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Coopetition in health care: A multi-level analysis of its individual and organizational determinants

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ABSTRACT

Cooperative inter-organizational relations are salient to healthcare delivery. However, they do not match with the pro-competitive healthcare reforms implemented in several countries. Healthcare organizations thus need to balance competition and cooperation in a situation of 'coopetition'. In this paper we study the individual and organizational determinants of coopetition versus those of cooperation in the price-competitive specialized care sector of the Netherlands. We use shared medical specialists as a proxy of collaboration between healthcare organizations. Based on a sample of 15,431 medical specialists and 371 specialized care organizations from March 2016, one logistic multi-level model is used to predict medical specialists' likelihood to be shared and another to predict their likelihood to be shared to a competitor. We find that different organizations share different specialists to competitors and non-competitors. Cooperation and coopetition are hence distinct organizational strategies in health care. Cooperation manifests through spin-off formation. Coopetition occurs most among organizations in the price-competitive market segment but in alternative geographical markets. Hence, coopetition in health care does not appear to be particularly anti-competitive. However, healthcare organizations seem reluctant to share their most specialized human resources, limiting the knowledge-sharing effects of this type of relation. Therefore, it remains unclear whether coopetition in health care is beneficial to patients.

1. Introduction

Health care is a service which is typically delivered to patients by several providers (i.e. organizations) cooperating in inter-organizational networks (Goes and Park, 1997; Luke et al., 1989; Provan et al., 2011). This is the result of the high level of specialization of providers and the fragmented nature of the sector due to its funding schemes (Gittell and Weiss, 2004; Provan and Sebastian, 1998). Inter-organizational networks can consist of various types of temporary or long-lasting inter-organizational relations through which resources are transferred between organizations, underpinned by various organizational motives (Oliver, 1990; Van de Ven, 1976). Examples of inter-organizational relations in health care include patient transfers, consortia, shared human resources, and interlocking directorates (e.g. Fottler et al., 1982; Westra et al., 2017). Well-structured cooperative inter-organizational healthcare networks are considered an efficient resource allocation method and have proven beneficial for quality of care (e.g. Lomi et al., 2014; Provan and Milward, 1995).

The absence of (price-)competition has long been considered a salient factor for inter-organizational cooperation to flourish (Jarillo, 1988) and much of the initial research regarding inter-organizational cooperation was consequently conducted in industries like health care (e.g. Levine and White, 1961). However, several Western countries have passed market-based reforms in an attempt to contain healthcare costs (Cutler, 2002; Maarse et al., 2016). Such reforms, aim to stimulate competition between providers which should in turn optimize value in the industry (Enthoven, 1993; Westra et al., 2017), with value being the best health outcomes per dollar spent (Porter, 2010). The introduction of

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competition effectively renders many cooperating healthcare providers in a situation where they simultaneously cooperate and compete, two diametrically opposed logics (Bengtsson and Kock, 2000).

During the past two decades, simultaneous cooperation and competition between organizations has become an increasingly established phenomenon in strategic management literature known as coopetition (Brandenburger and Nalebuff, 1996). It has attracted particular attention in knowledge-intensive industries (Bengtsson and Kock, 2014; Bouncken et al., 2015). While some have dubbed coopetition 'sleeping with the enemy' (Quint, 1997), the concept is primarily based on 'growth commensalism' (Ingram and Yue, 2008). It is described as a phenomenon in which competitors cooperate to create or expand a market but compete to appropriate the largest possible share of that market in academic literature (e.g. Ritala and Hurmelinna-Laukkanen, 2009). Along this line, knowledge sharing and inter-organizational learning are considered the primary motives to cooperate with competitors (e.g. Ritala and Hurmelinna-Laukkanen, 2009). Improved competitiveness and innovativeness resulting from scale advantages are considered the main outcomes of this process (e.g. Gnyawali and Park, 2011) when the tensions inherent to the opposite logics of competition and cooperation are well-managed at individual and organizational level (e.g. Das and Teng, 2000). Coopetition is primarily studied at the inter-organizational level using case studies (Bouncken et al., 2015) and empirical work has mostly failed to capture the multi-level nature of the phenomenon (Bengtsson and Kock, 2014).

In health care, coopetition has been described as 'the new market milieu' (Gee, 2000). Yet, despite the implementation of competition in several healthcare systems, and the inherent tensions this brings cooperating competitors, coopetition has not been studied extensively in the sector. In their systematic review of the coopetition literature, Bouncken et al. (2015) identified only two studies which explicitly utilize the concept of coopetition in health care (i.e. Barretta, 2008; Peng and Bourne, 2009). Albeit perhaps not explicitly referencing coopetition, simultaneous competition and cooperation has not gone unnoticed by health services researchers. Studies by Lomi and Pallotti (2012), Mascia et al. (2012), and Mascia et al. (2016) for example show that competing hospitals in the Italian National Health System (NHS) are more likely to collaborate with one another. Mascia and Di Vincenzo (2011) find that while cooperation benefits hospitals' performance, competition hampers it. Conversely, Plochg et al. (2006) find that market-based reforms hamper cooperation between providers in the Netherlands.

Most of the empirical research regarding coopetition in health care stems from the Italian NHS in which price-competition is absent (Mascia et al., 2012) and has focused on transferring patients, a temporary relation between organizations (Mascia et al., 2012). Empirically, long-lasting resource flows between organizations have only been considered to a limited extent in this stream of literature. Furthermore, the coopetition literature in health care has either operationalized competition as a relational phenomenon at the dyadic level (e.g. Mascia and di Vincenzo, 2013) or at the industry level as an industry characteristic (e.g. Plochg et al., 2006). Conceptualizations of competition at the sub-industry level (Ingram and Yue, 2008), which have been applied in healthcare management research (e.g. Marlin et al., 2002), have not been juxtaposed with cooperation. Strategic groups are arguably the most well-known sub-industry conceptualization of competition. Strategic groups refer to groups of organizations within an industry which offer similar products or services and which can thus be considered each other's main competitors (e.g. McGee and Thomas, 1986).

We aim to advance our understanding of coopetition in health care, and thus of competitive healthcare markets using the following research question; '*What are the individual and organizational determinants of coopetition versus those of cooperation in health care?*'. Consequently, we study the determinants of coopetition (i.e. simultaneous cooperation and competition) and contrast these with the determinants of cooperation. This enables us to unravel the similarities and differences between cooperation and coopetition in a price-competitive healthcare market. Furthermore, we answer the call for a multi-level approach to studying coopetition by examining which resources are shared by which organizations. Lastly, we study a long-lasting relation specific to the healthcare sector, namely shared human resources (i.e. medical specialists). Medical specialists are a key resource of hospitals (Robinson and Luft, 1985), yet it is common for them to be affiliated to multiple hospitals simultaneously (Gee, 2000; Zuckerman et al., 1995). This approach draws from the labor mobility literature in which employee inflows are perceived as vehicles to attract tacit knowledge of an employee's former employer and as conduits of communication between current and former employers (e.g. Corredoira and Rosenkopf, 2010; Madsen et al., 2003). It also captures the tension inherent to simultaneous cooperation and competition since shared medical specialists between healthcare organizations has been described as anti-competitive (Enthoven, 1988).

2. Methods

2.1. Setting

We study coopetition in the specialized care market of the Netherlands. Price-competition was introduced in this sector by the Health Insurance Act (HIA) in 2006 as a consequence of selective contracting of providers by third-party purchasers (i.e. insurers) (Enthoven and van de Ven, 2007). Upon introduction of the HIA in 2006, it was limited to approximately 7% of the specialized care services but since 2012, price-competition pertains to roughly 70% of the specialized care services (Schut and Varkevisser, 2017). In 2013, more than half of the curative healthcare expenditure under the HIA was spent on specialized care services which are delivered by academic hospitals, teaching hospitals, general hospitals, specialized hospitals, and independent treatment centers (Nza, 2015; Vektis, 2015).

2.2. Data

Our study, which was not subjected to the Dutch 'Research involving Human Subjects act' following the decision of the Maastricht University Medical Center ethics committee (number 14-5-028), was based on data owned by Vektis, the Dutch center for information and standardization in health care. Specifically, we used the publically available '*Algemeen Gegevensbeheer Code*' (AGB-code) data (version U145, released in the second half of March 2016) which is designed to handle claims and to analyze healthcare consumption (de Rouw, 2016). An AGB-code is a unique identifier for healthcare professionals and healthcare organizations in the Netherlands. Insurers only reimburse claims with a valid combination of a professional's and organization's AGB-code (de Rouw, 2016). In order to receive an AGB-code, medical specialists need to be listed in the country's medical (BIG) registry and specialized care organizations need to possess a unique chamber of commerce number and governmental admission to the market (de Rouw, 2016). The AGB-code database contains the active affiliations of professionals to healthcare organizations as well as a professional's and an organization's basic characteristics (e.g. age, gender, experience, type of organization, and location). AGB-code data has previously been used to explore the occurrence of shared specialists in the Netherlands (Westra et al., 2016).

2.3. Sample

From the database we selected all medical specialists ($n = 19{,}852$), all specialized care organizations ($n = 969$), and all active affiliations of the specialists to the organizations ($n = 26{,}614$). Because the financial incentive for specialists to keep the database up to date (Smeets et al., 2011) becomes obsolete upon their retirement, all specialists who had reached the Dutch retirement age on April 1st, 2016 were excluded. Five specialist who were below the age of 30 on April 1st, 2016 were also excluded, since only professionals who have completed their residencies are eligible for an AGB code, which is practically impossible before the age of 30 in the Netherlands (van der Velden and Hingstman, 2003). Specialists without an active affiliation to any of the organizations in our sample were disregarded.

Specialized hospitals, including psychiatric hospitals, were excluded because they can also be categorized as long-term care organizations in the AGB-code data and different entry barriers can apply (de Rouw, 2016). Our sample hence included independent treatment centers (ITCs), general hospitals, teaching hospitals, and academic hospitals. Similar to what Gaynor and Town (2012) describe as ambulatory surgical centers, ITCs are ambulatory clinics that typically offer low-complex outpatient care in a few specialties. Furthermore, the distinction between general, teaching, and academic hospitals is similar to what Zwanziger et al. (1994) describe as primary, secondary, and tertiary hospital services. General hospitals offer basic (i.e. 'primary') hospital services in several specialties. Teaching hospitals offer services which require more specialized resources (i.e. 'secondary services') and are hospitals where medical students and residents can be placed. Academic hospitals offer highly specialized (i.e. 'tertiary') services on a regional basis and are responsible for the training of medical students and residents in close collaboration with a university (Nza, 2014; Zwanziger et al., 1994). Because the services offered by organizations within each of these categories are distinct and most closely resemble the services offered by organizations in the same category, each organizational type was considered a separate strategic group.

All specialists were assigned an organization to which they were primarily affiliated and, if applicable, an organization to which they were shared. We calculated the duration of each active affiliation a specialist had using the starting date of the affiliation. The organization to which a specialist had the longest active affiliation was considered the specialist's primary organization. The second organization to which a specialist was affiliated was considered the organization to which a specialist was shared. Specialists with more than two affiliations were considered shared to the strongest competitor. That is, the most geographically proximate organization in the same strategic group. In cases none of the additional affiliations were to an organization in the same strategic group we considered them shared to the organization to which they had the second-longest affiliation. Specialists with equal affiliation durations for their first two affiliations were disregarded because we were unable to determine the primary organization which decided to share the specialist in these cases. Ultimately, we retained a sample of 15,431 medical specialists in 29 medical specialties (see Appendix 1), primarily affiliated to 371 specialized care organizations.

2.4. Measures and model specification

2.4.1. Dependent variables

In the Netherlands, medical specialists are either employed by a hospital or independent, self-employed, entrepreneurs organized in per-specialty partnerships called *'maatschap'* (Varkevisser et al., 2008). Sharing a medical specialist thus either implies that an organization shares a tenured employee or that a *'maatschap'* is affiliated to multiple organizations. In both cases the hospital board is responsible for its specialists (Scholten and Van der Grinten, 2005) and decides whether or not to share a specialist (Westra et al., 2016). Previous research has identified sharing specialists as an emergent, yet deliberate, strategy of healthcare organizations given the formal decision-making authority and the strategic considerations underpinning the decision (Westra et al., 2016).

We used two dependent variables, both of which indicated whether a specialist was shared between two organizations in our sample. Our first was a binary indicator coded 1 when a specialist was shared to another organization in our sample and 0 otherwise. Based on this first dependent variable, we modeled the individual and organizational determinants of cooperation. That is, a specialist's general likelihood to be shared. Our second dependent variable was a binary indicator coded 1 when specialists who were shared, as identified by our first independent variable, were shared to an organization in the same strategic group as their primary organization and 0 otherwise. Based on this second dependent variable we modeled the individual and organizational determinants of coopetition. That is, a specialist's likelihood to be shared to a competitor (i.e. an organization in the same strategic group).

2.4.2. Model specification

We constructed a multilevel logistic regression model with maximum likelihood estimation, Laplace likelihood approximation, and logit link function for both dependent variables using the 'glimmix' procedure in the SAS software for Microsoft Windows version 9.3. The multilevel structure was used in order to account for the separation of effects at the individual and organizational level (Snijders and Bosker, 2012). Formally we specified the following model:

$$
\begin{aligned}
&\mathit{Logit}(\pi_{ij})\\
&= \alpha_j + \beta 0_{ij} + \beta 1 \cdot \mathit{Gender}_i + \beta 2 \cdot \mathit{PhD}_i + \beta 3 \cdot \mathit{Experience}_i\\
&+ \beta 4 \cdot \mathit{Affiliation\,Duration}_{ij} + \beta 5 \cdot \mathit{Independent}_{ij} + \sum_{k=6}^{34} \beta k \cdot \mathit{Specialty}_{ijk}\\
&+ \beta 35 \cdot \mathit{Traveltime}_{ij} + \beta 36 \cdot \mathit{Traveltime}_{ij}^2 + \gamma 1 \cdot \mathit{Size}_j\\
&+ \gamma 2 \cdot \mathit{Competition}_j + \gamma 3 \cdot \mathit{MHG\,membership}_j + \gamma 4 \cdot \mathit{ITC}_j\\
&+ \gamma 5 \cdot \mathit{General\,Hospital}_j + \gamma 6 \cdot \mathit{Teaching\,Hospital}_j\\
&+ \gamma 7 \cdot \mathit{Academic\,Hospital}_j + \varepsilon_{ij}
\end{aligned}
$$

where: $\alpha_j = \alpha + \mu_j$

2.4.3. Level-1 independent variables

$\beta 0_{ij}$ through $\beta 37_{ij}$ represent personal characteristics of medical specialists and serve as first-level predictors of the likelihood that a specialist is shared. $\beta 0_{ij}$ represents the first-level intercept. Gender, experience, and the specialty of a specialist are all common personal-level variables in research regarding collaboration in health care (e.g. Landon et al., 2012). Gender_i was coded 1 for male and 0 for female. $\mathrm{Experience}_i$ was operationalized as the number of years between April 1st, 2016 and the date on which a specialist finished his or her residency. $\sum_{k=6}^{34}\beta k \cdot Specialty_{ijk}$ represents 29 mutually exclusive dummies indicating a specialist's medical specialty coded 1 for yes and 0 for no. Internal medicine, the largest specialty in our sample, serves as the reference category. PhD_i indicates whether the specialist holds a PhD (i.e. 1 for yes and 0 for no) and is used as an indication of seniority (Mascia et al., 2015) in medical terms. Affiliation $Duration_{ij}$ represents how long a specialist has been affiliated to their primary organization measured in years per April 1st, 2016 and is a predictor of employee turnover in labor economics (e.g. Lane and Parkin, 1998). $Independent_{ij}$ is a dummy variable coded 1 for specialists who work in a '*maatschap*' and 0 for employed specialists. $Traveltime_{ij}$ and $Traveltime^2_{ij}$, are only used in model 2 and indicate the (curvilinear) effect of geographical proximity, operationalized as travel time in hours, between a specialist's primary and secondary organization. The travel time between each dyad of organizations was retrieved from the Google Maps API through inputting both organizations' visiting address using the SAS software for Microsoft Windows version 9.3. Our findings proved robust against operationalizing proximity as geographical distance like in previous research (Landon et al., 2012; Mascia et al., 2015).

2.4.4. Level-2 independent variables

α_j denotes the second level random intercept specified as the grand mean α and hospital specific deviation from that mean μ_j. $\gamma 1_j$ through $\gamma 7_j$ represent organizational characteristics of a specialist's primary organization and serve as second-level predictors of the likelihood to be shared. $Size_j$ constitutes a common variable in studies regarding hospital strategies and was operationalized as the total number of specialists affiliated to the organization expressed in hundreds. $Competition_j$ represents a measure of the degree of competition to which an organization is exposed. It is operationalized as the cumulative degree of service-overlap of organization j with all other organizations k in a 10 km radius. The degree of service overlap between organization j and another organization k was defined as the percentage of specialties offered by organization j which organization k also offers. We considered an organization to offer a specialty when at least one specialist of a specialty was primarily affiliated to the organization. The 10 km radius represents the local nature of specialized care markets (Sohn, 2002) but findings proved robust against higher radiuses. MHS membership is a dummy variable coded 1 when an organization is part of a multihospital system (MHS) (Dranove and Shanley, 1995) in which at least one other organizations from our sample is also a member and 0 otherwise. The variable was constructed based on the group ID associated with each AGB-code in the Dutch national company registry of Statistics Netherlands. ITC_j, General $Hospital_j$, Teaching $Hospital_j$, and Academic $Hospital_j$ are mutually exclusive dummies indicating the type (i.e. strategic group) of each organization. General hospitals serve as the reference category. Lastly, ε_{ij} indicates the error term.

3. Results

3.1. Descriptive statistics

Table 1 presents the descriptive statistics of the first-level variables. It reveals that roughly 28% of all medical specialists in our sample (n = 15,431) are shared and that 31% of those shared specialists (n = 4277) are shared to an organization in the same strategic group. Of the 15,431 specialists, 61% are male, 52% are employed by their primary organization, and 22% have obtained a PhD. Of the 4277 shared specialists 66% is male, 45% is employed by their primary organization and 20% has a PhD. On average, specialists have almost 12 years of experience and have been affiliated to their primary organization for roughly 9.5 years. Shared specialists are, on average, more experienced (i.e. 13 years) and have longer affiliations to their primary organization (i.e. 10.5 years). Most of the specialists, as well as the shared specialists, are primarily affiliated to a general or a teaching hospital. Lastly, on average, shared specialists are shared to organizations located almost an hour away from their primary organization.

Table 2 displays the descriptive statistics of the characteristics of healthcare organizations. It indicates that 371 organizations served as the primary organization of one or more specialists in our sample. On average, 56 specialists were affiliated to an organization and organizations were exposed to 5.74 organizations in a 10 km radius with which they had full service overlap. Most organizations in our sample are ITCs (78%), followed by general hospitals (13%), teaching hospitals (8%), and academic hospitals (2%). Of those 371 organizations, 226 organizations cooperate. That is, they served as the primary organization of at least one shared specialist. On average, 90 specialists are affiliated to these organizations and they have 5.15 organizations in a 10 km radius with which they have complete service overlap. Most of the organizations to which shared specialists are primarily affiliated are ITCs (63%), followed by general hospitals (21%), teaching hospitals (13%), and academic hospitals (4%). Of these 226 organizations, 176 engage in coopetition. That is, they share at least one specialist to an organization in the same strategic group.

Table 3 indicates the number of specialists shared between each type of organization at organizational level. The rows represent the type of organization to which specialists are primarily affiliated and

Table 1
Individual-level descriptive statistics.

	Model 1					Model 2				
	n	Mean	SD	Min	Max	n	Mean	SD	Min	Max
Specialists shared	15,431	27.72%		0	1					
Specialists shared within strategic group						4277	30.98%		0	1
Gender	15,431	61.25%		0	1	4277	66.03%		0	1
PhD	15,431	21.53%		0	1	4277	20.22%		0	1
Experience of specialist	15,130	11.86	7.73	0	36	4198	12.90	7.65	0	36
Affiliation duration	15,426	9.44	7.12	0	36	4277	10.50	7.08	0	36
Independent	15,431	47.77%		0	1	4277	55.18%		0	1
Medical specialty	See Appendix 1					See Appendix 1				
Travel time to secondary organization						4277	0.92	0.59	0	3.20
Primarily affiliated to an ITC	15,431	5.17%		0	1	4277	8.39%		0	1
Primarily affiliated to a general hospital	15,431	34.82%		0	1	4277	41.17%		0	1
Primarily affiliated to a teaching hospital	15,431	36.85%		0	1	4277	37.74%		0	1
Primarily affiliated to an academic hospital	15,431	23.15%		0	1	4277	12.70%		0	1

Table 2
Organizational-level descriptive statistics.

	Model 1					Model 2				
	n	Mean	SD	Min	Max	n	Mean	SD	Min	Max
Size	371	0.56	1.14	0.01	7.07	226	0.90	1.35	0.01	7.07
Cooperate	371	60.92%		0	1	226	100%		0	1
Engage in coopetition						226	77.88%		0	1
Competition	371	5.74	6.90	0.67	81.11	226	5.15	6.98	0.95	81.11
MHS membership	371	22.91%		0	1	226	30.97%		0	1
Academic hospital	371	2.16%		0	1	226	3.54%		0	1
ITC	371	77.63%		0	1	226	63.27%		0	1
Teaching hospital	371	7.55%		0	1	226	12.39%		0	1
General hospital	371	12.67%		0	1	226	20.80%		0	1

Table 3
Number of shared specialists between types of organizations. The diagonal represents the number of specialists shared within the strategic group.

Shared by	Shared to				Number of specialists shared	Number of specialists primarily affiliated to organizational type[a]	% of specialist shared per organizational type
	ITC	General hospital	Teaching hospital	Academic hospital			
ITC	158	75	120	6	359	798	44.99%
General hospital	661	574	423	103	1761	5373	32.77%
Teaching hospital	451	579	500	84	1614	5687	28.38%
Academic hospital	81	191	178	93	543	3573	15.20%
Total	1351	1419	1221	286	4277	15,431	

[a] The total number of affiliated specialists to each type of organization was calculated based on the percentage of specialists affiliated to each type reported in Table 1.

the columns represent the type of organization to which specialists are shared. The diagonal represents the number of specialists shared to organizations in the same strategic group (i.e. 31%, or 1325 of the 4277). Almost half of the specialists shared by an ITC are shared to another ITC (i.e.158 of the 359). Approximately a third of the specialists who are shared by a general hospital or a teaching hospital are shared to another general hospital or teaching hospital (574 out of 1761 and 500 out of 1614 respectively), while roughly a fifth of the specialists shared by an academic hospital are shared to another academic hospital (i.e. 93 out of 543). Table 3 furthermore highlights that 45% of the specialists who are primarily affiliated to an ITC, 33% of all specialists primarily affiliated to a general hospital, 28% of all specialists primarily affiliated to a teaching hospital, and 15% of all specialists primarily affiliated to an academic hospital are shared.

Table 4 presents the results of our logistic multilevel regression models predicting the likelihood a specialist is shared and the likelihood a specialist is shared within a strategic group. Only the results of the full model are presented. In both cases the full model, including all individual and organizational level predictors, displayed the best model fit, indicated by the Akaike Information Criterion. The intraclass correlation (ICC), calculated following the method described by Snijders and Bosker (2012), reveals that a specialist's primary organization explains roughly a quarter of the variance in the likelihood to be shared (i.e. model 1) and more than a third of the variance in the likelihood to be shared to a competitor.

3.2. Likelihood of cooperation

Model 1 in Table 4 reveals the results of the regression model predicting the likelihood that a specialist is shared (i.e. the likelihood of cooperation). The results indicate that male specialists are 25% more likely to be shared than female specialists. Furthermore, a specialist is 3% more likely to be shared for each year he or she has been affiliated to their primary organization. Additionally, independent specialists are 10% less likely to be shared than specialists who are employed by their primary organization. Lastly, the likelihood of a specialist to be shared differs across medical specialties. In 21 of the 28 specialties the likelihood to be shared differs significantly from the reference category (see Appendix 2).

At the organizational level, neither the size of a specialist's primary organization nor the degree of competition to which it exposed significantly influence the likelihood of specialists to be shared. The type of organization to which a specialist is primarily affiliated and whether that organization is part of a MHS do significantly influence a specialist's likelihood to be shared. Specialists who are primarily affiliated to an academic hospital are 76% less likely to be shared than specialists affiliated to a general hospital (i.e. the reference category). Specialists affiliated to organizations which are part of a larger system of multiple organizations are 84% more likely to be shared.

3.3. Likelihood of coopetition

Model 2 in Table 4 presents the results of the regression model predicting the likelihood that a shared specialist is shared within a same strategic group (i.e. the likelihood of coopetition). At the individual level, the contract type, specialty of a medical specialist, and the traveling time between the primary and secondary organization all significantly influence a specialist's likelihood to be shared within a strategic group. Independent specialists are 31% less likely to be shared within a strategic group. A specialist is furthermore more likely to be shared within a strategic group if the organization to which he or she is shared is located further away, as indicated by the positive and significant effect of traveling time. However, the negative and significant effect of the squared travel time indicates that this likelihood decreases when the travel time between both organizations exceeds 96 min. The likelihood of a specialist to be shared within a strategic group differs significantly from the reference category in 8 of the 28 medical specialties (see

Table 4
Results of logistic multilevel regression predicting the likelihood that a specialist is shared (model 1) and shared to a competitor (model 2).

	Model 1	Odds Ratio Model 1 (95% CI)	Model 2	Odds Ratio Model 2 (95% CI)
Level-1 fixed effects				
Intercept	−2.017 (0.246)***	–	−0.576 (0.373)	–
Gender	0.220 (0.048)***	1.246 (1.135–1.369)	0.103 (0.094)	1.108 (0.921–1.334)
PhD	0.040 (0.055)	1.041 (0.934–1.160)	−0.038 (0.108)	0.963 (0.779–1.190)
Experience of specialist	−0.001 (0.005)	0.999 (0.989–1.008)	0.005 (0.010)	1.005 (0.986–1.024)
Affiliation duration	0.030 (0.006)***	1.030 (1.019–1.041)	−0.011 (0.011)	0.989 (0.968–1.010)
Independent	−0.110 (0.054)**	0.896 (0.806–0.996)	−0.372 (0.103)***	0.689 (0.563–0.844)
Medical specialty	Omitted	See Appendix 2	Omitted	See Appendix 2
Travel time			1.230 (0.279)***	3.420 (1.978–5.914)
Squared travel time			−0.383 (0.119)***	0.682 (0.540–0.860)
Level-2 fixed effects				
Size	0.129 (0.109)	1.138 (0.920–1.408)	−0.196 (0.140)	0.822 (0.625–1.082)
Competition	0.011 (0.011)	1.012 (0.989–1.034)	−0.002 (0.016)	0.998 (0.967–1.030)
MHS membership	0.612 (0.189)***	1.845 (1.274–2.671)	−0.112 (0.264)	0.894 (0.534–1.499)
ITC	0.387 (0.253)	1.473 (0.897–2.420)	0.890 (0.349)**	2.436 (1.229–4.826)
General hospital	Reference	–	Reference	–
Teaching hospital	−0.375 (0.280)	0.687 (0.397–1.188)	−0.346 (0.372)	0.707 (0.341–1.467)
Academic hospital	−1.439 (0.546)***	0.237 (0.081–0.692)	−0.753 (0.725)	0.471 (0.114–1.950)
Random effects				
Level 2 intercept	1.074 (0.176)***		1.784 (0.334)***	
ICC	0.246		0.352	
Model fit				
AIC	14808.21		4178.86	
ROC	0.786		0.843	

Estimation method: Laplace.
* p-value<0.10.
** p-value<0.05.
*** p-value<0.01.

Appendix 2).

At the organizational level, neither the size, the degree of competition to which an organization is exposed, nor MHS membership influence the likelihood that a specialist is shared within a strategic group. The type of organization to which a specialist is primarily affiliated does have a significant influence on the likelihood of a specialist to be shared in a strategic group. Specialists who are primarily affiliated to an ITC are 2.44 times as likely to be shared to an organization in the same strategic group (i.e. another ITC) than specialists affiliated to a general hospital (i.e. the reference category).

4. Discussion

The aim of the study was to identify the individual and organizational determinants of cooperation and coopetition in health care. We based our analysis on shared human resources between healthcare organizations and used a multilevel approach to study which healthcare organizations share which human resources in general and to competitors. We find that more than a quarter of all specialists are shared. This contradicts the notion that specialists have a lifetime affiliation with one single hospital (Varkevisser et al., 2008). In line with previous research (Gee, 2000; Varkevisser et al., 2013; Westra et al., 2016) it instead indicates that sharing specialists is a common inter-organizational relation in health care. This is particularly true for male specialists which can be explained by the fact that females are three times more likely to work part-time than males in the Netherlands (CBS, 2015) and sharing part-time employees could erode the already limited availability of these employees to an organization.

Our results indicate that cooperation and coopetition entail different strategies. This becomes apparent in several ways. Firstly, the organizational level explains a considerable amount of the variance in a specialist's likelihood to be shared (to a competitor), underlining the notion that sharing medical specialists is a deliberate organizational strategy. Secondly, not all organizations which cooperate engage in coopetition. Sixty-one percent of the organizations in our study cooperate. Of those, 78% engage in coopetition. Thirdly, the type of specialists shared in general and shared to competitors differs. While male specialists and specialists with longer affiliations, and consequently higher degrees of firm-specific knowledge, are more likely to be shared in general, they are not more likely to be shared to competitors. There are furthermore significant differences between the likelihood to be shared versus the likelihood to be shared to competitors in several medical specialties. Lastly, coopetition is more common for ITCs while cooperation is more common for organizations which belong to a multi-hospital system but less common for academic hospitals. Coopetition ultimately entices decisions ‘what to share, with whom, when, and under which conditions’ (Levy et al., 2003, p. 4) and our results show that different organizations share different resources (i.e. specialists) in situations of cooperation versus coopetition.

Cooperation predominantly manifests itself through spin-off formation by general and teaching hospitals. Model 2 indicates that specialists shared to organizations in the same geographical market are likely to be shared to non-competitors. Subsequently, inspection of Table 3 reveals that 40% (i.e. 1193 of 2952) of the specialists who are shared to non-competitors are shared to an ITC. Although such ambulatory clinics compete with hospitals for patients (Casalino et al., 2008), hospital boards do share specialists to ITCs which constitute (potential) competitors (Westra et al., 2016) and these ITCS are thus likely to constitute spin-offs. Creating a spin-off in the same geographical market furthermore minimizes the travel-time for specialists and allows hospitals to outsource certain activities while ensuring incoming referrals of patients (Westra et al., 2016). The finding that specialists with high degrees of firm-specific knowledge (i.e. longer affiliations to their primary organization) are more likely to be shared underlines the notion of spin-off formation as these specialists can maximize the alignment between both organizations.

Coopetition manifests itself most clearly in organizations which are active in the price competitive segment of the market. That is, ITCs typically perform services in the price competitive market segment (Nza, 2012) and specialists primarily affiliated to an ITC are 2.5 times more likely to be shared to a competitor. Furthermore, 45% of all specialists primarily affiliated to an ITC are shared. However, Model 2 also indicates that cooperation with competitors predominantly occurs with competitors located further (i.e. one hour on average) away. Given the local nature of specialized care markets (Sohn, 2002) these competitors thus reside in different geographical markets. The risk of anti-competitive effects resulting from sharing medical specialists suggested by previous research (Enthoven, 1988; Varkevisser et al., 2013; Westra et al., 2016) thus seem limited. The fact that coopetition seems most common in organizations which operate in the price-competitive market segment does raise the question on which criteria these organizations select appropriate partners to share their resources to. Future research should attempt to unravel these mechanisms at a dyadic level, preferably through longitudinal approaches.

Lastly, our results suggest that both cooperation and coopetition based on shared medical specialists fails to fulfill its full knowledge-sharing potential. Inter-organizational learning and knowledge exchange are considered important drivers of coopetition in general and sharing specialists in particular (Bengtsson and Kock, 2014; Varkevisser et al., 2013; Westra et al., 2016) However, neither more experienced specialists nor specialists with medical seniority (i.e. those who have obtained a PhD) are more likely to be shared. Healthcare providers thus seem reluctant to share their most experienced, specialized, and arguably most knowledgeable human resources. Furthermore, specialists who are primarily affiliated to an academic hospital and who typically have experience with treating the most complex patients are significantly less likely to be shared. Considered in conjunction with the finding that specialists with higher degrees of firm-specific knowledge are less likely to be shared, this result suggests that healthcare organizations seek to protect their competitive advantage (i.e. their most specialized resources).

5. Limitations

Our work is subject to a few caveats. Firstly, medical specialists and healthcare organizations are not obliged to possess an AGB-code. However, it is a requirement for reimbursement by health insurers. This constitutes a strong financial incentive to keep the database up to date, making it a reliable source for research purposes (Smeets et al., 2011). Additionally, the AGB-code database has recently undergone a quality review in which all specialists were requested to update their records (Vektis, 2016). Secondly, we have operationalized competitors through mutual strategic group membership. However, competition is not exclusive to organizations within a strategic group. Hospitals can cross-subsidize unprofitable services with the revenues of simpler services for which they compete with ITCs for example (Gaynor and Town, 2012). Nonetheless, organizations offer services which most closely resemble those offered by organizations from the same strategic group and the sub-industry categorization on which we based our strategic groups is generally accepted in multiple healthcare settings (Zwanziger et al., 1994).

6. Conclusion

The presence of price-competition in several healthcare markets makes it compelling to understand the mechanisms of cooperation and coopetition in the sector. In this paper we studied cooperation and coopetition between healthcare organizations based on shared human resources. We show that coopetition and cooperation entail different strategies in health care. That is, different organizations share different resources under circumstances of cooperation and competition. Cooperation predominantly manifests through spin-off formation. Coopetition occurs most in the price-competitive segment of the market but does not seem to be anti-competitive. However, healthcare organizations are reluctant to share their most specialized human resources, seemingly protecting their competitive advantage which limits the full knowledge-sharing potential of this type of inter-organizational relationship. Whether coopetition in healthcare benefits patients hence remains a point for future research.

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Appendix 1. Descriptive statistics of medical specialty dummies

	Model 1 (n = 15,431)			Model 2 (n = 4277)		
	Mean	Min	Max	Mean	Min	Max
Ophthalmology	3.81%	0	1	6.08%	0	1
Ear nose throat	3.05%	0	1	2.81%	0	1
Surgery	7.42%	0	1	8.44%	0	1
Plastic surgery	1.66%	0	1	3.39%	0	1
Orthopedics	4.21%	0	1	3.41%	0	1
Urology	2.43%	0	1	3.06%	0	1
Gynecology	6.17%	0	1	6.13%	0	1
Neurosurgery	0.86%	0	1	2.10%	0	1
Dermatology	3.15%	0	1	8.42%	0	1
Pediatrics	8.09%	0	1	5.78%	0	1
Gastroenterology	2.82%	0	1	2.57%	0	1
Cardiology	6.07%	0	1	10.12%	0	1
Pulmonology	3.43%	0	1	3.37%	0	1
Rheumatology	1.61%	0	1	1.61%	0	1
Allergology	0.12%	0	1	0.12%	0	1
Rehabilitation	1.72%	0	1	1.31%	0	1
Cardio thorax surgery	0.73%	0	1	0.33%	0	1
Psychiatry	3.27%	0	1	1.75%	0	1
Neurology	5.02%	0	1	3.02%	0	1
Geriatrics	1.50%	0	1	1.26%	0	1
Radiology	5.97%	0	1	5.59%	0	1
Radiotherapy	1.13%	0	1	0.37%	0	1
Nuclear medicine	0.87%	0	1	0.87%	0	1
Clinical chemistry	0.99%	0	1	0.58%	0	1
Microbiology	0.97%	0	1	1.08%	0	1
Pathology	1.76%	0	1	1.64%	0	1
Anesthesiology	9.16%	0	1	6.83%	0	1
Clinical genetics	0.63%	0	1	0.12%	0	1
Internal medicine	11.38%	0	1	7.86%	0	1

Appendix 2. Odds ratios of medical specialty dummies omitted from Table 4

	OR (95% CI) Model 1	OR (95% CI) Model 2
Ophthalmology	3.852 (3.058–4.852)	0.811 (0.521–1.262)
Ear nose throat	1.440 (1.104–1.880)	1.118 (0.643–1.943)
Surgery	1.954 (1.613–2.369)	0.896 (0.603–1.332)
Plastic surgery	6.074 (4.469–8.257)	0.641 (0.366–1.121)
Orthopedics	1.106 (0.864–1.415)	1.551 (0.941–2.559)
Urology	2.448 (1.869–3.205)	1.014 (0.601–1.711)
Gynecology	1.659 (1.350–2.039)	0.829 (0.535–1.284)
Neurosurgery	11.813 (7.787–17.92)	0.844 (0.438–1.625)
Dermatology	15.813 (12.152–20.577)	0.372 (0.242–0.572)
Pediatrics	1.147 (0.933–1.409)	1.199 (0.773–1.858)
Gastroenterology	1.472 (1.120–1.936)	1.298 (0.734–2.295)
Cardiology	3.756 (3.086–4.571)	0.318 (0.210–0.482)
Pulmonology	1.524 (1.186–1.960)	0.537 (0.310–0.931)
Rheumatology	1.874 (1.347–2.606)	1.454 (0.750–2.820)
Allergology	1.100 (0.343–3.533)	1.122 (0.064–19.702)
Rehabilitation	1.213 (0.851–1.730)	0.581 (0.270–1.251)
Cardio thorax surgery	0.800 (0.442–1.449)	4.832 (1.399–16.695)
Psychiatry	0.532 (0.381–0.743)	0.803 (0.397–1.622)
Neurology	0.754 (0.587–0.969)	1.169 (0.688–1.988)
Geriatrics	1.489 (1.034–2.145)	2.142 (1.061–4.324)
Radiology	1.279 (1.032–1.585)	0.901 (0.57–1.423)
Radiotherapy	0.540 (0.308–0.947)	0.006 (<0.001 - >999.999)
Nuclear medicine	1.925 (1.249–2.964)	1.087 (0.463–2.549)
Clinical chemistry	0.633 (0.385–1.040)	0.908 (0.318–2.592)
Microbiology	1.923 (1.271–2.909)	1.389 (0.629–3.066)
Pathology	1.563 (1.121–2.179)	2.069 (1.101–3.885)
Anesthesiology	1.026 (0.843–1.249)	1.745 (1.171–2.601)
Clinical genetics	0.542 (0.216–1.360)	1.426 (0.146–13.901)
Internal medicine	–	–

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