680	.3202381	.4667069	0	1
ccast	1680	.4303571	.4952735	0	1

[4] The labels selected were Eros, HMV, Music Today, SaReGaMa, Sony Music, T-Series, Times Music, Tips, Universal, Venus, Virgin Music, Yash Raj Music, Zee Records.

HYPOTHESIS DEVELOPMENT: QUALITATIVE STUDY

In the following, we develop four hypotheses about the performance effects of social ties, based the insights into effects of social ties in Bollywood provided by our key informant interviews and insights into the mechanisms behind the effects provided by our case studies.

The effect of uniplex ties

Fully commercial and enjoying no state subsidies, Bollywood operates other large-scale film industries. It comprises a large (and shifting) number of production companies, specialized suppliers, and freelancing creative and technical labor, collaborating in constantly changing project configurations. Social ties play a significant role for designing new film projects, and one important example of uniplex ties is family relations.

Our key informant interviews cast light on the history of family relations in Bollywood. After Indian independence, there was a significant influx of small, family-based production companies from North India and Pakistan to Mumbai, and for the subsequent half-century, family relations have been an often-used port of entry to Bollywood. Two producers in our case projects exemplify how family relations have helped them start as filmmakers:

(Producer interviewed March 24, 2006): My dad used to make core Bollywood cinema so he has the respect … I also have a manager of mine, who has brought me up. He was with my dad so he knows the industry very well and he knows everybody."

(Producer interviewed March 23, 2006): "My family has had bearings here in Bombay with film industry people, and so I have been friends with so many film industry people. When you're there in this kind of environment you're only doing films all the time … My first independent film venture … was produced by my father .... In fact my brother who went on to become a major star, he also helped me in production … So it was a good platform for me to take off and since then I've been doing the kind of cinema I do.... "

Today, Bollywood is growing its turnover and exports and modernizing fast, applying state-of-the-art technologies and production designs in order to produce films with production values on a par to Hollywood. However, Bollywood's traditional organization has proven to be remarkably resilient. Family relations are still abundant, and the majority of Bollywood's production companies, including most of the successful mainstream companies, remain family-owned. The Bollywood dynasties of star actors and actresses are well-known, and family relations also abound among other filmmakers in the industry. Says one actor (interviewed April 9, 2006):

"Bollywood makes films about big noisy families, and we *are* one big noisy family!"

Out of the 30 case projects, 24 had uniplex ties in the guise of family relations to Bollywood dynasties. Three producers of case study films exemplify their own family relations.

(Producer interviewed March 30, 2006): "I'm the third generation in my family. So the only thing I do is make movies. The only thing I know is making movies and nothing else."

(Producer interviewed March 23, 2006): "Well, see, it's a long journey starting with the early generation. My father was in Bombay film industry first … When my mother gave birth to me, my father had to leave a shoot and come. I've been born into a film family, so I've been eating, sleeping films, cinema."

(Producer interviewed April 7, 2006): "See it's the fact that it's born in the family. My father made 128 movies so genetically we're workaholics. I'm only 45 years old and my brother has made 70 movies so between father and 2 sons we have nearly 250 movies … And I feel that because my father was in the business and my mother was in the business, my uncles were in the business so from the childhood I've been living in the studios and laboratories and my experience is to my advantage."

In combination with our key informant interviews, our case studies suggest an interesting effect of family relations to prominent Bollywood filmmaking dynasties: they facilitate combination of strategic resources in a manner that effectively blocks competitors' access to the same resource at a particular point in time. Such appropriation, particularly of star actors and studio dates, is important for performance of Bollywood film projects because of competition between mainstream production companies for these strategic resources. This competition is fierce because of the nature of Bollywood's dominant product formula, the *masala* (literally, "spice mix"). Targeting an all-Indian audience, *masala* films revolve around emotions and reverie rather than stories, and their content is jokingly summarized by studio owner Rahul Shantaram, son of director V. Shantaram who dominated Bollywood for almost 60 years (interviewed March 16 and 20, 2006) as

"… one star, six songs, three dances".

Hence, scripts are not a strategic resource for *masala* films, but given their lush production values, finance is. Finance often hinges upon star cast, with some actors so hugely popular they can ensure commercial success of almost any film, as well as attract financiers. However, with less than twenty top actors and actresses who demand upfront fees constituting up to half of films' budgets, stars are an extremely scarce and potentially expensive resource. Furthermore, because Bollywood stardom is relatively short, star actors are known to overbook their calendars when they are at the peak of their career. This means that they often get delayed for shoots, causing delays of production schedules. Such delays may cascade, because film studio dates are another scarce resource in Bollywood (high property values in chronically crowded Mumbai have converted many film studios to alternative use). If a studio date is lost due to star actor cancellation, a new may take months to obtain. A prominent director-producer (interviewed June 24, 2005) expresses his view on this situation:

"Chaos! Absolute mayhem!"

As star actors are not just central to sales, but also hold the key to other strategic resources, such as finance and studio dates, a producer's or director's ability to acquire resources through signing star actors and negotiate a reasonably low fee, and manage resources through motivating actors to perform highly and refrain from cancelling dates, is crucial for project performance. Our case studies illustrate how family relations to Bollywood dynasties may facilitate exactly this type of resource acquisition and management. The producer of one of the highest-grossing case study films, nephew of two of Bollywood's most prolific film producers and married into another prominent filmmaking family (interviewed April 1, 2006) explained in detail how his position as producer allowed him to combine resources in the guise of star cast and scriptwriters:

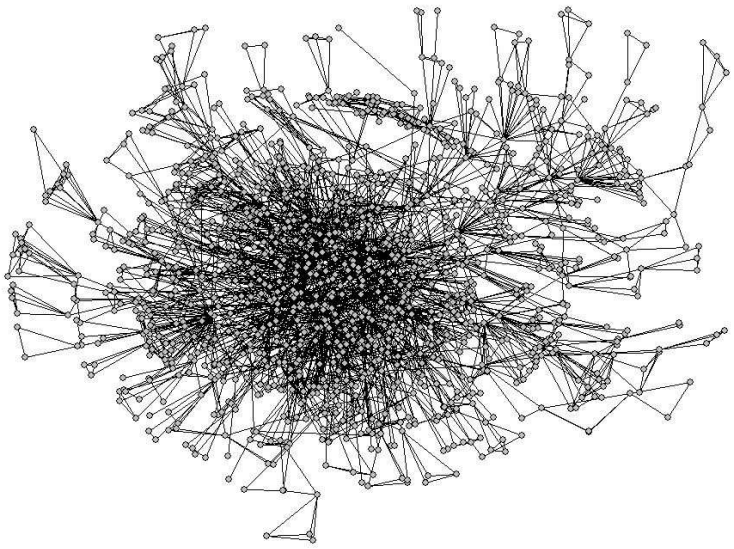
"It is very very unique in the sense that I don't pay anybody. Whoever, whoever all the actors in my films as Sanjay Dutt, Amitabh Bachchan, Saif Ali Khan, Jackie Shroff, Boman Irani, Jimmy Shergill [all star actors] … Somebody like Amitab Bachan [Bollywood's formerly top grossing star actor] … would work … at no price. But not only at no price mark, because he wanted to stay in a better hotel which I couldn't afford for the rest of the crew, he paid for it. I couldn't give him a private plain to fly in, he actually paid for his plane. He paid for his own travel. So this is so unusual that the biggest star of this country will do that. And he will return if the film makes money and I will do the best I can … You see Raju Hirani [a high-grossing scriptwriter] … was signed for 1 lakh [100,000] rupees and by that time of release we had no money. So I paid him 11.000 rupees in the same room and said go and have a nice evening and have a drink … I don't know in how many films I'm the top producer but I don't have a lawyer … Warner Brothers and the studios take almost 6 months to do one agreement. It would simply take me 2 minutes."

We want to test whether such positive effects of family relations are widespread throughout Bollywood, and consequently, we develop the first hypotheses for subsequent testing ***H1: Uniplex ties enhance project performance.***

The moderating effect of diverse ties on uniplex ties

Our key informant interviews reveal that in Bollywood like in other large-scale filmed entertainment industries, a dozen well-established mainstream production companies release the majority of blockbusters and big-budget films to mass markets, while a periphery of hundreds of other production companies enjoy less commercial success or target niche markets. This industry structure is traceable in the network of social ties formed between filmmakers through their past collaboration in film projects. We mapped this network of project collaborations for the years 2001-2006. This Bollywood association network resembles networks in other, previously studied film industries, for instance in Hollywood (Cattani et al., 2008; Pontikes et al., 2010), Italy (Usai et al., 2001; Delmestri et al., 2005), and Denmark (Andersen, 2012). Like these other industries, Bollywood has a core group of filmmakers who are particularly active and often collaborate with each other. The structure of the Bollywood association network is depicted in Figure 1.

Figure 1. The studied Bollywood association network (main component of the past project collaboration network for 2001-2006)



In combination with family relations, ties to filmmaking peers formed in past project collaboration represents diverse ties. Our interviews provide examples of how this type of tie diversity facilitate resource search through providing access to information, as well as resource acquisition through reputation effects and personal favors. Several filmmakers point to how ties to filmmakers met in past project collaborations allow filmmakers to access information about each other. Says one central actor (interviewed April 9, 2006):

"A producer [with many ties] can pick up the phone and know in less than 15 minutes whether Aamir [Khan, one of the biggest star actors] is in town and whether he is available".

Talking about his own production activities, he continues:

"If I want to produce something with Sharrukh [Khan, Bollywood's biggest star], I just pick up the phone and call him, and he will probably say yes … You just send an SMS and say "You want to have brunch on Sunday?" or "It's a long time since you came to my house for food!" … There is no way you can ever do that in Hollywood, no matter who you are, no matter whether you are a star or not, it will need to go through formal channels."

A producer who has been working with the majority of present-day star actors (interviewed March 23, 2006) says:

"There are very few filmmakers, very few production houses who's done this kind of, you know the

body of work that we have, is something which very, very few can match. And with that comes the knowhow, with that comes the experience, and the contacts."

He also exemplifies how many past project collaborations gives reputation:

"My pockets may not be as deep as Yash Chopra's [the biggest Bollywood production company] but my credibility perhaps could match his [because]… my production house has done almost thirty films."

The producer quoted above also exemplifies how the combination of social ties to people from past project collaborations and uniplex social ties in the guise of family relations enhance performance through personal favors:

"There are one or two films that I've taken up only because I wanted to help a friend of mine. He could not find buyers, he could not release his film so I could release it with my system … Madhuri [Dixit, one of the biggest female star actors of the 1990s] was like our in-house heroine [because of her close ties with the producer's brother]. We had a contract for 5 films with her ... two films I give to one of my friends, one film I gave to another friend of mine, and one film I used myself."

Hence, we hypothesize ***H2: Diverse ties enhance the positive project performance effect of uniplex ties.***

The effect of multiplex ties

Family relations are not just frequent across Bollywood, they also proliferate inside film projects. When a filmmaker collaborates with a family member, this represents a multiplex social tie. Out of the 30 case projects, 18 had multiplex ties in the guise of family members collaborating (8 projects had more than one multiplex tie). Three producers in these case studies describe how they work with their family:

(Producer interviewed March 24, 2006): "Where I get my money from? 60% is mine, the rest I get from my family like my dad. He doesn't interfere with anything but I do take his advice. This man made 60 movies over a period of 60 years!"

(Producer interviewed March 23, 2006): "In my films, either [my brother] works with a newcomer … or he works my wife … There's no point working with in-betweens."

The latter producer involves family in his film projects so often that he feels the need to add a disclaimer:

"When you are doing two to three films at the same time you can't have just your family doing all the films. So I've had one film at any given time with a family member and the other beyond or outside the family."

Our case studies provide insight into the reason for the many multiplex social ties in Bollywood. One producer (interviewed April 7, 2006) hints at the reason when he claims:

"I feel great pride in calculating my own family."

Another producer (interviewed April 7, 2006) explicates how a similar sense of pride plays out in his work:

"And now we're 3 generations in the business, right from my father from black and white era when my father joined the industry, to the color movies and now my son have taken over … My niece, she has been a popular actress and now she is producing and directing herself. My nephew was a big star and now he is a director … We're like an excellent clan … we are an unlimited company and not a public company and it's a family run business and I'm the chairman … We have no partners. Everything is done in the family."

Due to such sense of pride, many Bollywood filmmakers self-select into film project with family members. This sense of pride goes as far as to make filmmakers work with family members in projects that have less performance potential:

(Producer interviewed March 23, 2006):"[My brother, a star actor] has been involved in production from the initial times with me … I was handling his career till his 61st or 62nd film … [and] I've had some major ups and downs in my career … I've been down in the dumps like no other person has been."

Keeping with the cultural setting of our study, we call such "blind" family loyalty (self-selection regardless of the performance potential of a project) for a *dharma* mechanism.[5] In the film industry, key participants will often (contingent on contracts) leave poorly performing projects before completion, but in Bollywood, the *dharma* mechanism makes many family members stay even in less promising projects. As result, we may expect that multiplex ties in the guise of family members collaborating will be overrepresented in poorly performing projects. Furthermore, film projects that use people on the basis on their family relations rather than on their skills will, ceteris paribus, mean a high degree of resource iteration, a lower diversity of resources (lock-in), and poor innovation performance. Consequently, we hypothesize ***H3: Multiplex ties decrease project performance.***

The moderating effect of diverse ties on multiplex ties

While our case studies suggested that multiplex ties may be associated with poorly performing projects, our key informant interviews suggest that, in some instances, self-selection into projects with multiplex ties may be perfectly rational. Several key informants point out that several of the most successful and most experienced filmmakers often collaborate with their family members. One key informant (interviewed April 14, 2006) describes the strategy of a producer with a substantial history of successful projects who often co-produce with his son and sometimes use a second son in the main cast as:

"[The company] making strong use of the brand of the producers".

Such branding is very valuable in an industry where most producers and directors need to attract external finance to their projects. For several of our case projects produced by experienced, well-established filmmakers, family relations inside projects constitute a strong brand and indicate economic potential to investors.

Filmmakers build such family-based brands through signaling, openly flagging their use of family members as an added value to their film projects. The case project producer (interviewed April 7, 2006) who expressed his pride in family above consistently uses his brother as scriptwriter and director and says about him:

"I have a genius of a brother. Has very fertile soil".

This signaling process is likely to be affected by tie diversity. Producers may use their ties to filmmaker peers, and to Bollywood's external stakeholders (advertising companies, record labels, and of course financiers), to flag the value of collaborating with their family.

In the case mentioned above (interviewed April 7, 2006), the repeated collaboration between the two brothers is highly commercially successful. However, this is not just due to the scriptwriter/director brother being one of the most productive in Bollywood, it is also a result of the producer's consistent strategy of inviting newcomer actors and technical talent into productions — traceable in the producer's very high number of ties from past project collaborations. Thus, tie diversity is not just used for signaling and branding, it is also used for counteracting lock-in following from resource iteration.

In sum, our qualitative data suggests that while multiplex ties may generally be associated with poor project performance, there is a group of Bollywood filmmakers who are able to use tie diversity, i.e. ties to peers and to external stakeholders, to avoid resource lock-in and even turn multiplex ties and resource iteration into an advantage through building family-based brands. Consequently,

[5] "Dharma" is Sanskrit and can be translated loosely as "obligation" or "proper conduct".

we hypothesize ***H4: Diverse ties decrease the negative project performance effect of multiplex ties.***

HYPOTHESIS TEST: QUANTITATIVE STUDY

We now test our hypotheses. Table 7 below shows the estimated models 1-6. Controls are estimated in model 1, main effects of key variables are included in model 2 and 3, model 4 includes the interaction between multiplex ties and ties to external stakeholders, model 5 the interaction between multiplex ties and ties to peers, and model 6 both interactions between multiplex ties and both the latter types of ties.

Table 7. Multilevel logit models predicting probability of transition from performance baseline (category 2).

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
				Transition to category 1 (”non-starter at the box office”)				
Multiplex ties		0.210	0.838	0.321	0.166	0.204	1.079*	0.188
		[0.474]	[0.589]	[0.686]	[0.483]	[0.481]	[0.652]	[0.487]
Uniplex ties		0.135	0.111	0.135	0.044	0.127	0.108	0.066
		[0.152]	[0.154]	[0.152]	[0.129]	[0.140]	[0.154]	[0.126]
Ties to peers		-2.080	-1.106	-2.093	-1.962	-2.061	-1.094	-1.930
		[1.299]	[1.309]	[1.289]	[1.313]	[1.297]	[1.310]	[1.319]
Ties to		-0.540**	-0.558**	-0.528*	-0.559**	-0.563*	-0.539*	-0.464
external stakeholders		[0.265]	[0.266]	[0.277]	[0.266]	[0.338]	[0.276]	[0.365]
Peers*multiplex			-15.625				-16.168	
			[10.466]				[9.929]	
External*multiplex				-0.194			-0.392	
				[0.948]			[0.946]	
Peers*uniplex					2.213			2.859
					[2.760]			[3.229]
External*uniplex						0.044		-0.200
						[0.389]		[0.466]
max_eigen	-5.542***	-3.832**	-3.841**	-3.853**	-5.398*	-3.873**	-3.866**	-5.673*
	[1.739]	[1.849]	[1.856]	[1.856]	[2.769]	[1.868]	[1.864]	[2.905]
producer	-0.032	0.002	0.009	0.001	-0.010	0.000	0.009	-0.009
	[0.081]	[0.083]	[0.083]	[0.083]	[0.081]	[0.082]	[0.083]	[0.081]
ccast	0.008	0.053	0.056	0.053	0.050	0.053	0.056	0.048
	[0.065]	[0.077]	[0.077]	[0.077]	[0.077]	[0.077]	[0.077]	[0.077]
Constant	0.818***	0.990***	0.957***	0.988***	1.058***	0.996***	0.953***	1.050***
	[0.282]	[0.300]	[0.300]	[0.301]	[0.310]	[0.304]	[0.301]	[0.309]
				Transition to category 3 (”some good remarks”)				
Multiplex ties		0.601	0.382	1.053	0.545	0.651	0.837	0.629
		[0.553]	[0.698]	[0.833]	[0.558]	[0.567]	[0.913]	[0.564]
Uniplex ties		0.487***	0.511***	0.486***	0.371**	0.553***	0.511***	0.448***
		[0.173]	[0.177]	[0.172]	[0.155]	[0.159]	[0.178]	[0.151]

Ties to peers		0.006	-0.469	-0.068	0.152	-0.004	-0.525	0.180
		[1.295]	[1.418]	[1.287]	[1.305]	[1.286]	[1.417]	[1.315]
Ties to		0.219	0.231	0.304	0.193	0.388	0.308	0.616
external stakeholders		0.356]	[0.356]	[0.365]	[0.357]	[0.423]	[0.366]	[0.464]
Peers*multiplex			2.886				2.435	
			[5.564]				[5.159]	
External*multiplex				-0.730			-0.681	
				[1.098]			[1.103]	
Peers*uniplex					2.862			5.726
					[2.697]			[3.597]
External*uniplex						-0.294		-0.791
						[0.459]		[0.598]
max_eigen	3.569**	2.720	2.718	2.655	0.621	2.966	2.638	-0.975
	[1.754]	[1.951]	[1.946]	[1.940]	[2.654]	[1.983]	[1.940]	[3.020]
producer	-0.050	-0.044	-0.050	-0.045	-0.061	-0.035	-0.049	-0.057
	[0.105]	[0.108]	[0.109]	[0.108]	[0.105]	[0.105]	[0.109]	[0.104]
ccast	-0.060	-0.084	-0.089	-0.078	-0.088	-0.078	-0.081	-0.092
	[0.092]	[0.112]	[0.114]	[0.113]	[0.112]	[0.112]	[0.114]	[0.112]
Constant	-0.331	-0.558	-0.535	-0.593	-0.460	-0.615	-0.565	-0.499
	[0.332]	[0.371]	[0.369]	[0.372]	[0.384]	[0.377]	[0.369]	[0.386]
Transition to category 4 (”all good remarks”)								
Multiplex ties		0.670	0.708	-13.946***	0.508	0.420	-14.895***	0.408
		[0.751]	[0.841]	[0.720]	[0.745]	[0.724]	[0.837]	[0.727]
Uniplex ties		0.313	0.308	0.305	0.022	-0.005	0.308	-0.060
		[0.232]	[0.237]	[0.237]	[0.218]	[0.217]	[0.239]	[0.210]
Ties to peers		4.015**	4.079**	4.043**	4.605**	4.448**	3.967*	4.581**
		[1.977]	[2.062]	[1.980]	[2.022]	[2.108]	[2.051]	[2.088]
Ties to		0.696	0.696	0.489	0.612	-0.718	0.484	-0.640
external stakeholders		[0.509]	[0.511]	[0.524]	[0.519]	[0.758]	[0.524]	[0.741]
Peers*multiplex			-1.065				1.560	
			[4.651]				[4.778]	
External*multiplex				14.934***			15.735***	
				[1.076]			[1.070]	
Peers*uniplex					8.565**			2.542
					[4.146]			[4.179]
External*uniplex						1.891***		1.677**
						[0.727]		[0.764]
max_eigen	7.543***	4.694*	4.651*	4.959**	-2.943	3.125	4.970**	1.568
	[2.175]	[2.480]	[2.485]	[2.476]	[4.244]	[2.461]	[2.475]	[3.927]
producer	-0.031	-0.063	-0.066	-0.066	-0.124	-0.138	-0.075	-0.148
	[0.145]	[0.140]	[0.139]	[0.142]	[0.146]	[0.142]	[0.142]	[0.145]
ccast	-0.217	-0.468**	-0.467**	-0.476**	-0.510**	-0.497**	-0.481**	-0.500**
	[0.134]	[0.197]	[0.197]	[0.197]	[0.203]	[0.213]	[0.197]	[0.211]
Constant	-1.750***	-2.222***	-2.213***	-2.128***	-1.855***	-1.907***	-2.109***	-1.857***
	[0.380]	[0.580]	[0.582]	[0.562]	[0.564]	[0.535]	[0.561]	[0.565]

	Transition to category 5 (”all good remarks and rewards to prove it”)							
Multiplex ties	0.880	0.128	-12.940***	0.847	0.990	-13.422***	1.013	
	[0.991]	[1.058]	[1.260]	[1.000]	[1.043]	[1.454]	[1.066]	
Uniplex ties	0.479*	0.532**	0.474*	0.419**	0.629***	0.525**	0.534**	
	[0.262]	[0.255]	[0.264]	[0.196]	[0.241]	[0.255]	[0.222]	
Ties to peers	3.745	2.626	3.887	3.861	3.638	2.722	3.781	
	[4.652]	[4.948]	[4.551]	[4.638]	[4.669]	[4.833]	[4.648]	
Ties to	2.523**	2.564**	2.304**	2.505**	2.975***	2.301**	3.520***	
external stakeholders	[1.046]	[1.065]	[1.074]	[1.045]	[0.998]	[1.075]	[0.768]	
Peers*multiplex		8.030				9.716*		
		[5.629]				[5.609]		
External*multiplex			13.918***			13.542***		
			[1.595]			[1.638]		
Peers*uniplex				1.143			7.513	
				[4.393]			[5.657]	
External*uniplex					-0.590		-1.360	
					[0.856]		[1.190]	
max_eigen	7.172**	4.104	4.210	4.048	3.491	4.773	4.178	-0.489
	[3.009]	[5.267]	[5.247]	[5.164]	[5.579]	[5.469]	[5.127]	[4.069]
producer	-0.201	-0.184	-0.199	-0.181	-0.186	-0.145	-0.192	-0.176
	[0.226]	[0.213]	[0.217]	[0.213]	[0.209]	[0.220]	[0.217]	[0.214]
ccast	0.051	-0.184	-0.220	-0.195	-0.176	-0.151	-0.241	-0.170
	[0.176]	[0.380]	[0.385]	[0.377]	[0.386]	[0.397]	[0.383]	[0.393]
Constant	-3.396***	-5.606***	-5.565***	-5.419***	-5.575***	-5.879***	-5.342***	-5.926***
	[0.792]	[0.926]	[0.942]	[0.901]	[0.879]	[0.786]	[0.908]	[0.774]
Pseudo LL	-1980.49	-1923.83	-1915.96	-1916.75	-1915.58	-1906.84	-1908.38	-1901.179
No of Obs	1680	1680	1680	1680	1680	1680	1680	1680
Wald-Chi2	65.6186***	179.2148***	191.7369***	1926.236***	211.018***	246.4965***	1760.165***	234.7546***

Note: * p<0.1, ** p<0.05, *** p<0.01, Year dummies estimated but not reported

Model 1 includes controls only. Model 2 to 8 test Hypothesis H1, that there is a positive association between uniplex ties (family relations to Bollywood dynasties) and performance. All models 2 to 8 support the proposed positive association for transition from a performance baseline (category 2, “break-even”) to category 3 (“some good remarks”) and 5 (“all good remarks and awards to prove it”). H1 is supported.

Hypothesis H2 posing that the positive effect of uniplex ties is enhanced by diverse ties is tested in model 5 and 6. First, we look at the main effect of the two additional tie types (ties to filmmaker peers and ties to external stakeholders). In all models the main effect of ties to peers is significantly positive for transition from the baseline to category 4 (“all good remarks”). The main effect of ties to external stakeholders is significantly negative in all estimated models for transition from the baseline to category 1 (“non-starter at the box office”) and significantly positive for transition from the baseline to category 5. Then, we turn to diversity in the guise of interactions between different tie types. The interaction between uniplex ties and ties to peers is significant and positive for transition from the baseline to 4 in model 5, and the interaction between uniplex

ties and ties to external stakeholders is significant and positive for transition from the baseline to 4 in model 6 and 8. This supports H2.

The negative association between multiplex ties and performance proposed in Hypothesis H3 is tested in model 2 to 8. Model 2, 3, 5, 6, and 8 show no significant effects of multiplex ties, but in model 4 and 7 the effects are significant and negative for transition from the baseline to category 4 and 5. In model 7 the positive effect for transition from the baseline to 1 is significant on a 10% level. H3 is supported.

In model 4 and 7, Hypothesis H4, that diverse ties should moderate the negative effect of multiplex ties, is tested. The interaction between multiplex ties and ties to external stakeholders is significantly positive for transition from the baseline to 4 and 5. In model 7, the interaction term between multiplex ties and ties to peers is significantly positive for transition from the baseline to 5 (at a 10% significance level). This supports H4.

There are no significant effects of controls for role in the production process. The effect of maximum team member tie diversity is significantly negative for transition from the baseline to 1 and significantly positive from transition from the baseline to 4 in models 1, 2, 3, 4, 7, and 8, and significantly positive for transition from the baseline to 3 and from the baseline to 5 in model 1.

DISCUSSION

We have found that different combinations of social ties of Bollywood filmmakers influence economic performance in distinct ways: through impacting resource search, acquisition, use and management. In the following, we discuss how our study may inspire some general insight into management of resources.

In the resource-based view (Penrose, 1959; Peteraf, 1993), the fundamental argument is that competitive advantage arises from incomplete competition for resources (Wernerfelt, 1984; Barney, 1986). One research stream focuses on factor market competition, arguing on resources that are unpriced and unstandardized because they are built internally in business firms (Direrickx and Cool, 1989; Prahalad and Hamel, 1990). However, another stream of research focuses more explicitly on management, arguing that even resources that are prized and standardized on open factor markets can provide competitive advantage, if managers are able to combine and shift them in unique ways (Kogut and Zander, 1992; Leonard-Barton, 1992; Teece et al., 1997). Sirmon et al. (2007; 2008; 2011) point to three major managerial activities in such resource combination, what they term *resource orchestration*:

- *Structuring*: acquiring, accumulating and divesting resources from external sources,
- *Bundling*: Stabilizing, enriching, and integrating resources after they are acquired,
- *Leveraging*: Putting the integrated resources into use in order to take advantage of market opportunities.

In the following, we discuss how our empirical findings provide insights into resource orchestration activities.

Table 8. Discussion of our main findings

Social tie types	Resource orchestration activities	Empirical finding	Theoretical proposition
Uniplex social ties	Resource structuring	Bollywood filmmakers' family relations to film dynasties help them to secure critical resources, often before competitors	Uniplex ties may facilitate resource pre-emption
Multiplex social ties	Resource bundling	Bollywood filmmakers who collaborate with family members tend to re-use these resources from project to project	Multiplex ties may facilitate resource iteration
Diverse social ties	Resource structuring	Bollywood filmmakers use their ties from past project collaboration to identify critical resources which are then secured through their relations to film dynasties	Diverse ties may facilitate resource search
	Resource leveraging	Bollywood filmmakers use their ties from past project collaboration and ties to external stakeholders to turn resource iteration arising from collaboration with family into a valuable brand	Diverse ties may prevent resource lock-in Diverse ties may build auxiliary value around resources

As listed in table 8 above, we found that uniplex social ties of Bollywood filmmakers influenced their ability to structure resources through acquisition. More specifically, a producer's or director's membership of a prominent filmmaking dynasty grants him access to scarce resources. In the filmed entertainment industry, competition for finance and star cast is fierce, and film project performance hinges not only on accessing scarce resources, but also blocking competitors' access to the same resources at a particular point in time. In Bollywood, star cast is a particular scarce resource, and a producer or director's ability to prevent competitors from signing a star can secure that his film comes to dominate the market temporarily. Mumbai studio facilities are also scarce, and whether a film can be completed in time often hinges upon moving first in securing studio dates. We find that in the fast-moving Bollywood industry, uniplex social ties of filmmakers help them secure star cast and studio dates ahead of competitors. Hence, our empirical results suggest that *uniplex social ties may facilitate resource pre-emption*. This variety of first mover advantages (Lieberman and Montgomery, 1988; 1998) is an important competitive strategy on highly competitive factor markets (Capron and Chatain, 2008).

We also found that multiplex social ties significantly affect Bollywood filmmakers' bundling of resources, making them likely to re-use family members for film projects. This suggests that *multiplex ties may facilitate resource iteration*. For the majority of filmmakers, this strategy adversely influences their performance as it lowers resource diversity and leads to lock-in, lowering product innovation scope. Hence, in contexts where resource iteration lowers performance, multiplex ties may be interpreted as a variety of over-

embeddedness (Uzzi, 1997; Uzzi and Spiro, 2005). For some Bollywood filmmakers, however, resource iteration constitutes a valuable brand, as shall be discussed below.

Diverse social ties proved to influence both resource structuring and leveraging. Ties to filmmaker peers affect resource structuring through facilitating search processes among peers. More specifically, when filmmakers combine past project collaboration ties with other types of ties, they benefit from acute information about the whereabouts and availability of star actors and other critical resources. Hence, tie diversity in the guise of ties to peers combined with uniplex ties enhances the efficiency of resource pre-emption. Moreover, we found that tie diversity in the guise of ties to peers combined with multiplex ties help to keep film projects "open for innovation" arising from non-local inputs (Laursen and Salter, 2006), even when filmmakers apply a strategy of re-using family members as core resources. This suggests that *diverse ties may prevent resource lock-in*. Diverse ties also affect resource leverage, trough allowing filmmakers signaling and building family brands around their iteration of resources. Such brands are highly valuable in Bollywood, a competitive environment where filmmakers need to attract investments from external stakeholders. This suggests that *diverse ties may build auxiliary value around resources.*

The two studied types of diverse ties both had significant positive moderating effects. However, the effect of combining multiplex ties with ties to external stakeholders was stronger than the effect of combining them with ties to peers. This may be an indication that in Bollywood, a filmmaker's signaling outside the filmed entertainment industry is more important for him building a valuable family brand than signaling to other filmmakers. This raises a future research question: *While social ties inside a network of peers are efficient in facilitating search and acquisition of resources, are social ties outside the peer network more efficient when it comes to building auxiliary value around these resources?*

Our findings point to a potential hazard of multiplex ties which, to the best of our knowledge, has been paid scant attention in the literature. Our research provides valuable insight into why even well connected, successful professionals at times venture into hopeless partnerships: in Bollywood, a sense of obligation makes filmmakers adverse to abandoning projects that include family members, even if these projects perform poorly. It is an empirical question whether Bollywood's *dharma* mechanism can also be found in other contexts. For example, multiplex social ties are likely to be prevalent not just in family-based business groups, but also in many boards of directors.

CONCLUSION

In order to provide insight into the performance effects of different types and combinations of social ties, the paper investigated the filmed entertainment industry in Bollywood. The paper found significantly different effects of uniplex, multiplex, and diverse social ties, and offered qualitative empirical exploration as well as theoretical discussion of the mechanisms underlying these effects.

While aligning with the literature on social capital and social structure, our empirical results provide new insight into two areas about which the literature on orchestration of resources is still relatively silent (Simon et al., 2008). First, the literature does not explicate what dynamic capabilities consist of and how they are they embedded in firms. For example, are they essentially the same as boundary spanning skills (Tushmann and Katz, 1980)? Our empirical results indicate that in a project-based industry, the ability of managers to leverage their social ties is a crucial component of dynamic capabilities. Second, the literature

says little about how external environments impact the management of resources. For example, how does industry clockspeed (Fine, 1998) or factor market competition (Capron and Chatain, 2008) influence managers' ability to structure, bundle and leverage resources? Our results indicate that in the fast-paced filmed entertainment industry, social ties may facilitate first-mover advantages and resource pre-emption. To paraphrase Granovetter's *strength of weak ties* (1973), we may call this the *speed of strong ties*.

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