Clients' outcomes from providers' networks: the role of relational exclusivity and complementary capabilities

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Abstract

Organizations have leeway in how much they employ their network relations to the benefit of their clients. When do they do so more rather than less? Relying on research on trust and knowledge absorption, the authors suggest that providers' network relations generate better outcomes for their clients when these relations are concentrated in a limited, exclusive set of partners. The authors argue that providers' relational exclusivity benefits clients because it facilitates the awareness and use of partners' complementary client service capabilities. An analysis of a regional network of patient referrals among 110 hospitals supported this argument. The study highlights the role of interorganizational partnership networks in activating client service capabilities and stimulates further inquiry into providers' network features that benefit the users of their services.

Keywords

Interorganizational networks, Client benefits, Health care.

The implications of interorganizational collaboration networks for the benefit of the users of organizations' offerings – variously called consumers, clients, customers or patrons – are puzzlingly variable. Clients may enjoy substantial quality and price benefits from providers' collaboration networks (Brueckner and Whalen, 2000; Morrish and Hamilton, 2002)[1]. Yet network ties among providers may also disadvantage their clients by limiting the clients' ability to choose between independent providers or to judge the quality of the offerings (Baker and Faulkner, 1993; Ingram and Roberts, 2000). Neutral scenarios, when providers' networks do not affect the benefits of the users of their services, are also possible.

Why such different outcomes? What determines the extent to which providers' network relations benefit their clients? Organizational networks research has given this question remarkably short shrift. Studies have examined the benefits of provider networks for buyer firms (Uzzi, 1997; Uzzi and Gillespie, 2002; Uzzi and Lancaster, 2003), but not for individual end customers. Studies in other disciplines that touched upon the question have generally converged on the importance of providers' motivation to benefit their clients. Some studies implied that providers may jointly benefit clients when they are intrinsically motivated to collaborate in the clients' interest (Bunderson and Thompson, 2009; Leana et al., 2009; Wrzesniewski et al., 1997). Others noted a similar motivating effect of external pressures to collaborate on improving service recipients' outcomes, including institutional pressures by professional associations or accreditations agencies (Durand and McGuire, 2005; Ruef and Scott, 1998) and competitive pressures forcing providers into alliances whose efficiency benefits spill over to their clients (Brueckner and Whalen, 2000; Morrish and Hamilton, 2002).

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[1]Going forward, we use the term "provider" to denote any organization that provides goods or services. Because we develop and test an argument that specifically applies to providers and users of professional services, we will refer to users of providers' offerings as "clients" or "service recipients." We will use more general terms, such as "customer" or "consumer," when they feature in arguments that we reference.

While the role of providers' motivation is undeniable, motivation cannot fully account for clients' benefits from providers' network relations. Even highly motivated providers can put their networks in the service of their clients only to the extent that their network relations improve their capability to serve clients (Wuyts et al., 2015). A full account of service users' benefits from providers' networks is not possible without understanding when and how providers' networks unlock this capability.

Our study takes an early step toward such understanding. We build on the fundamental insight of organizational network theory that organizational outcomes depend on features of interorganizational partnership networks (Borgatti and Halgin, 2011; Powell et al., 1999; Uzzi 1996, 1997). We extend the notion that features of these networks enable organizational outcomes, arguing that network features may also enable client outcomes. Building on theories of trust and knowledge absorption, we argue that relational exclusivity is a feature of providers' ego networks that improves their capability to benefit clients: providers' partnerships produce better outcomes for their clients when they connect to their partnership network through selected, exclusive relations. We further argue that relational exclusivity benefits clients by helping providers combine client service capabilities; its effect is, therefore, more pronounced to the extent that the partners' client service capabilities are complementary.

We examine our argument in a regional patient referral network comprising 110 hospitals in Italy. We follow the lead of previous studies that used data from health care to test theoretical arguments generalizable across industries (Barrera and van de Bunt, 2009; Drange, 2013) and patient outcome data in particular to operationalize client benefit (e.g. DiBenigno and Kellogg, 2014; Provan and Milward, 1995; Schoonhoven, 1981). Specifically, we test the effects of referral network features on the benefits that patients derive from being routed toward providers of better care.

Our research contributes to organizational network theory by identifying a provider network feature that enables better client outcomes. We transcend the motivational explanations of client outcomes from providers' network relations, showing that client outcomes depend on the extent to which these relations activate providers' capability to serve client needs. The study challenges organizational network theory to match the rich literature on interorganizational network features that benefit providers with an equally rich understanding of network features that benefit clients. We also offer practical recommendations to policymakers on improving client outcomes from provider networks.

Theory and hypotheses

Motivational determinants of client outcomes from provider networks

Studies of determinants of client benefits from providers' network relations are spread across various literatures and have been in minimal dialogue with each other. The common feature of these diverse studies is the emphasis on providers' motivation. In different ways, they suggested that providers are motivated to use their network relations in the interest of the client insofar as the providers' rewards are interdependent with their clients' outcomes.

The interdependence of providers' and customers' outcomes is most obvious when it is inherent in the nature of the transaction. For example, in the venture capital industry, the investing firms' collaboration ties simultaneously benefit the investing firms and their investment targets (Hochberg et al., 2007; Ozmel et al., 2020). Similar interdependence may exist due to contractual arrangements, such as contingent fee contracts in legal and financial services, which explicitly make providers' rewards dependent on clients' outcomes (Gravelle and Waterson, 1993; Rau, 2000).

However, the interests of providers and their customers are usually imperfectly aligned. Then, providers have leeway to disregard the benefit of the customers in their network relations, or even to act against it. In the milder of such scenarios, a fully booked hotel whose management is linked to another hotel by friendship relations may refer potential customers to that partner hotel (Ingram and Roberts, 2000); thus, steering them away from better competing offers. The more drastic scenarios have attracted economists' attention since the days of Adam Smith, who famously commented that "people of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices" (Smith, [1776] 1991:116). Modern research examines similar designs by "people of the same trade" under the rubric of organized special interests (Boies, 1989; Grier et al., 1991) or collusion (Rotemberg and Saloner, 1990).

When providers' outcomes are loosely related to clients' outcomes, two categories of factors may motivate organizations to jointly improve clients' outcomes. First, organizations may be motivated by external pressures. Most obviously, such pressure may come from antitrust regulators explicitly tasked with

preventing and punishing collaboration that is harmful to clients. Professional associations or accreditation agencies may also exert external pressure on providers to adopt service standards above and beyond government regulations (Durand and McGuire, 2005; Ruef and Scott, 1998), including standards that regulate providers' collaboration (Cohen and Hilligoss, 2010; Patterson, 2008). Furthermore, competitive pressure may impel providers to jointly benefit clients, e.g. by forming alliances that improve services and cut prices (Brueckner and Whalen, 2000; Morrish and Hamilton, 2002).

Second, providers may be intrinsically motivated to provide good customer experience. Research has highlighted a secular sense of calling – that is, construing work as a fulfilling, socially useful activity – and shown the role of calling in sustaining the quality of service (Bunderson and Thompson, 2009; Wrzesniewski et al., 1997; Wuyts et al., 2015). Individuals or organizations driven by a sense of calling may collaboratively craft work routines that lead to better service quality (Leana et al., 2009).

Enabling network features

No matter how motivated providers are to put their network ties in the service of clients, they can only do so if their own and their network partners' capabilities can be joined in ways that produce better client service (Wuyts et al., 2015). Without denying the importance of motivational factors, we therefore shift the focus to the role of network features that unlock providers' capabilities to jointly benefit clients. We extend the basic insight of network theory that individuals' and organizations' outcomes depend on features of the networks in which they are embedded (Granovetter, 1985; Borgatti and Halgin, 2011), positing that network features may also shape the outcomes that organizations produce for their clients.

Network features enabling organizational outcomes

An extensive, vibrant literature has documented features of organizations' ego networks that enable beneficial organizational outcomes. For example, a balanced mix of strong and weak ties in a firm's network has been shown to improve its survival chances (Uzzi, 1996). There is evidence that firms that are well-connected (central) in their industry's overall network attain better performance (Powell et al., 1999; Tan et al., 2015), and so do firms whose network partners are diverse (Baum et al., 2000). Studies found that organizations'

innovation performance is better when their networks bridge between industry peers (Soda, 2011) and when they have fewer ties connecting them to competitors through intermediaries (Pahnke et al., 2015). Networks that connect organizations to disconnected, non-redundant partners have been shown to be advantageous to organizations' performance in uncertain, entrepreneurial environments, while networks that connect to highly interconnected partners are advantageous in stable environments (Baum et al., 2014; Rowley et al., 2000).

Relational exclusivity as an enabler of client outcomes

Service providers routinely shape the outcomes not only for themselves but also for their clients. Given the amply evidenced potential of beneficially structured networks to create economic value for providers, we suggest that features of providers' networks have a comparable potential to shape the benefits of their clients. Rather than attempt to develop an exhaustive theory of providers' ego network features that are favorable to client outcomes, our study takes an early step toward such theory by identifying one favorable feature, relational exclusivity.

Providers' network relations are exclusive to the extent that they are concentrated to few select partners rather than evenly spread across available partners (see Figure 1 for illustration). We argue that providers linked to the network through exclusive relations – sometimes synonymously referred to as embedded relations (Uzzi, 1996; Shipilov, 2005) – better cater to client needs because such relations facilitate providers' awareness and use of the partners' client service capabilities[2].

Theory suggests two reasons why relational exclusivity helps develop awareness of partners' capabilities to serve clients. First, exclusive commitment to a limited set of network partners generates, and is generated by, mutual trust (Granovetter, 1985; Gulati, 1995; Zaheer and Venkatraman, 1995). Partners who develop trust are more willing to mutually disclose information without fearing harmful consequences (Levin and Cross, 2004; Lui and Ngo, 2004; Mayer et al., 1995). Openness about an organization's shortcomings in client service is particularly helpful in

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[2]Despite the affinity between relational exclusivity and Granovetter's (1985) notion of embeddedness, we avoid treating the two concepts as equivalent because alternative operationalizations of embeddedness have been suggested (e.g. Moody and White, 2003).

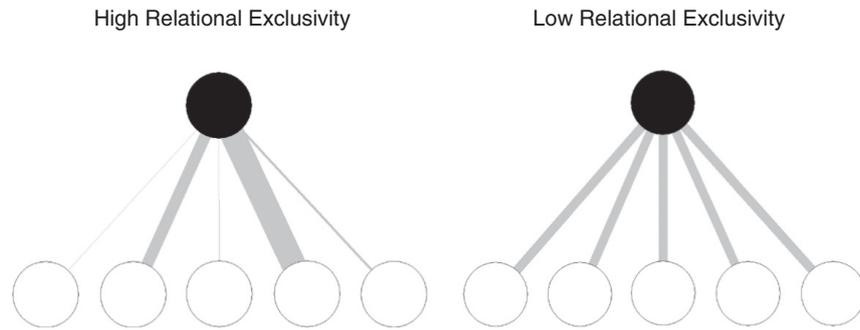High Relational Exclusivity   Low Relational Exclusivity

Figure 1: High and low relational exclusivity. Note: Relational exclusivity is an attribute of the black node. Line thickness is proportional to relation intensity.

informing its partners how they can assist its clients. For example, firms more fully disclose their products' typical problems to external customer support partners who they have trusted relational ties to; awareness of the problems in turn helps such partners provide good customer support (Wuyts et al., 2015). Similarly, clinical history paperwork that accompanies patients referred between hospitals may reveal shortcomings in the referring hospital's treatment (with potential reputational and legal repercussions) – but the shortcomings also suggest what the receiving hospital can do for the patient that the sending hospital could not (Iwashyna and Courey, 2011; Lomi and Pallotti, 2012). Thus, by enabling trust-based disclosure, relational exclusivity better positions providers to combine their capabilities in ways that benefit clients.

Second, exclusive relations help partners overcome obstacles to knowledge absorption. A substantial share of knowledge that collaborators need to complete joint tasks is tacit, complex or both. The absorption of tacit or complex knowledge depends on assistance that its source offers. Because partners in embedded, exclusive relations have more willingness and shared time to assist each other in absorbing knowledge, and to ask for assistance, such relations have proved instrumental for tacit and complex organizational learning (Szulanski, 1996; Uzzi, 1997). The notion that exclusive relations help convey and retain tacit knowledge has been invoked to explain the very existence of organizations (Kogut and Zander, 1992). Insofar as the use of exclusive relations to link to the network facilitates the absorption of knowledge that may benefit organizations, we expect it to have the same effect on knowledge that helps them jointly benefit their clients.

The relationship between providers' relational exclusivity and the benefits of their service recipients may be summarized as follows:

H1.   A provider generates more benefit to service recipients through its partnership ties to the extent that the provider concentrates relations to few partners rather than spreads them out among many partners.

Complementary client service capabilities

Our argument is premised on the logic of complementary capabilities. We argued that relational exclusivity unlocks the potential of partnering organizations to benefit clients because it improves their knowledge and use of network partners' complementary client service capabilities. This logic implies that the hypothesized effect of relational exclusivity varies with the extent to which the focal providers' and its partners' capabilities can be combined to benefit clients. If providers have few complementary capabilities, their networks can produce little benefit to their clients, no matter how they might be structured. Conversely, if the partners' complementarity is high, beneficially structured networks will help them direct their clients toward partners' capabilities that they lack.

To probe the supporting logic of our first hypothesis, we examined the following additional hypothesis:

H2.   The positive effect of relational exclusivity on client benefit is stronger to the extent that the providers' and its partners' client service capabilities are complementary.

The empirical setting

We test our hypotheses using data that we collected on patient referral relations in a network of hospital

organizations. Our choice of health care as the empirical setting is consistent with our focus on capability-related causal mechanisms. Because of the ethical and legal norms that mandate concern for patient well-being, motivational determinants of the quality of client service in health care may vary little and be poorly generalizable to other contexts. In contrast, health care providers' use of partners' complementary capabilities to benefit a patient is not mandated; it is subject to the effects of providers' network features, as it is in other types of services.

The health care system in Lazio

Lazio is the large Italian region with the center in Rome and a population of almost 5.9 million. The health care system in Lazio is part of Italy's National Health Service (INHS), a publicly funded health care system providing universal insurance coverage to all citizens and legal residents. During the four-year period covered by our data, the system had 110 facilities in Lazio, 59 of which were publicly owned hospitals. The remaining 51 were accredited private hospitals and contracting ambulatory care organizations. All 110 facilities, regardless of the ownership form, accepted universal health insurance.

The system underwent reforms in the 1990s, aimed at improving overall performance. Among other changes, the reforms introduced a diagnosis-based system of reimbursement of hospital services, established financial performance criteria and made hospital CEOs responsible for meeting them, gave patients more freedom to choose health care providers, and made funding more directly dependent on the amount and quality of provided services. The reforms created a quasi-market designed to sustain the equity benefits of traditional public healthcare systems while also reaping the potential efficiency gains from competition (Barretta, 2008). In this hybrid arrangement, accredited hospitals compete for patients and INHS budget allocations but may also cooperate in the interest of public health (Lomi and Pallotti, 2012).

Inter-hospital patient referral

Inter-hospital referral of patients is a common collaborative activity for health care institutions (Iwashyna and Courey, 2011; Lomi and Pallotti, 2012). We focus on the referral of inpatients under nonemergency conditions. Engaging in such referral is voluntary for hospitals – they have the discretion to make, accept and refuse referral requests. There are no regulations prescribing the choice of collaboration partners or requiring that hospitals give reasons for

acceptance or refusal. Nor may a hospital be forced to refer a patient simply because it lacks beds or admits no patients with particular symptoms or condition – by definition, inpatient referral may only happen if the patient was previously admitted to the sending hospital. As hospitals face few external pressures in nonemergency referral decisions, the referral destinations are determined, alongside care quality, by informal, hospital-specific norms and routines (Bosk et al., 2011; Veinot et al., 2012).

Patient referral networks are uniquely suited to our empirical purposes for at least four reasons. First and foremost, patient referral data can detect the particular benefits that accrue to care recipients from relations between providers, rather than risk confounding these benefits with those that come from other sources. When a patient is referred to a hospital delivering services of higher quality, we know that the improvement in service quality that she experiences is due to a particular instance of interorganizational collaboration. In contrast, in most other instances where clients may benefit or suffer from interorganizational relations, no quantitative method can reliably link a client's outcome to any particular relation. This link can only be established in in-depth case study (Provan and Milward, 1995) or indirectly inferred from correlation between network variables and client outcomes (Hochberg et al., 2007).

Second, our statistical inference is immune to selection biases resulting from service recipients' actions because patients surrender control at admission over interhospital referrals. Patients cannot choose where they will be referred; like any other treatment decision, referral remains a prerogative of the hospital in charge of the patient.

Third, the exclusivity of patient referral relations exhibits wide and meaningful variation, necessary for the test of *H1*. Some hospitals' patient referrals are episodic acts, negotiated and coordinated *ad hoc* for each specific instance. In other cases, patient referral is a manifestation of an underlying rich and lasting, exclusive interorganizational partnership. Such partnerships involve well-developed knowledge exchange routines, trust and joint decision making (Bosk et al., 2011; Gittell and Weiss, 2004). They predate and transcend specific instances of referral.

Finally, the particular methodological advantage of the inpatient referral network in Lazio is that it is largely contained within the region. In the period that we studied, only between 6 and 8 percent of Lazio's inpatient referrals crossed the region's boundary (Marrocu et al., 2016, p. 24). Network boundary specification, an endemic problem in network studies, is thus not a major concern in our data.

Data

Our quantitative data come from the Regional Hospital Information System database maintained by the Public Health Agency of Lazio. The database holds information on attributes of the 110 hospitals in the region accredited by the INHS and on referral patient flows between them, recorded annually from 2006 through 2009. We used data on all of these hospitals except two that referred no patients. The data set records a referral only if the receiving hospital admitted the referred patient. To improve our contextual understanding of patient referral in Lazio, we conducted 17 semi-structured interviews with region's physicians and hospital administrators.

Measures

Data structure and model

Our data set has a four-wave panel structure: the variables are measured yearly at the level of the hospital. Standard errors may be biased when regression models are estimated with panel data sets because the residuals are subject to correlation across repeated observations within organizations and within periods. To preclude such bias, the standard errors in the linear regression models reported below were corrected for hospital-level and year-level clustering (Cameron et al., 2012; Thompson, 2011). The correction algorithm calculates standard errors in three cluster-robust covariance matrices: one with clustering by the first variable (hospital), one with clustering by the second variable (year), and one with clustering by their intersection. The standard errors are then estimated with the matrix computed by summing the first two matrices and subtracting the third (Cameron et al., 2012). Unlike in fixed and random effects models, standard errors corrected for clustering by two variables are unbiased even when the effect of one clustering variable varies across levels of the other (Petersen, 2009)[3].

Dependent variable: patient benefit

Patients benefit from interhospital referral networks to the extent that the receiving hospitals provide

[3]This correction may be used with any pair of variables that make observations non-independent and with a variety of regression models. The stata code that implements correction for clustering on two variables in linear, probit, logit and tobit models is available at www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm.

higher quality care than the sending hospitals (Bosk et al., 2011; Iwashyna et al., 2009; Lomi et al., 2014). The risk-standardized readmission rate (RSRR) is a common measure of the quality of hospital care (Axon and Williams, 2011; Horwitz et al., 2012; Landrum and Weinrich, 2006). When patients are frequently readmitted to a hospital, this attests that the hospital fails to cure the conditions that its patients need treatment for; conversely, if the readmission rate is low, the hospital routinely succeeds in curing its patients. The INHS officially defines hospital readmission as admission of the patient into the hospital from which that patient was discharged within previous 30 days for the same condition. To make this raw readmission rate comparable across hospitals, it is standardized by the types of medical procedures offered by the hospital and the complexity of cases treated. Cases of planned readmission (such as chemotherapy, HIV and kidney dialysis) are excluded from the calculation of the RSRR.

RSRR is routinely used by the INHS, Medicare, Medicaid and the Hospital Quality Alliance to measure patient outcomes in a way that is comparable across hospitals with different specialization profiles (Centers for Medicare and Medicaid Services, 2016). Unlike the mortality rate, the other common measure of care quality, RSRR is applicable to non-life-threatening conditions. RSRR has passed construct validity tests that compared it to hospital rankings and patient satisfaction (Boulding et al., 2011; Halfon et al., 2006; Horwitz et al., 2012). It also responds to interventions aiming to improve care quality (Coleman et al., 2006).

Despite its advantages and wide use, RSRR is not a perfect metric. It is a coarser measure of care quality than other possible readmission measures unavailable to us, such as department-level readmission rates. Also, the precise definition of unplanned readmission and the methods of cross-hospital standardization are a matter of debate in medical research (Axon and Williams, 2011). We embrace RSRR in awareness of these imperfections.

Following Lomi et al. (2014), we conceptualize patient benefit from a single instance of referral as the difference between the quality of care in the hospital that receives and in the hospital that sends the patient. Because lower readmission rates correspond to better quality, we subtract the RSRR in the sending hospital from that in the receiving hospital. Our dependent variable brings this patient benefit measure to the level of the hospital by summing these differences over all the hospital's referrals made or received in the year. The higher the sum is, the greater is the total patient benefit from the hospital's patient referral relations.

Because hospital and interhospital factors in a given year (rather than any prior year) are most relevant to the patient referral outcomes in that year, our dependent variable is not lagged.

Independent variables

Relational exclusivity

First-order network coupling captures the extent to which organizations concentrate their relations to few partners rather than spread them out among many potential partners (Uzzi, 1996). Researchers have used first-order network coupling in various contexts, adapting it to the type of network at hand (see e.g. Shipilov, 2005; Shipilov et al., 2011). In a network of patient referrals, the measure captures the extent to which hospitals concentrate their referrals to few of the many potential partner hospitals. It is computed as $\sum_{j=1}^{J} P_{ij}^2$, where P_{ij} is the fraction of hospital i's total patient referral flow accounted by referrals to or from partner hospital j, and J is the count of partner hospitals in i's referral network. When the measure is close to 0, the hospital spreads out its patient referral relations among many partner hospitals, without clearly preferring some over others. When the measure is at its extreme value of 1, the focal hospital has an exclusive referral relation with one partner.

Complementarity of capabilities

One hospital may complement another's patient care capabilities by having clinical expertise or equipment that the other lacks. For example, when a hospital lacking an oncology unit refers a patient with cancer symptoms to one that specializes in oncology, the hospitals are leveraging their complementarity for patient benefit. In our context, such complementarity is measurably reflected in hospitals' clinical specialty profiles. The profile of the focal hospital is complementary with its referral partners to the extent that its partners lack its clinical specialties and it lacks theirs. This type of complementarity is captured by the Jaccard distance (one minus the ratio of overlapping specialties to all unique specialties that either partner has) between a hospital and its partner. Thus, we compute the measure of clinical complementarity as the average Jaccard distance between the focal hospital and all its partners. There are 53 clinical specialties represented in the sample.

Control variables

We included a set of control variables to minimize the threat of omitted variable bias. To account for larger hospitals' greater capacity to benefit patients, we included the hospital size, expressed as the number of beds. The average number of beds among the focal hospital's referral partner hospitals captures the same capacity in the hospital's partnership network. We controlled for the hospital's occupancy rate, to account for the possibly higher propensity to refer patients when the hospital has a shortage of available beds. Because we expect geographic proximity to affect both the patient benefits and the networks that the hospitals create, we controlled for the average geographic distance between the focal hospital and its referral partners, weighted by the total yearly patient flow between them. Furthermore, we controlled for the ownership form, distinguishing private from public hospitals, to account for private organizations' higher propensity to focus on economic performance at the expense of client benefit (Hansmann, 1980; Baum et al., 2000). The hospital attributes in our model that are potentially related to patient benefit from referrals include the total number of referral patients that the hospital sent and received in the given year, the case mix index (INHS's standard measure of the complexity of the cases treated by the hospital), and the comparative performance index (CPI). The CPI is the annual hospital efficiency score, computed annually by the regional division of the INHS. The CPI captures the relative time that it takes the hospital to successfully treat cases of similar complexity. The index takes the value of 1 for hospitals whose performance is average compared with other hospitals in the region. It is below (above) 1 if the hospital performs above (below) the regional average. We also controlled for the RSRR in the focal hospital. This control is essential because hospitals with a higher readmission rate (i.e. those that provide less effective treatment) are by design more likely to benefit patients when they refer them to another hospital and less likely to do so when they receive referred patients.

Table 1 shows the measures' descriptive statistics and correlation matrix. All control variables except the number of referrals made and received are significantly correlated with the dependent variable and at least one main independent variable; exclusion of these variables would therefore subject the model to omitted variable bias.

Results

Are patients referred to hospitals providing better care?

Before examining the determinants of patient referral to hospitals providing better care, it is instructive

Table 1. Variables in the analysis: descriptive statistics and the correlation matrix.

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Patient benefit	−1.38	6.54												
2. Beds in focal hospital	205.9	271.5	−0.43**											
3. Average beds in partner hospitals	398.3	191.9	−0.12**	−0.06										
4. Occupancy rate	0.69	0.21	−0.18**	0.30**	−0.03									
5. Average distance to partners (km)	21.86	16.15	−0.15**	0.11*	0.01	0.18**								
6. Private hospital	0.46	0.50	0.18**	−0.25**	0.03	−0.24**	−0.41**							
7. Referral patients sent in year	153.7	225.4	−0.03	0.52**	−0.13**	0.40**	0.03	−0.30**						
8. Referral patients received in year	153.7	218.1	−0.02	0.62**	−0.09	0.30**	−0.06	−0.03	0.45**					
9. Case mix index	0.89	0.97	−0.34**	0.27**	0.02	0.02	−0.10	0.12*	−0.04	0.30**				
10. Comparative performance index	1.00	0.19	−0.12*	0.19**	0.07	0.16**	0.001	−0.23**	0.14**	−0.01	0.02			
11. Risk-standardized readmission rate	0.03	0.04	−0.37**	0.19**	0.02	0.04	−0.02	−0.10**	−0.02	0.07	0.25**	0.15**		
12. Clinical complementarity with partners	0.37	0.22	−0.20**	0.53**	−0.25**	0.35**	−0.08	−0.25**	0.36**	0.47**	0.15**	0.25**	0.43**	
13. Relational exclusivity	0.24	0.23	0.16**	−0.37**	0.09	−0.25**	−0.16**	0.30**	−0.10	−0.03	0.45**	−0.40**	−0.04*	−0.18**

Notes: $N = 390$ hospital-years with non-missing data. Cases are missing when hospitals neither send nor receive referred patients. $*p < 0.05$; $**p < 0.01$.

to see how commonly patients get routed toward higher- or lower-quality hospitals.

The numbers in Table 2 confirm that patient referral is not optimized to care quality in our setting, a pattern already noted in various patient referral networks (Bosk et al., 2011; Hains et al., 2011; Veinot et al., 2012). In every year within our observation period, a patient was slightly more likely to be referred to a hospital with a higher (worse) RSRR compared to the sending hospital than to a hospital with a lower readmission rate. The same tendency is evidenced by the negative mean of the patient benefit variable. Care quality improvement is thus clearly not a guaranteed outcome of patient referral in our setting, but rather a contingent feature dependent on partner hospitals involved.

The effect of relational exclusivity

Table 3 reports the results of the multivariate analysis of patient referral to hospitals with better care quality (lower readmission rate). Model 1 includes only the control variables. It has good predictive power, largely because the amount of benefit or harm a hospital (or any organization) can create is a function of its size, captured by the bed count and patient flow variables.

In Model 2, we add the measure of relational exclusivity. The model tests the notion that hospitals whose patient referral relations tend to be concentrated to few partners – rather than spread among many partners – create more benefit to their referral patients. The fit of the model significantly improved relative to Model 1, and R^2 increased to 0.54. The effect of the added variable is large and positive, supporting H1.

The effect of interaction of relational exclusivity and clinical complementarity

Model 3 includes the interaction term of clinical complementarity with relational exclusivity. The interaction effect is large, positive, and significant. Consistent with H2, this result shows that clinical complementarity amplifies the effect of relational exclusivity. Remarkably, it is only due to hospitals' leveraging of clinical complementarity that this effect attains significance in Model 2. The non-significant main effect of relational exclusivity in Model 3 affirms that, at low levels of complementarity, the prediction of H1 does not hold. In other words, when partner hospitals have few complementary capabilities to be aware of and to act upon, relational exclusivity produces no significant patient benefit. On the other hand, the negative and significant main effect of clinical complementarity attests that, at low levels of relational exclusivity, hospitals that are highly complementary with their partners tend to refer patients into inferior care conditions. It is only at higher levels of relational exclusivity that clinical complementarity helps hospitals refer patients toward better care.

Figure 2 visualizes the moderating effect of clinical complementarity in Model 3. The vertical axis shows the effect of relational exclusivity on patient benefit at every level of clinical complementarity. The lowest value of this effect is 5.37, which corresponds to the main effect of relational exclusivity. The effect increases as clinical complementarity increases, reaching significance at $p = 0.05$ beyond the 10th percentile of clinical complementarity.

Table 2. The flow of referral patients by year and relative risk-standardized readmission rate.

	Patients referred to hospitals where readmission rate is		
Year	lower (better) than in sending hospital	higher (worse) than in sending hospital	same as in sending hospital
2006	8,524	9,454	153
2007	7,793	8,696	0
2008	7,670	7,869	0
2009	7,219	7,599	566
Total	31,206	33,618	719

Table 3. Effect of relational exclusivity on patient referral to hospitals with better care quality.

	Linear regression models with two-dimensional clustering of standard errors		
	Model 1	Model 2	Model 3
Beds in focal hospital	−0.02** (0.004)	−0.02** (0.003)	−0.01** (0.003)
Average beds in referral partner hospitals	−0.004* (0.002)	−0.003 (0.002)	−0.004* (0.002)
Occupancy rate	−5.42** (1.86)	−3.82* (1.57)	−4.11* (1.71)
Average weighted distance to partners (km)	−0.01 (0.02)	−0.01 (0.02)	−0.01 (0.02)
Private hospital	0.31 (0.90)	0.17 (0.85)	−0.23 (0.83)
Case mix index	−1.66** (0.58)	−2.74** (0.72)	−2.73** (0.70)
Comparative performance index	2.19 (1.61)	5.04** (1.91)	5.02* (2.00)
Referral patients sent in year	<0.01 (<0.01)	<0.01 (<0.01)	<0.01 (<0.01)
Referral patients received in year	0.02** (<0.01)	0.02** (<0.01)	0.01** (<0.01)
Risk-standardized readmission rate	−37.75** (13.93)	−34.66* (16.45)	−34.31* (16.08)
Clinical complementarity with partners		≤0.01 (2.73)	−8.95** (3.33)
Relational exclusivity		15.18** (4.26)	5.37 (4.20)
Clinical complementarity with partners × Relational exclusivity			42.58** (14.05)
N	390	390	390
R^2	0.50	0.54	0.58
LR χ^2 (relative to previous model)	−	36.70**	28.95**

Notes: Standard errors, clustered by hospital and year, are in parentheses. The unit of analysis is hospital-year. The intercept is omitted. *$p < 0.05$; **$p < 0.01$.

Supplementary analyses

We performed supplementary analyses to examine two types of potential threat to the validity of our results. First, we checked the robustness of our quantitative findings. Second, we examined the transcripts of our interviews with health care professionals to confirm that they understand the main concepts that we measured and consider them when making patient referral decisions.

Robustness checks

Because the positive effect of relational exclusivity on organizational outcomes has been shown to peak at an optimal level and then decline (Uzzi, 1996), we examined if our linear specification of this effect was warranted. We tried adding the quadratic term to

Model 2. The quadratic term had no significant effect, and we omitted it. We also experimented with adding the quadratic term and its interaction term with clinical complementarity to Model 3. The added terms created multicollinearity and did not improve the fit of Model 3. The interaction of the quadratic term with clinical complementarity was not significant.

We also re-estimated Models 2 and 3 with the added variable measuring hospitals' degree of specialization, a Herfindahl index summing the squared shares of beds allocated to each clinical specialty. Because more specialized hospitals tend to have more exclusive referral relations, models might have confounded the effects of specialization and exclusivity. With the Herfindahl index included in Models 2 and 3, both hypothesized effects retained their size and significance. The index had no significant effect, did not improve the model fit
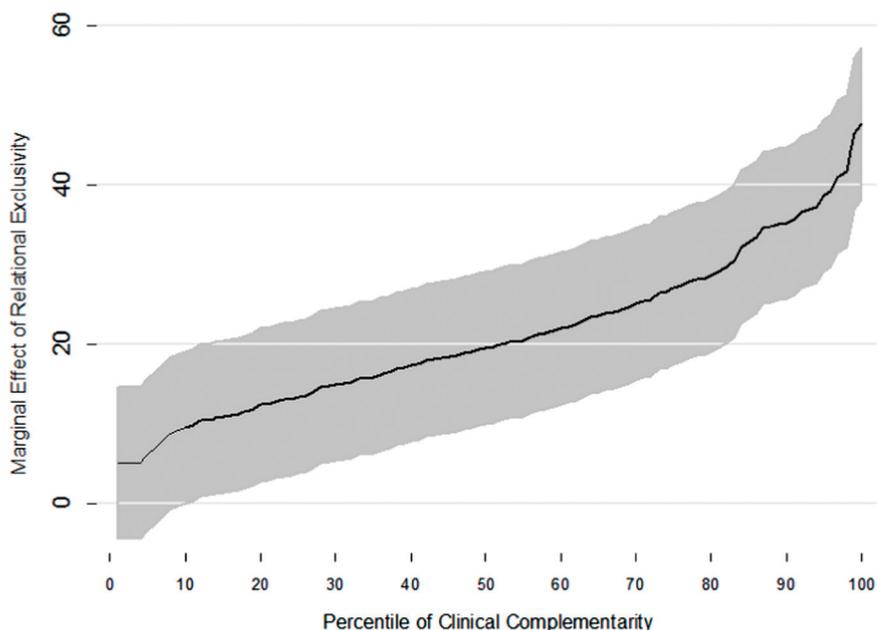
Figure 2: The marginal effect of relational exclusivity across the range of the clinical complementarity variable. Note: The 95% confidence interval shown in grey. The line is thicker where the marginal effect is different from zero at $p<0.05$.

and removed nine observations because of missing specialization data.

The results reported in Table 3 are remarkably robust to model specification. We reproduced both hypothesized effects in models with fixed hospital and year effects, with correction for clustering on one variable (year or hospital) only, with the Huber–White correction, and with uncorrected random effects. We also reproduced all effects when the sample was restricted to hospital partnerships where patient benefit values were positive. All results of robustness checks are available on request.

Relational exclusivity and complementary capabilities in health professionals' accounts

We used the transcripts of our interviews with health care professionals to verify that physicians and hospital administrators understand and use – at everyday, common-sense level – the concepts that we theorized and measured. Our 17 semi-structured interviews preceded the rest of our work on this study and were not intended to bear on its arguments. The objective of the interviews was to elicit first-hand accounts of why and how hospitals refer patients. Because we used a convenience sample, the data enable no robust causal inference. Nevertheless, the interview evidence added confidence that decision makers in hospitals understand relational exclusivity and complementary capabilities and consider them in making patient referrals.

Every respondent in our sample was asked "Why does your hospital refer patients to other hospitals?" Additional unscripted follow-up questions were asked to elicit extended answers to this question. Some follow-up questions were asked by email and answers were appended to the transcripts.

Our respondents, physicians and administrators alike, showed awareness of the role of relational exclusivity. In accordance with our hypotheses, they attested that exclusive relations help hospitals leverage knowledge of mutual complementary capabilities for patient benefit. A physician said:

> There are a few hospitals that [together] send us […] 60 to 70 percent of the [referral] patients [we receive]. […] Apart from geography, [we prefer these hospitals because] they know what we can do for their patients. And, of course, we send our patients to these hospitals whenever needed[4].

He proceeded to explain that exchange of patients with such frequent partner hospitals is easier because

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[4] All interview quotes are translated from Italian.

information about what the partner can do for the patient can be more effectively communicated:

> In some instances […[a phone call of 20 minutes is enough [to finalize a patient referral]. […] [Such quick decision making] has to do with […] knowledge about resources […] and administrative procedures. Previous interaction helps us accumulate such precious knowledge.

The administrative director of a large children's hospital similarly pointed out that procedural knowledge among frequent referral partners helps the efficiency of the referral:

> Hospitals that send patients more regularly, or with which we have been in touch for a long time, are very good in sending us the right material that lets us fully understand [how we can help with] the clinical case. […] There are partners who know very well what we want to see in their referral requests. And this is not strictly related to the type of patient to be transferred, but rather it is about how they present their request and about the completeness of information.

A physician in a major teaching hospital suggested that exclusive relations may not only create awareness of complementary care capabilities, but also the confidence that the partner will make these capabilities available when requested:

> I remember a patient with lung cancer who […] developed an infection. We have no clinical ward for infection diseases at our hospital, so we decided to transfer the patient. […] We chose [hospital X] as partner because they have a good infectious disease department. […] I know they have the expertise and have never refused to receive a patient [from us].

Finally, we noted that awareness of complementary capabilities may motivate hospitals not only to send but also to receive referral patients. A physician reported that his hospital "primarily accepts patients coming from another hospital because we have better ability to treat their diseases."

Discussion

Contributions and future directions

Under what conditions do clients benefit from providers' partnership networks? Our answer builds on the idea that client benefits ensue from providers' ego-network features that enable the use of mutually complementary capabilities to deliver higher-quality client service. We argued that relational exclusivity improves the providers' knowledge and use of network partners' complementary capabilities and

thereby helps clients benefit from providers' network relations. We hypothesized that organizations will be more likely to know their partners' capabilities and put this knowledge to work for the benefit of the client to the extent that their relations are concentrated among few selected partners. The analysis supported this hypothesis. We also found that the hypothesized effect strengthens as the complementarity of providers' client service capabilities increases, which supports the notion that relational exclusivity facilitates the use of such capabilities for client benefit.

Our argument and findings offer two contributions to organizational network theory. First, we offer early evidence that configurations of providers' networks may not only benefit organizations, as previous network studies amply confirmed, but also deliver benefits to organizations' clients. Second, our study transcends the notion that providers' networks benefit clients when providers are motivated to serve client needs. We point out that motivation cannot fully account for clients' benefits from providers' networks and advocate a theoretical account that embraces the role of providers' network features that unlock their client service capabilities. These contributions hold out a promise of a fruitful research program examining network features that make providers more or less capable of serving client needs. We start and encourage this research effort.

As the emerging literature on clients' benefits from organizational networks matures, it may fruitfully mirror the earlier theoretical and empirical development of the literature on organizations' benefits from networks. Two pathways in this development have been particularly rich in insight. First, research moved from examining the main effects of having ties (Mizruchi and Stearns, 1994; Uzzi, 1996; Gulati, 1998) toward contingent theories examining the benefits and drawbacks of networks depending on external environments and tasks at hand (Gulati and Higgins, 2003; Fleming et al., 2007). Second, studies progressed from focusing on the effects of network structures (Coleman et al., 1957; Granovetter, 1985) toward examining the content of network relations (e.g. Emirbayer and Goodwin, 1994). Both pathways remain largely untrodden in research on clients' benefits. Future studies may examine how client benefits from networks are contingent on the intensity of competition among providers and on whether providers are for-profit or nonprofit. They may further consider how the structural effects are modified by cross-cultural variation in network relations' content and by power inequalities between partners.

We see our methodological contribution in encouraging network research to capture the effects of

interorganizational relations directly, rather than infer such effects from relationships between network variables and outcome variables. Our method highlights the distinction between, on the one hand, capturing whether providers refer clients to network partners who offer better-quality service and, on the other hand, examining the correlation between a provider's ego-network properties and its clients' outcomes. In the former case, we can say with confidence that we are observing a relational effect: the client was served by a better-quality provider because of the cooperation between specific providers in the network. In the latter case, we cannot rule out that the correlation exists due to unmeasured provider properties that simultaneously affect its networks and client outcomes, such as financial or other resources. Similar distinctions apply in all studies of relational outcomes, where only an unmistaken linkage between a relation and its outcomes can safeguard against spurious network effects.

Practical implications

Our argument suggests that service recipients' outcomes may be improved by structuring providers' network ties in ways that promote the coordinated use of providers' service capabilities. This opens new ways of improving health care outcomes, particularly by countering the adverse effects of care fragmentation. Research has shown that patients are disadvantaged when patient care is spread across poorly coordinated providers and examined the merits of anti-fragmentation policies aimed at internalizing the care within formally organized groups of providers (Agha et al., 2017). Our study suggests that promotion of preferred provider-to-provider direct partnerships, rather than organized provider groups, may be a viable alternative anti-fragmentation policy.

Generalizability and limitations

We advocate caution in generalizing our argument or empirical results. This is not because there are evident reasons why relational exclusivity should fail to produce the hypothesized effects beyond health care, or beyond professional services, but because these reasons are largely unexplored. While a close examination of these reasons is beyond our scope, three conditions seem particularly likely to restrict the generalizability of our argument.

First, we expect relational exclusivity to generate client benefits only in settings where providers' capabilities are differentiated. If providers have identical capabilities, their potential to improve products or services by partnering is limited. Indeed, as our analysis just showed, network mechanisms generate no patient benefits in hospitals whose network partners have similar service capabilities. Second, our argument depends on the presence of motivation to deliver good client service. Whichever client benefit potential provider networks may create, providers who lack all motivation to deliver good outcomes to clients – most typically in markets with limited competition – will not realize that potential. Third, the argument only applies when providers partner in matters of serving client needs. We do not theorize any client outcomes from partnerships established for other purposes, such as joint lobbying or acting against common competitors.

A variety of professional services meets the triple scope condition of differentiation, client service motivation, and partnering in matters of service. Beside health care, the three conditions are most reliably met in postsecondary education, accounting services, legal aid and venture capital – which all happen to be fields where, similar to health care, referrals of clients (or, in case of education, students) across organizations are common. In contrast, wholesaling commodity producers are not differentiated in capabilities relevant to end-consumer experience and thus fail to meet the first condition. Normally, however, we do not expect the presence or absence of any of the three conditions to be a binary contrast, but rather a matter of degree. In most contexts, a dedicated empirical investigation is required to determine whether the scope conditions are sufficiently met for our argument to apply.

Our study has a number of methodological limitations. First, our empirical scope is limited to a local health care system. While health care has obvious institutional idiosyncrasies, the problem of how collaboration among organizations may benefit their customers remains general. Our design would benefit from replication in different contexts, with measures of customer outcomes tailored to the context at hand. Second, our measures of care quality are coarser than we would have liked. With fine-grained, preferably patient-level health data, we would be able to go beyond hospital-centered measures such as RSRR and examine transaction-level factors that affect patient outcomes. While access to patient-level information is difficult due to privacy concerns, such information may validate and improve the results of our study. Third, referrals are one of many types of interorganizational collaboration that may be potentially consequential for client benefit. We trust that future research will build on

our arguments and analysis and will examine the implications of other types of interorganizational collaboration for client benefit.

References

Agha, L., Frandsen, B. and Rebitzer, J. B. 2017. Causes and consequences of fragmented care delivery: theory, evidence, and public policy. Working Paper No. 23078, National Bureau of Economic Research, Cambridge, MA.

Axon, R. N. and Williams, M. V. 2011. Hospital readmission as an accountability measure. *JAMA: The Journal of the American Medical Association* 305: 504–505.

Baker, W. E. and Faulkner, R. R. 1993. The social organization of conspiracy: illegal networks in the heavy electrical equipment industry. *American Sociological Review* 58: 837–860.

Barrera, D. and van de Bunt, G. G. 2009. Learning to trust: networks effects through time. *European Sociological Review* 25: 709–721.

Barretta, A. 2008. The functioning of co-opetition in the health-care sector: an explorative analysis. *Scandinavian Journal of Management* 24: 209–220.

Baum, J. A., Calabrese, T. and Silverman, B. S. 2000. Don't go it alone: alliance network composition and startups' performance in Canadian biotechnology. *Strategic Management Journal* 21: 267–294.

Baum, J. A. C., Cowan, R. and Jonard, N. 2014. Does evidence of network effects on firm performance in pooled cross-section support prescriptions for network strategy?. *Strategic Management Journal* 35: 652–667.

Boies, J. L. 1989. Money, business, and the state: material interests, Fortune 500 corporations, and the size of political action committees. *American Sociological Review* 54: 821–833.

Borgatti, S. P. and Halgin, D. S. 2011. On network theory. *Organization Science* 22: 1168–1181.

Bosk, E. A., Veinot, T. and Iwashyna, T. J. 2011. Which patients, and where: a qualitative study of patient transfers from community hospitals. *Medical Care* 49: 592–598.

Boulding, W., Glickman, S. W., Manary, M. P., Schulman, K. A. and Staelin, R. 2011. Relationship between patient satisfaction with inpatient care and hospital readmission within 30 days. *American Journal of Managed Care* 17: 41–48.

Brueckner, J. K. and Whalen, W. T. 2000. The price effects of international airline alliances. *Journal of Law and Economics* 43: 503–546.

Bunderson, J. S. and Thompson, J. A. 2009. The call of the wild: zookeepers, callings, and the double-edged sword of deeply meaningful work. *Administrative Science Quarterly* 54: 32–57.

Cameron, A. C., Gelbach, J. B. and Miller, D. L. 2012. Robust inference with multiway clustering. *Journal of Business and Economic Statistics* 29: 238–249.

Centers for Medicare and Medicaid Services 2016. Re-admission measures. available at: https://www.qualitynet.org/inpatient/measures/readmission (accessed July 2, 2019).

Cohen, M. D. and Hilligoss, P. B. 2010. The published literature on handoffs in hospitals: deficiencies identified in an extensive review. *BMJ Quality & Safety* 19: 493–497.

Coleman, E. A., Parry, C., Chalmers, S. and Min, S. J. 2006. The care transitions intervention: results of a randomized controlled trial. *Archives of Internal Medicine* 166: 1822–1828.

Coleman, J., Katz, E. and Menzel, H. 1957. The diffusion of an innovation among physicians. *Sociometry* 20: 253–270.

DiBenigno, J. and Kellogg, K. C. 2014. Beyond occupational differences: the importance of cross-cutting demographics and dyadic toolkits for collaboration in a U.S. hospital. *Administrative Science Quarterly* 59: 375–408.

Drange, I. 2013. Early-career income trajectories among physicians and dentists: the significance of ethnicity. *European Sociological Review* 29: 346–358.

Durand, R. and McGuire, J. 2005. Legitimating agencies in the face of selection: the case of AACSB. *Organization Studies* 26: 165–196.

Emirbayer, M. and Goodwin, J. 1994. Network analysis, culture, and the problem of agency. *American Journal of Sociology* 99: 1411–1454.

Fleming, L., Mingo, S. and Chen, D. 2007. Collaborative brokerage, generative creativity, and creative success. *Administrative Science Quarterly* 52: 443–475.

Gittell, J. H. and Weiss, L. 2004. Coordination networks within and across organizations: a multi-level framework. *Journal of Management Studies* 41: 127–153.

Granovetter, M. 1985. Economic action and social structure: the problem of embeddedness. *American Journal of Sociology* 91: 481–510.

Gravelle, H. and Waterson, M. 1993. No win, no fee: some economics of contingent legal fees. *The Economic Journal* 103: 1205–1220.

Grier, K. B., Munger, M. C. and Roberts, B. E. 1991. The industrial organization of corporate political participation. *Southern Economic Journal* 57: 727–738.

Gulati, R. 1995. Does familiarity breed trust? The implications of repeated ties for contractual choice in alliances. *Academy of Management Journal* 38: 85–112.

Gulati, R. 1998. Alliances and networks. *Strategic Management Journal* 19: 293–317.

Gulati, R. and Higgins, M. C. 2003. Which ties matter when? The contingent effects of interorganizational partnerships on IPO success. *Strategic Management Journal* 24: 127–144.

Hains, I. M., Marks, A., Georgiou, A. and Westbrook, J. I. 2011. Non-emergency patient transport: what are

the quality and safety issues? A systematic review. *International Journal for Quality in Health Care* 23: 68–75.

Halfon, P., Eggli, Y., Prêtre-Rohrbach, I., Meylan, D., Marazzi, A. and Burnand, B. 2006. Validation of the potentially avoidable hospital readmission rate as a routine indicator of the quality of hospital care. *Medical Care* 44: 972–981.

Hansmann, H. 1980. The role of nonprofit enterprise. *Yale Law Review* 89: 835–901.

Hochberg, Y. V., Ljungqvist, A. and Lu, Y. 2007. Whom you know matters: venture capital networks and investment performance. *Journal of Finance* 62: 251–301.

Horwitz, L., Partovian, C., Lin, Z., Herrin, J., Grady, J., Conover, M., Montague, J., Dillaway, C., Bartczak, K., Suter, L., Ross, J., Bernheim, S., Krumholz, H. and Drye, E. 2012. Hospital-wide all-cause unplanned readmission measure. *Technical report prepared for the Centers for Medicare & Medicaid Services*.

Ingram, P. and Roberts, P. W. 2000. Friendships among competitors in the Sydney hotel industry. *American Journal of Sociology* 106: 387–423.

Iwashyna, T. J. and Courey, A. J. 2011. Guided transfer of critically ill patients: where patients are transferred can be an informed choice. *Current Opinion in Critical Care* 17: 641–647.

Iwashyna, T. J., Christie, J. D., Moody, J., Kahn, J. M. and Asch, D. A. 2009. The structure of critical care transfer networks. *Medical Care* 47: 787–793.

Kogut, B. and Zander, U. 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science* 3: 383–397.

Landrum, L. and Weinrich, S. 2006. Readmission data for outcomes measurement: identifying and strengthening the empirical base. *Quality Management in Healthcare* 15: 83–95.

Leana, C., Appelbaum, E. and Shevchuk, I. 2009. Work process and quality of care in early childhood education: the role of job crafting. *Academy of Management Journal* 52: 1169–1192.

Levin, D. Z. and Cross, R. 2004. The strength of weak ties you can trust: the mediating role of trust in effective knowledge transfer. *Management Science* 50: 1477–1490.

Lomi, A., Mascia, D., Vu, D. Q., Pallotti, F., Conaldi, G. and Iwashyna, T. J. 2014. Quality of care and interhospital collaboration: a study of patient transfers in Italy. *Medical Care* 52: 407–414.

Lomi, A. and Pallotti, F. 2012. Relational collaboration among spatial multipoint competitors. *Social Networks* 34: 101–111.

Lui, S. S. and Ngo, H. Y. 2004. The role of trust and contractual safeguards on cooperation in non-equity alliances. *Journal of Management* 30: 471–485.

Marrocu, E., Balia, S. and Brau, R. 2016. A spatial analysis of inter-regional patient mobility in Italy. ERSA Conference Paper No. ersa16p127, European Regional Science Association Louvain-la-Neuve, Belgium.

Mayer, R. C., Davis, J. H. and Schoorman, F. D. 1995. An integrative model of organizational trust. *Academy of Management Review* 20: 709–734.

Mizruchi, M. S and Stearns, L. B. 1994. A longitudinal study of borrowing by large American corporations. *Administrative Science Quarterly* 39: 118–140.

Moody, J. and White, D. R. 2003. Structural cohesion and embeddedness: a hierarchical concept of social groups. *American Sociological Review* 68: 103–127.

Morrish, S. C. and Hamilton, R. T. 2002. Airline alliances – who benefits?. *Journal of Air Transport Management* 8: 401–407.

Ozmel, U., Yavuz, D., Trombley, T. and Gulati, R. 2020. Interfirm ties between ventures and limited partners of venture capital funds: Performance effects in financial markets. *Organization Science* (Forthcoming).

Pahnke, E. C., McDonald, R., Wang, D. and Hallen, B. 2015. Exposed: venture capital, competitor ties, and entrepreneurial innovation. *Academy of Management Journal* 58: 1334–1360.

Patterson, E. S. 2008. Structuring flexibility: The potential good, bad and ugly in standardisation of handovers. *Quality and Safety in Health Care* 17: 4–5.

Petersen, M. A. 2009. Estimating standard errors in finance panel data sets: comparing approaches. *Review of Financial Studies* 22: 435–480.

Powell, W. W., Koput, K. W., Smith-Doerr, L. and Owen-Smith, J. 1999. Network position and firm performance: organizational returns to collaboration in the biotechnology industry. *Research in the Sociology of Organizations* 16: 129–159.

Provan, K. G. and Milward, H. B. 1995. A preliminary theory of interorganizational network effectiveness: a comparative study of four community mental health systems. *Administrative Science Quarterly* 40: 1–33.

Rau, P. R. 2000. Investment bank market share, contingent fee payments, and the performance of acquiring firms. *Journal of Financial Economics* 56: 293–324.

Rotemberg, J. J. and Saloner, G. 1990. Collusive price leadership. *The Journal of Industrial Economics* 1: 93–111.

Rowley, T., Behrens, D. and Krackhardt, D. 2000. Redundant governance structures: an analysis of structural and relational embeddedness in the steel and semiconductor industries. *Strategic Management Journal* 21: 369–386.

Ruef, M. and Scott, W. R. 1998. A multidimensional model of organizational legitimacy: hospital survival in changing institutional environments. *Administrative Science Quarterly* 43: 877–904.

Schoonhoven, C. B. 1981. Problems with contingency theory: testing assumptions hidden within the language of contingency theory. *Administrative Science Quarterly* 26: 349–377.

Shipilov, A. V. 2005. Should you bank on your network? Relational and positional embeddedness in the making of financial capital. *Strategic Organization* 3: 279–309.

Shipilov, A. V., Li, S. X. and Baum, J. A. 2011. A matching theory of embedded interfirm tie formation. *Academy of Management Proceedings*.

Smith., A. 1776/1991. *An Inquiry into the Nature and Causes of the Wealth of Nations* Everyman's Library, New York, NY, London and Toronto.

Soda, G. 2011. The management of firms' alliance network positioning: implications for innovation. *European Management Journal* 29: 377–388.

Szulanski, G. 1996. Exploring internal stickiness: Impediments to the transfer of best practice within the firm. *Strategic Management Journal* 17: 27–43.

Tan, J., Zhang, H. and Wang, L. 2015. Network closure or structural hole? the conditioning effects of network-level social capital on innovation performance. *Entrepreneurship Theory and Practice* 39: 1189–1212.

Thompson, S. 2011. Simple formulas for standard errors that cluster by both firm and time. *Journal of Financial Economics* 99: 1–10.

Uzzi, B. 1996. The sources and consequences of embeddedness for the economic performance of organizations: the network effect. *American Sociological Review* 61: 674–698.

Uzzi, B. 1997. Social structure and competition in interfirm networks: the paradox of embeddedness. *Administrative Science Quarterly* 42: 35–67.

Uzzi, B. and Gillespie, J. J. 2002. Knowledge spillover in corporate financing networks: embeddedness and the firm's debt performance. *Strategic Management Journal* 23: 595–618.

Uzzi, B. and Lancaster, R. 2003. Relational embeddedness and learning: the case of bank loan managers and their clients. *Management Science* 49: 383–399.

Veinot, T. C., Bosk, E. A., Unnikrishnan, K. P. and Iwashyna, T. J. 2012. Revenue, relationships and routines: the social organization of acute myocardial infarction patient transfers in the United States. *Social Science and Medicine* 75: 1800–1810.

Wrzesniewski, A., McCauley, C., Rozin, P. and Schwartz, B. 1997. Jobs, careers, and callings: People's relations to their work. *Journal of Research in Personality* 31: 21–33.

Wuyts, S., Rindfleisch, A. and Citrin, A. 2015. Outsourcing customer support: The role of provider customer focus. *Journal of Operations Management* 35: 40–55.

Zaheer, A. and Venkatraman, N. 1995. Relational governance as an interorganizational strategy: an empirical test of the role of trust in economic exchange. *Strategic Management Journal* 16: 373–392.