

## Organizational Form and Asymmetric Competition: The Dynamics of Surgery Center and Hospital Exit

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October 20, 2009

### **Abstract**

The literature on organizational niche suggests that competition between firms that have overlapping niches tends to elevate mortality risks. However, the vast majority of this research considers only competition between firms with a similar organizational form. Ambulatory surgery centers (ASCs) represent an emergent class of specialized organizational forms that are leaner versions of generalist forms. We apply niche overlap theory to the market for outpatient surgical procedures in order to explore whether ASCs and hospital compete with one another in fundamentally different ways. By manipulating patient-level datasets from the state of Florida, we were able to measure competition and firm entry/exit with a high level of precision. We broke down our explanatory variables by facility type (ASC vs. hospital) and utilized Cox proportional hazard models to evaluate the impact of competition from each on ASC and hospital exit. Although ASCs do tend to exit markets in which there are high levels of ASC competition, we found weak evidence to suggest that ASCs exit rates are lowest in markets with high hospital density. On the other hand, hospitals not only tend to exit markets with high levels of hospital competition but also experience high exit rates in markets with high ASC density. Our results suggest that specialized organizational forms representing “focused factories” are unaffected by generalist forms while generalists are hurt by the presence of competing specialists.

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<sup>1</sup> I thank my advisers Mark V. Pauly, Lawton R. Burns, Guy David, Jitendra V. Singh, and Lee Fleisher for helpful discussions and advice. Thanks to the state of Florida’s Agency for Health Care Administration (AHCA) – particularly Arlene Schwahn, John Terlouw, and Kim Stewart – for their research assistance. I also benefitted greatly from conversations with Amol Navathe as well as feedback from participants at the Health Care Systems Department (HCSD) Student Seminar and the Academy of Management 2009 Annual Meeting.

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## **I. BACKGROUND**

### ***A. Organizational Niche***

The literature on organizational niche emerged originally in order to explain why some organizations choose to be specialists while others choose to be generalists. However, the concept of the organizational niche has evolved significantly over time. Hannan and Freeman (1977) originally linked organizational niche to environmental conditions (Hannan & Freeman, 1977). They theorized that specialists tend to do better in environments that are stable and fare poorly in turbulent environments because they have difficulties outlasting the unfavorable periods. Meanwhile, generalists tend to fare better when environmental variation is high because of their ability to diversify this risk across different product lines. Hannan and Freeman tested empirically the effects of various forms of environmental variation on the life chances of organizational populations with varying degrees of specialization within the semiconductor and restaurant industries and found limited support for their ideas within these settings (Freeman & Hannan, 1983; Hannan et al., 1989).

Over time, several alternative models emerged to explain the nature of competition between organizations occupying different niches. These models issue predictions about organizational niche that are less closely related to environmental risk and than they are to the concentration of organizations within markets comprised of heterogeneous resources. They view the organizational niche as a location in multi-dimensional space defined by the resources in the environment. Organizations initially attempt to find a viable position within this market by targeting their products to various resource segments. Specialist organizations choose relatively homogenous targets while generalist organizations choose targets composed of heterogeneous segments.

However, these theories differ in their level of analysis since there are different ways of characterizing the niche. On the one hand, organizational populations that compete with one another but possess different organizational forms occupy different “macro-niches.” On the other hand, individual organizations may choose to participate in different product markets and may therefore occupy different “micro-niches,” which refers to variation in resource requirements at the organization level. These two perspectives on the niche complement each other since organizational populations encompass multiple niches; in addition to the macro-niche of the population, organizations have their own micro-niches as well (McKelvey, 1982). In spite of this obvious complementarity, there is no existing research that attempts to synthesize these two views of the niche.

For example, resource partitioning theory is the most widely-accepted theory that focuses on the macro-niches occupied by different organizational populations. It suggests that competition among large generalist organizations to occupy the center of a market frees up resources in the market periphery (Carroll, 1985). In concentrated markets with a few large generalists, small specialists can exploit these resources and locate in peripheral areas of the market in order to avoid direct competition with large generalists. Thus, the model predicts that high levels of concentration among generalist organizations within mature industries will lead to rapid market entry by specialist organizations. Carroll (1985) found support for the resource partitioning model in an analysis of mortality rates in several local newspaper populations from 1800 to 1975 (Carroll, 1985). Subsequent studies have used resource partitioning theory to explain the rapid growth of specialized organizational forms like microbreweries and brewpubs within the brewing industry as well as the farm winery within the California wine industry (Carroll & Swaminathan, 2000; Delacroix & Solt, 1988; Swaminathan, 1995, 1998).

Carroll's (1985) model has only limited applications because he assumes that economies of scale exist and that no real price competition occurs between firms in the market (Carroll, 1985). As a result, large generalists possess a competitive advantage over small specialists and so specialists try to avoid direct competition with generalists. These assumptions make intuitive sense for manufacturing-oriented industries like brewing and wine making. But how are these predictions affected when we examine industries in which specialists possess a cost advantage? We know that there are a variety of markets, particularly within service industries, in which organizations possessing specialist forms represent low-cost alternatives to generalists. These organizations are frequently referred to as "focused factories" since they can eliminate more costly organizing elements, are able to operate more efficiently, and may therefore possess a significant cost advantage over generalists (Herzlinger, 1997; Skinner, 1974). Thus, Carroll's (1985) model of resource partitioning is less applicable to settings in which specialists benefit from the presence of diseconomies of scope. Under these circumstances, a different model of organizational niche is more appropriate.

There is a complementary body of work that attempts to explain how firms compete within organizational micro-niches, which refers to variation in resource requirements at the organization level. For example, niche overlap theory focuses on the micro-niches occupied by firms within an organizational population possessing the same form. According to the theory, every organization in a population occupies an organizational niche characterized by a location in resource space (Baum & Singh, 1994a, 1994b). Depending on the organizational niches they target, organizations face different competitive landscapes. Organizations that operate in the same organizational niche experience competitive effects since they compete directly for scarce resources. Organizations that occupy non-overlapping organizational niches experience

mutualistic effects by, for example, cooperating directly or providing services that create complementary demand. Since the theory focuses on organizational micro-niches, it does not make any attempt to address the macro-niches occupied by different organizational populations.

Baum and Singh (1994b) suggested that firm exit is a function of the concentration of organizations with overlapping and non-overlapping niches (Baum & Singh, 1994b). To measure the potential competition faced by all organizations in an organizational niche, they defined niche overlap density to be the total number of firms with overlapping niches. They studied the effects of overlap density on firm exit rates and argued that greater overlap density implies greater competition between a focal organization and all other organizations in the population. Since higher levels of competition tend to increase the likelihood of firm exit, they hypothesized the following:

*Hypothesis 1: Overlap density is positively related to the exit rate.*

Likewise, they defined niche non-overlap density to be the total number of firms with non-overlapping niches (Baum & Singh, 1994b). They argued that differentiation among firms with non-overlapping niches reduces the level of competition between them and may create mutualistic interdependencies among them. For example, these organizations may offer products or services that create complementary demand or they can cooperate directly by referring potential customers to each other. Firms with non-overlapping niches may also confer legitimacy benefits upon one another. Given a lack of competition for underlying resources and the potential beneficial effects of demand enhancement and greater legitimacy of the organizational form, they hypothesized that non-overlap density would have mutualistic effects on the exit rate:

*Hypothesis 2: Non-overlap density is negatively related to the exit rate.*

Baum and Singh confirmed these theories by studying how niche overlap and non-overlap (e.g., serving children of the same/different ages) affected the founding and mortality rates of Toronto day care centers from 1971 to 1989 (Baum & Singh, 1994a, 1994b). They found that day care centers have high exit rates and low entry rates in markets with high overlap density while they display low exit rates and high entry rates in markets with high non-overlap density. They also found that this competition is generally asymmetric in that organizations occupying niche  $i$  have a different impact on organizations occupying niche  $j$  than vice versa. Depending on the extent of overlap in the ages of children they are licensed to enroll, day care centers compete with each other at different levels of intensity. Subsequent work has found additional support for these findings regarding the impact of niche overlap and non-overlap on firm entry and exit rates within a variety of other settings (Baum & Oliver, 1996; Dobrev, Kim, & Hannan, 2001; Sorensen, 2004).

Niche overlap theory focuses on the micro-niches of organizations and explains entry/exit by firms with the same organizational form as a function of density within these niches. However, studies of niche overlap theory have not explored the effect of niche overlap and non-overlap between organizational populations occupying different macro-niches. From resource partitioning theory, we know that specialists and generalists may compete with one another in fundamentally different ways, but we do not know how these firms will behave when these new specialists possess a competitive advantage over existing generalists. In fact, there is no existing research that attempts to reconcile these two perspectives on the niche by simultaneously examining competition within the macro- and micro-niche. Though there is no theory that describes how these two forms compete within these organizational niches, we can draw from

existing theory to pose some hypotheses regarding the effects of niche competition between different organizational forms.

### ***B. Organizational Form***

Since the different macro-niches occupied by organizational populations are predicated upon the notion that they constitute different organizational forms, we begin by defining an organizational form. There are several different methods of defining organizational forms that are premised on different approaches to classification (McKelvey, 1982). One common approach distinguishes between the core and peripheral properties of organizational forms. It suggests that new organizational forms are novel recombinations of core organizational features involving goals, authority relations (including organization structure and governance arrangements), technologies, and client markets (Hannan & Freeman, 1984; Scott, 1995). Peripheral features refer to all other organizational attributes. One organizational form differs from another primarily according to the core characteristics of the form, which are defined by the four-dimensional space that was described previously.

This definition of organizational form is typically used to identify instances of organizational speciation in which a new organizational form is created (Lumsden & Singh, 1990). In this sense, it is the analog to the biological phenomenon of speciation. Much like its biological counterpart, organizational speciation plays an important role in the evolution of organizational diversity. The process by which organizational speciation occurs is closely linked to resource partitioning theory; a key premise of organizational speciation is that the existence of unfilled ecological niches – places unoccupied by other organizational forms – is an important precondition for the birth of new organizational forms (Rao & Singh, 2001). These unoccupied niches may emerge as a result technological innovations that create new resource spaces or

interrelations among existing organizations that influence the branching of new resource spaces (Astley, 1985; Carroll, 1985; Romanelli, 1991; Tushman & Anderson, 1986).

Depending on the environmental conditions that lead to the creation of new organizational forms, there are several different types of organizational recombination. Rao and Singh (2001) developed a taxonomy for classifying organizational recombination along the lines of whether the organizational form involves: (1) the addition of new organizing elements and/or (2) the deletion of organizing elements. This matrix has been reproduced below in Table 1:

**Table 1: A Recombination Typology of New Organizational Forms**

	No addition of attributes	Addition of new attributes
No deletion of attributes	Imitative entrepreneurship (entry by general hospitals)	Partial enlargement (hospitals entering managed care)
Deletion of attributes	Partial contraction (specialty hospitals)	Radical recombination (health maintenance organizations)

Source: Rao & Singh (2001)

Each cell in the matrix represents a different type of organizational recombination and the authors cite several real-world examples for each one, which we have modified slightly. They point out that organizational forms that emerge by means of recombination through partial contraction often represent leaner versions of existing forms so financial markets and consumers may welcome them as low-cost options (Rao & Singh, 2001).

As an example of this organizational form, scholars have cited Southwest Airlines since it was the first of the no frills, cut-rate, point-to-point airlines that compete primarily on price and do not have the additional perks that are typically part of a regular, full-service airline (Lumsden & Singh, 1990). In fact, there are obvious parallels between Southwest airlines and the emergence of more specialized organizations like surgery centers and specialty hospitals within the healthcare industry (Altman, Shactman, & Eilat, 2006). These organizational forms are frequently referred to as “focused factories” since scholars have argued that such firms become exceptional in their area of expertise and are able to operate more efficiently and effectively than

generalist forms (Herzlinger, 1997; Skinner, 1974). There are other examples of these organizations present in manufacturing settings (Hayes & Wheelwright, 1984; Hill, 2000) and service environments (Herzlinger, 1997; Heskett, 1986; Huckman & Zinner, 2005).

Although these two organizational forms compete for the same resources, specialists considered to be focused factories may not be adversely affected by the presence of generalists because they possess a significant competitive advantage. Organizations focusing on a narrow product mix for a particular market niche can operate more efficiently than the conventional plant, which attempts a broader mission (Skinner, 1974). As a result, these efficiencies may produce lower operating costs that specialists pass onto consumers in the form of lower prices. Although generalists may have already created the market, these advantages permit specialists to attract consumers more easily and to enjoy higher profit margins. For these reasons, specialists may be relatively unaffected by generalists, and they may enter or exit markets without regard for the presence of competing generalists. Meanwhile, generalists are almost certainly hurt by competition for scarce resources with these specialists.

In fact, Ruef (2000) argues that there are several reasons why new organizational forms might actually benefit from existing forms, and his arguments take on particular significance when the new organizational form is a specialist. Existing organizational forms offer legitimacy benefits in the form of: (1) residual socio-political legitimation due to prior collective action by the predecessor; and (2) residual cognitive legitimation as a result of the more highly crystallized identity of the predecessor (Ruef, 2000). This is particularly true of organizations that emerge by means of recombination through partial contraction since the new form eliminates some elements from preexisting blue-prints (Rao & Singh, 2001). New organizational forms also benefit from resource spillovers since prior organizational forms also provide a set of structures, strategies,

and routines that can be adopted by forms with related identities (Ingram & Inman, 1996; Ruef, 2000). While this is true of any new organizational form, specialists in particular may learn from generalists which niches are the most profitable and which organizing elements can be eliminated.

Since these organizations compete for the same resources, existing organizational forms may be hurt by the emergence of new organizational forms. Meanwhile, there are a variety of reasons why emergent specialists may benefit from the presence of existing generalists or, at the very least, may be unaffected by them. In this way, competition between these two organizational forms may be considered asymmetric in that one organizational form may benefit while the other is hurt. In the parlance of population ecology, this would be considered a parasitic relationship. We hypothesize that asymmetric competition exists between these two organizational forms.

*Hypothesis 3: Overlap density among specialists is positively related to the exit rate among generalists.*

*Hypothesis 4: Overlap density among generalists is negatively related to the exit rate among specialists.*

Table 2 summarizes all of our hypotheses by displaying the predicted effect of competition from specialists and generalists upon market exit by each type of organizational form.

**Table 2: Predicted Coefficients for Exit Models**

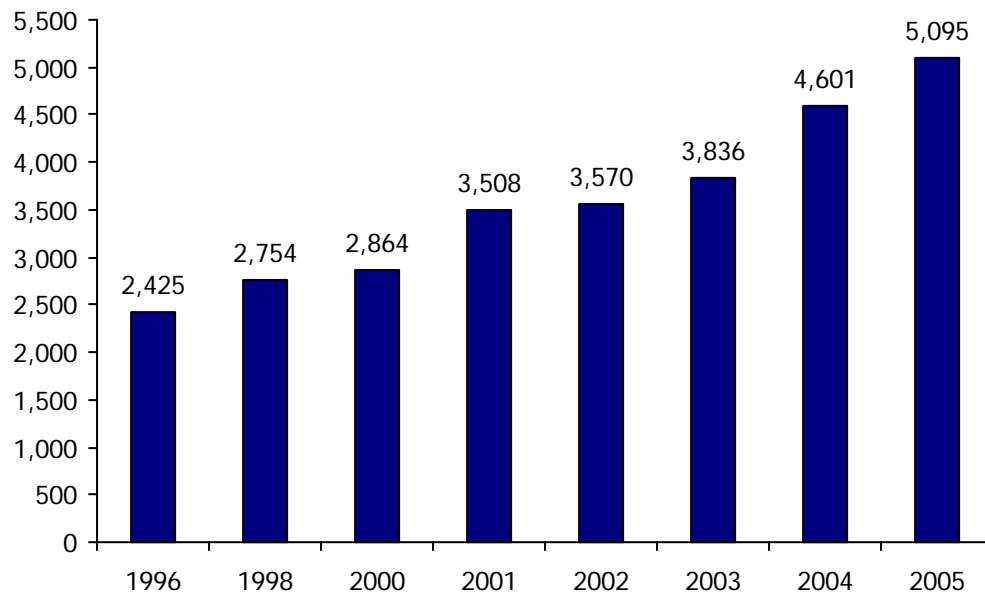
		Niche Overlap Density Competition from				Niche Non-Overlap Density Presence of	
		Specialist	Generalist			Specialist	Generalist
Exit by	Specialist	+	-	Exit by	Specialist	-	
	Generalist	+	+		Generalist		-

Our definition asymmetric competition is illustrated within the left table that describes the effects of niche overlap density. The upper-right and lower-left hand cells predict coefficients with opposite signs.

### C. Ambulatory Surgery Centers

Over the past two decades, ambulatory surgery centers have emerged within the health care marketplace and have exhibited tremendous growth. From 1982 to 1992, the number of surgery centers increased over 600 percent, from 239 to 1,530 facilities. From 1992 to 2002, the number of surgery centers more than doubled from 1,530 to an estimated 3,570 facilities (Baker, 2002). Given that the total number of community hospitals in the U.S. declined from 5,830 to 4,919 between 1980 and 2004, this phenomenon is even more striking. Figure 1 displays this recent growth.

**Figure 1: Number of Freestanding Ambulatory Care Surgery Centers (1996, 1998, and 2000 – 2005)**



Source: Verispan's Surgery Center Profiling Solution, 2005.

This growth stems in large part from the advances of medical technology that have significantly decreased hospital length of stay and accelerated the movement from inpatient to outpatient models of patient care (Becker & Biala, 2000). Surgeries that were once performed in an 8-hour span and required several days of recovery can now be performed within 90 minutes and permit the patient to return home on the day that he or she was admitted. The other cause of this rapid

growth was a desire for cost containment as reimbursement policies by insurance companies and other third-party payers favored outpatient surgery over hospital admission (Hecht, 1995; Pandit, 1999).

Surgery centers represent significantly different organizational forms than general hospitals in terms of their: (1) client markets; (2) technologies; (3) governance; and (4) goals. First, they participate in different clients markets since there are clear limits on the type of markets that they can participate in; they cannot perform a surgical procedure when, before surgery, an overnight hospital stay is anticipated (Center for Medicare and Medicaid Services, 2006). Second, they utilize different technologies than general hospitals; surgery centers require less capital and equipment because outpatient procedures are typically technology intensive than inpatient procedures and do not require the same extent of emergency services (Balicki, Kelly, & Miller, 1995). Third, they have a different governance structure as evidenced by the fact that there are relatively few physician-owned general hospitals while approximately 83% of surgery centers are wholly- or partly-owned by physicians (Gabel et al., 2008; Lynk & Longley, 2002; Mitchell, 2007; Strobe et al., 2009). Fourth, they possess different goals since the vast majority of surgery centers are for-profit entities whereas the majority of hospitals are non-profit organizations (Verispan, 2006). For this same reason, hospitals experience certain capital constraints that surgery centers generally do not (Pauly, 1987).

In fact, several papers have explicitly identified ASCs as being an organizational form distinct from general hospitals. Carey, Burgess and Young (2009) study the impact of ASC entry on hospital financial performance and state the following:

Over the past three decades, the U.S. hospital industry has been experiencing growing competitive forces in an environment of wide-ranging organizational change. A key development during this period has been a dramatic shift in service provision from the inpatient to the outpatient setting, a transition reflecting

both new technologies that have made more procedures feasible on an ambulatory basis, and effort of public and private insurers to control the growth of hospital costs. Emphasis on cost containment realized through greater reliance on outpatient care also has provided a stimulus to the entry of a *new healthcare organizational form*, the freestanding ambulatory surgery center (ASC), a limited-service alternative for treating surgery patients not requiring an overnight stay. (Carey, Burgess, & Young, 2009).

Likewise, Ruef (2000) identifies 48 different organizational forms within the health care sector and distinguishes between surgicenters (ASCs) and community hospitals. He argues that “the complex morass of organizational arrangements makes the health care sector a particularly challenging and intriguing case for the analysis of form emergence” (Ruef, 2000). Referring back to Rao and Singh (2001) in order to classify the nature of the differences between ASCs and hospitals, surgery centers represent the deletion of some elements but no addition of new elements, which they refer to as the partial contraction mode of recombination (Rao & Singh, 2001). Recall that organizations falling within this category of organizational speciation are considered to be specialists since they resemble leaner versions of existing forms (Rao & Singh, 2001).

Surgery centers represent one example of these specialized organizational forms since they perform only outpatient procedures but may participate in multiple specialties. In fact, proponents of surgery centers have claimed for some time that they represent “focused factories” since specialization allows them to function more efficiently than general hospitals (Herzlinger, 1997). Allowing the same surgical team to perform the same procedure repeatedly within the same operating room reduces the amount of preparation time needed prior to each procedure. There is also evidence to suggest that group membership stability predicts improvement rates for these procedures themselves (Edmondson, Winslow, Bohmer, & Pisano, 2003). Additionally, one of the key tenets of operations research is that variation reduces production output. More

customers to be handled by a given service process when there is relatively little variation in the workflow; utilizing the same surgical team and/or scheduling the same procedures increases the total number of procedures that can be performed (Cachon & Terwiesch, 2006). Coupled with the fact that surgery centers need not remain open and staffed for 24 hours a day and do not make inpatient beds available for overnight stays, they maintain considerably lower costs than general hospitals (Balicki et al., 1995)

Yet surgery centers possess another competitive advantage over general hospitals. Competition for outpatient procedures is essentially competition for physician referrals; patients rarely elect to have their procedure performed in a facility other than the one recommended by their physician (Kouri, Parsons, & Alpert, 2002; Lynk & Longley, 2002). Thus, physicians are ultimately the critical resource within this market. Surgery centers possess a competitive advantage when competing with hospitals for physician referrals because 83% of surgery centers are wholly- or partly-owned by physicians (Gabel et al., 2008; Lynk & Longley, 2002; Mitchell, 2007; Strobe et al., 2009). Surgeons also report that surgery centers are considerably more sympathetic to their scheduling needs than general hospitals (Verispan, 2006). As a result, surgery centers have been relatively successful in their efforts to recruit surgeons from hospital in spite of the fact that hospitals have begun to pursue many different strategies to stem this tide (Berenson, Bodenheimer, & Pham, 2006).

The market for outpatient surgery represents a unique setting in which to synthesize these ideas. There are obvious applications of niche overlap theory to the market for outpatient surgery because surgical specialties can be considered niches and outpatient facilities compete with one another insofar as they serve overlapping niches. In fact, this view of surgical specialties as the relevant organizational niche reflects a broader shift to service line competition

within health care (Berenson et al., 2006). Yet this setting also presents an opportunity to study competition between organizational populations occupying different macro-niches since surgery centers represent a specialized organizational form that has emerged within a mature industry previously concentrated by generalists. By observing how organizational density influence exit rates among each type of facilities, we can understand how different organizational forms – surgery centers and hospitals – compete against one another within these niches.

#### ***D. Previous Research***

The recent growth in the number of ambulatory surgery centers has been mirrored by the growth of other specialized providers that have caused a variety of health care services to migrate away from the general hospital (Berliner, 2008). Some have suggested that the emergence of these providers signifies a shift to service line competition within the health care marketplace (Berenson et al., 2006). Specialty hospitals and ambulatory surgery centers represent the most prominent example but similarly specialized facilities are beginning to emerge for gastrointestinal endoscopy, diagnostic imaging, sleep disorders, peripheral vascular disease, cosmetic surgery, radiation therapy, lithotripsy, cardiac catheterization, and cancer chemotherapy (Berenson et al., 2006). The emergence of these specialized providers and uncoupling of these services from the general hospital may push hospitals to a peripheral role as the provider of ever-diminishing acute inpatient services (Robinson, 1994). There is a growing body of research that studies the effect of specialization within the health care industry. However, specialty hospitals have received the vast majority of this attention, perhaps because they are viewed as more of a competitive threat to general hospitals.

In fact, the rapid growth among specialty hospitals in the 1990's led Congress in 2003 to enact an 18-month moratorium on the construction of new specialty hospitals in order to gather

evidence regarding whether they treated healthier patients and provided lower quality care (Iglehart, 2005). During the time that this moratorium was in place, a number of studies were conducted on the differences between specialty hospitals and general hospitals. Several studies found that specialty hospitals tend to treat patients that are healthier than general hospitals (Barro, Huckman, & Kessler, 2006; Cram, Rosenthal, & Vaughan-Sarrazin, 2005; U.S. Government Accounting Office, 2003). Other studies found that when controlling for these patient characteristics, specialty hospitals produce outcomes that are equal to or better than general hospitals (Cram et al., 2005; Dobson, 2003; Fahlman et al., 2006; Greenwald et al., 2006). Regarding their competitive effects, there is evidence to suggest that entry by specialty hospitals not only improves the efficiency of markets and lowers the cost of care but may even improve the profit margins of nearby general hospitals (Barro et al., 2006; Greenwald et al., 2006; Schneider et al., 2007). Yet there are still outstanding questions regarding the effect of specialty hospital entry upon the ability of non-profit hospitals to provide community benefits.

In spite of the fact that there are over 6,000 ambulatory surgery centers and just over 100 specialty hospitals currently operating in the US, surgery centers have received far less attention in the literature. This is particularly surprising in light of a recent report by the GAO which suggests, based on surveys of community general hospitals, that the most significant competitive challenge may come from ASCs (U.S. Government Accounting Office, 2006). However, a few studies are beginning to emerge that offer a more balanced treatment of ambulatory surgery centers. Several studies have found that entry by ASCs is associated with a decline in hospital outpatient surgeries and no significant change in inpatient surgeries (Bian & Morrissey, 2007; Plotzke, 2008). Carey, Burgess, and Young (2009) found that entry by ASCs exerted a downward pressure on both revenues and costs in general hospitals but that these effects offset

each other and caused no significant change in hospital profit margins (Carey et al., 2009).

Another study by Bian and Morrisey (2006) showed that there tend to be more surgery centers in metropolitan statistical areas where there are fewer general hospitals (Bian & Morrisey, 2006).

However, they failed to distinguish between facilities with overlapping and non-overlapping niches, and they did not consider whether this outcome results from facility entry or exit.

Nevertheless, their study provides a convenient starting point from which to explore the causes of exit by both types of facilities.

## **II. METHODS**

### ***A. Data***

We chose the state of Florida as our study site for several reasons. First, it is the state with the second highest number of ambulatory surgery centers in the US. In fact, the number of surgery centers in Florida grew from just 110 in 1993 to 379 in 2006 so it closely mirrors the trends in ASC growth being observed throughout the country. More importantly, the state of Florida requires that health care facilities report data on all inpatient and outpatient surgical procedures that they perform. The availability of this patient-level data is a unique facet of this study because previous empirical work in population ecology has gathered data at the level of the firm and has inferred consumer demand from population demographics and industry velocity. From this patient data, we were able to measure competition, procedure demand, and firm entry and exit with a considerably higher level of precision than previous studies and to directly model the relationship between them.

Patient data reported by Florida health care facilities is compiled by the Agency for Health Care Administration (AHCA) and represents a complete census of all inpatient and outpatient surgeries that have occurred within the state from 1997 to 2006. For the inpatient

data, surgical procedures are represented by ICD-9-CM/ICD-10-CM procedure codes. Within the outpatient data, surgical procedures are represented by CPT /HCPCS procedure codes.<sup>2</sup> In order to transform these patient datasets into quarterly procedure counts, we coded these procedures and categorized them within surgical specialties. Clinical Classification Software (CCS) from the Health Care Utilization Project (HCUP) allowed us to classify both ICD-9-CM/ICD-10-CM and CPT/HCPCS codes among 244 different procedure types.<sup>3</sup> The Technical Appendix to this paper lists all 244 procedure types included within the CCS software. Each of the 244 single-level CCS procedure types was assigned to one of 15 procedure chapters through the use of a crosswalk that has been reproduced in the Technical Appendix.<sup>4</sup> We cross-tabulated these procedure types with facility IDs and patient county codes in order to produce quarterly procedure counts at the county- and facility-level. Our dependent and independent variables were calculated from these two datasets.

In order to model competition and procedure demand, it was necessary to establish some reasonable definition of a health care market. Conveniently, the state also maintains data on the location of all surgery centers and general hospitals, which allows us to assign them to their county of residence. Each of these 67 counties was subsequently assigned to one of 17 health service areas (HSAs) based upon the market boundaries established by the National Center for Health Statistics (Makuc, Haglund, Ingram, Kleinman, & Feldman, 1991). We defined these

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<sup>2</sup> Both datasets include a field that accounts for the principal procedure that a patient received as well as additional fields representing any other procedures that the patient underwent during the same stay. We dealt with this by generating two different sets of procedure counts; the first set included only the principal procedure codes and the second set treated all procedure codes (principal and other) as equivalent. We ran our analyses from the procedure volume datasets that emerge from principal codes.

<sup>3</sup> By applying the single-level CCS software to the procedure codes in our patient data, we were able to successfully code 99.9997% of the procedures in the inpatient dataset and 99.9898% of the procedures in the outpatient dataset, which represent very high match percentages.

<sup>4</sup> Although the CCS software actually assigns each of the 244 procedure types to one of 16 procedure chapters, only 15 of these 16 chapters describe outpatient surgical procedures. So we only took into account the first 15 chapters and ignored the 16<sup>th</sup> chapter for the sake of comparability.

HSAs to be their own markets for the purposes of this study and all explanatory variables were initially measured at the HSA level.

Although health service areas provide a convenient starting point from which to define markets, they span very large geographic areas. So we elaborated upon them in order to distinguish between local and diffuse market conditions since travel distances clearly play a role in the market for outpatient services (Kessler & McClellan, 2000; Makuc et al., 1991). We calculated our local measures from the county within which each surgery center resides and our diffuse measures from all other counties within that surgery center's HSA. In the same way that local and diffuse factors are likely to have a different impact upon firm exit, we have hypothesized that competition with surgery centers and hospitals will have different effect on market exit by each type of facility. Thus, our explanatory variables were divided up by facility type and calculated them separately for surgery centers and hospitals in the same manner that we divided these constructs into their local and diffuse components.

### ***B. Dependent Variables***

We tabulated quarterly procedure counts by facility ID code in order to produce a panel dataset in which the unit of observation is a facility-quarter and each field represents that facility's procedure count within each of 15 surgical specialties. Facilities enter and exit this panel dataset as they enter and exit the market for outpatient services and so this panel provided us a starting point from which to observe facility entry and exit. The state of Florida also maintains information on all licensed and accredited outpatient facilities in the state. This dataset extends back to the early-1990's and provides the date(s) of opening and closing for all such entities as well as the reason for termination of that facility's ID number. This licensure dataset was merged with our outpatient procedure dataset through AHCA ID numbers in order to

validate the patterns of activity produced by our panel dataset with the state’s official entry and exit dates.

Since the state also keeps track of the reasons for facility exit, we checked these records in order to ensure that we only attributed an exit to each facility when it went bankrupt/defunct or voluntarily terminated its license. We did not consider merger and acquisition activity that resulted in the termination of a facility license to be a valid exit. Only when there was concordance between the SASD outpatient procedure dataset and AHCA licensure data over exit timing and the facility had a valid reason for exit was a facility exit recorded in our empirical models. From these datasets, we identified a total of 51 exits among 406 ASCs and 9 exits among 222 hospitals from 1997 to 2006, which represent fairly reasonable sample sizes.

### **C. Independent Variables**

#### **1. Niche Overlap and Non-Overlap**

Our hypotheses relate the likelihood of surgery center and hospital exit to the level of competition within local health care markets. In order to test these hypotheses, we measured the concentration of outpatient facilities with overlapping and non-overlapping niches within each market. Following the example of Baum and Singh (1994), we constructed niche overlap weights from the procedure volume of each pair of facilities within the same HSA:

$$(1.1) \quad w_{ij} = \frac{s_{ij}}{s_{ij} + s_i} \quad w_{ji} = \frac{s_{ji}}{s_{ji} + s_j}$$

where  $s_{ij}$  and  $s_{ji}$  represent the number of procedures they perform within the same surgical specialties while  $s_i$  represents the number of procedures performed by firm  $i$  in specialties that

firm  $j$  does not participate in and vice versa.<sup>5</sup> The weights calculate the extent to which their procedure volumes overlap.

Given these weights, the overlap and non-overlap density for each facility was calculated from the following formulas:

$$(1.2) \quad \text{overlap density}_i = \sum_{j=1}^n w_{ji} \quad \text{nonoverlap density}_i = n - \sum_{j=1}^n w_{ji}$$

where  $w_{ji}$  represents the weights that were described previously and  $n$  represents the number of outpatient facilities in the health service area occupied by firm  $i$ . To calculate overlap and non-overlap density for firm  $i$ , we counted up the number of outpatient facilities its health service area at time  $t$  and then assigned them all fractional weights based on the extent to which their procedure volume overlaps with that of firm  $i$  at time  $t$ . Overlap density was calculated by adding all these weights while non-overlap density was calculated by subtracting the sum of these weights from the total number of outpatient facilities in firm  $i$ 's health service area. We calculated these measures separately by facility type (ASC vs. hospital) and geographic location (local vs. diffuse) in order to evaluate the differential impact of each.

## **2. Procedure Demand**

Having established our measures of niche overlap and non-overlap density, we included a number of additional variables in our models in order to control for a number of other factors that might affect a facility's likelihood of exit. First and foremost was the size of demand within the surgical specialties that a facility serves, which represents the environmental carrying capacity. In order to measure market demand, we generated quarterly procedure counts by

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<sup>5</sup> In the process of studying the predictors of specialty entry and exit for a related paper, we developed a fairly elaborate set of assumptions in order to determine whether a facility participates in a given surgical specialty, which have been outlined in the Technical Appendix.

patient county code instead of by facility code.<sup>6</sup> We then aggregated these procedure counts across each specialty that a facility participates in based upon our definition of specialty participation. This procedure generated two separate sets of procedure counts; we included outpatient procedure counts within our exit models for ASCs and hospitals while we included the inpatient counts for hospitals only. These procedure counts were deemed to be a reasonable proxy for the level of demand within the markets that a facility serves. As with our measures of competition, each of these demand statistics was broken down by facility type (ASC vs. hospital) and geographic location (local vs. diffuse).

### **3. Physician Statistics**

The setting for this study is unique in that outpatient facilities not only compete for procedures but also for physician referrals. These relationships that exist between surgery centers and their physicians may affect entry and exit probabilities such that a facility's likelihood of exit depends on the extent to which the facility depends upon its surgeons and vice versa. To that end, we attempted to include some measures that would control for these relationships. Conveniently, there is an ID code representing the operating physician in each record of the outpatient dataset. These physician IDs were cross-tabulated with facility IDs in order to account for how facilities divide procedure volume across surgeons and how surgeons divide procedure volume among facilities.

To begin, we produced a simple count of the number of surgeons operating within a facility in any given quarter. We also included a control that represents the average number of facilities that the facility's surgeons are utilizing for their outpatient procedures. Taking into

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<sup>6</sup> We recoded out of state residents with the county for the facility in which they were treated, which was deemed to be a reasonable assumption in light of the fact that the vast majority of patients (81%) visited an outpatient facility in their home county.

account procedure volume to represent facility and physician dependence on one another, we also produced a measure of physician-facility inter-dependence (PFI) (Feldman & Wholey, 1999; Marsh & Feinstein, 1997; Wholey & Burns, 2000). It was calculated according to the following formula:

$$(2.1) \quad \text{PFI} = \frac{\text{Percent of surgeries in facility } i \text{ coming from physician } j}{\text{Percent of surgeries for physician } j \text{ admitted to facility } i}$$

$$(2.2) \quad \text{PFI} = \frac{\frac{\text{Number of surgeries performed by physician } j \text{ in facility } i}{\text{Total number of surgeries performed in facility } i}}{\frac{\text{Number of surgeries performed by physician } j \text{ in facility } i}{\text{Total number of surgeries performed by physician } j}}$$

Higher values of the PFI indicate that the physician has relatively more leverage over the facility while lower values indicate that the facility has more leverage.

#### **4. Facility Controls**

We also included a number of control variables in our model that emerged from our panel dataset as well as the Florida licensure data. The liability of newness suggests that relatively inexperienced firms are more likely to exit than firms that have more experience (Freeman, Carroll, & Hannan, 1983). To control for this effect, we added a covariate representing firm age to our model. Firm age was calculated from the entry dates provided by the Florida licensure dataset, which we validated with the dates produced by our outpatient procedure volume dataset.

Although surgery centers and hospitals occupy different macro-niches, there are relative specialists and generalists among each type of organizational form. For example, some multi-specialty ASCs perform every imaginable surgical procedure while there are specialty hospitals that participate in only one surgical specialty. To that end, we included a variable to control for the possibility that specialists or generalists among either organizational form may have a higher likelihood of exit. We calculated the number of surgical specialties that each facility participates

in – based upon our definition of specialty participation – and we included this variable in our model to control for this effect.

The Florida outpatient dataset also includes a field that describes the payer for each procedure in the dataset. Using this field, we cross-tabulated facility procedure counts by payer and divided them by a facility’s total procedure volume in each quarter in order to calculate the proportion of a facility’s procedure volume that is reimbursed by each type of payer. Although the Florida outpatient dataset utilizes 16 different payer codes, we collapsed these codes into three categories: public, private, and other.<sup>7</sup> We included variables representing the proportion of a facility’s business that is reimbursed by public and private payers while omitting the variable representing other payers as a comparison group.

We also included several other control variables that emerged from facility licensure data provided by the state of Florida. For example, the state provided data on the size of the facilities in our sample. For surgery centers, size was represented by the number of operating rooms; for hospitals, it was represented by the total number of beds. The state maintains a record of the profit status of its outpatient facilities and so we included a dummy variable in our model representing whether each facility is a for-profit or non-profit entity. The state also provided data on each facility’s ownership type, which we assigned to the following categories: corporation, partnership, government, and other.<sup>8</sup> In our surgery center exit models, we included dummies representing corporation and partnership ownership while omitting all other ownership

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<sup>7</sup> Public payers include Medicare, Medicare HMO, Medicaid, Medicaid HMO, VA, other state/local government, and Kidcare. Private payers include commercial insurance, commercial HMO/PPO, and self pay. Other payers include workers’ compensation, CHAMPUS, other, charity, and unknown.

<sup>8</sup> Corporate owned facilities include any incorporated entity including S corporations. Partnerships include LTD, LLC, and similar joint ventures between multiple entities or individuals. Government owned facilities include ownership by a county, city/county, state, or hospital district. Other ownership types included individual and church ownership.

types. In our hospital exit models, we included dummies representing corporation and government ownership. The state of Florida also provided data on each facility’s administrator and owner names as well as the owner file number and FEIN number for hospitals. By cross-referencing these identifiers, we were able to determine whether each facility was owned by an ASC or hospital chain, which we included as a dummy variable in our models.

#### ***D. Empirical Model***

Our study assesses a facility’s likelihood of exit as a function of market competition, demand conditions, physician practice patterns, and facility controls. Therefore, the appropriate unit of observation here is an individual firm. The mathematical representation of this model is presented by the following equation:

$$(3.1) \quad \Pr(\text{Exit}_{it}) = \beta_0 + \beta_1 \text{OverlapDensity}_{jt-1} + \beta_2 \text{NonoverlapDensity}_{jt-1} + \beta_3 \text{DemandSize}_{jt-1} + \beta_4 \text{PhysicianStatistics}_{it-1} + \beta_5 \text{FirmControls}_{it-1} + \varepsilon_{it}$$

where  $\text{OverlapDensity}_{jt-1}$  is a variable representing the overlap density for specialties within market  $j$  that are served by facility  $i$ ,  $\text{NonoverlapDensity}_{jt-1}$  is a variable representing the non-overlap density for specialties within market  $j$  that are served by facility  $i$ ,  $\text{DemandSize}_{jt-1}$  is a variable representing the size of demand for specialties within market  $j$  that are being served by facility  $i$ ,  $\text{PhysicianStatistics}_{it-1}$  is a vector of facility-level physician statistics that we described (e.g., PFI, etc.), and  $\text{FirmControls}_{it-1}$  is a vector of facility-level control variables (e.g., age, etc.).

Recall that we validated the entry and exit dates produced by our panel dataset with more precise dates provided by the AHCA licensure database and coded a separate variable to represent an exit event when the facility’s reason for exit was deemed to be valid. However, there is a shortcoming to the way we dealt with exit timing in our model. We model a facility’s probability of exit at time  $t$  as a function of overlap and non-overlap density at time  $t$ . The

difference between these two explanatory variables is the number of firms at time  $t$ , which is a mechanical function of firm exit. In order to avoid this problem, we lagged all of our right-hand side variables by one quarter.<sup>9</sup>

Given that we analyzed exit rates over a short period of time, there were a large proportion of left- and right-censored observations. Thus, an event history model was deemed to be the most appropriate specification (Allison, 1995). In particular, we utilized a Cox proportional hazard model because it avoids the need to choose a functional form and accommodates time-varying covariates (Cox, 1972).<sup>10</sup> The Cox model estimates a hazard rate of the following form:

$$(3.2) \quad h_i(t) = \lambda_0(t)e^{\beta x_i}$$

which was reformulated to fit our exit model:

$$(3.3) \quad h_i(t) = \lambda_0(t)e^{\left( \begin{array}{l} \beta_0 + \beta_1 \text{OverlapDensity}_{jt} + \beta_2 \text{NonoverlapDensity}_{jt} + \\ \beta_3 \text{DemandSize}_{jt} + \beta_4 \text{PhysicianStatistics}_{it} + \beta_5 \text{FirmControls}_{it} + \varepsilon_{it} \end{array} \right)}$$

The baseline hazard functions cancel out and the proportional hazard takes on the ratio of hazards:

$$(3.4) \quad L_1 = \frac{e^{\beta x_1}}{e^{\beta x_1} + e^{\beta x_2} + \dots + e^{\beta x_n}}$$

This proportional hazard is estimated through maximum likelihood, which adjusts the  $\beta$  coefficients to maximize the probability that the next event occurred to the observation(s) that

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<sup>9</sup> Lagging all the time-varying variables in our model by one quarter this reduced the number of exits in our model because facilities that only operated for one quarter (e.g., facilities that closed in 1997Q1 or opened 2006Q4) were automatically excluded from our sample.

<sup>10</sup> We validated the robustness of our results by running accelerated failure time models with an exponential distribution.

actually did experience an event. Thus, only the order of events affects the partial likelihood and so there is some efficiency loss as a result of the fact that the timing of exit is ignored.

Although the unit of observation in our dataset is the facility-quarter, we assigned each of these quarters start and end dates because we had more specific data on the timing of market entry and exit. We replaced these dates with more precise dates from the AHCA licensure database when facilities entered or exited the market.<sup>11</sup> A separate variable was also coded to represent an exit event where there was concordance between these datasets and the reason for exit was deemed to be valid. When our Cox model encountered an exit, it assumed that the facility remained in the dataset up until the end date listed for that quarter and estimated each facility's probability of exit as a function of the covariate values at that point in time.

Since we broke down each category of explanatory variables by facility type (surgery center vs. hospital) and geographic location (local vs. diffuse), we introduced these distinctions in a relatively gradual manner. The first model included every set of variables at the highest possible level, the second model broke them down by facility type (ASC vs. hospital), the third model broke them down by geographic location (local vs. diffuse), and the fourth model broke them down both by facility type and geographic location. We estimated our Cox proportional hazard models of facility exit with STATA version 10 and reported coefficient estimates instead of hazard ratios. Tables 3 and 4 present the results of our Cox proportional hazard models while variables from different models have been lined up horizontally rather than vertically so that similar elements are grouped together.

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<sup>11</sup> The fact that our facility exit dates emerged from AHCA licensure data meant that we rarely encountered ties in our data. Nevertheless, we used the Efron approximation method for handling ties because it is regarded as more accurate than the Breslow method (Allison, 1995).

**Table 3: Surgery Center Exit – Cox Proportional Hazard Model**

Category	Facility Location	Measure	Model 1	Model 2 Facility	Model 3 Geography	Model 4 Facility Geography	
		Breakdown(s)					
Model Statistics		Observations	9695	9695	9695	9695	
		Number of subjects	396	396	396	396	
		Number of failures	50	50	50	50	
		Log likelihood	-260.4859	-253.6074	-258.5369	-251.0884	
		Likelihood Ratio Chi <sup>2</sup>	32.24	46	36.14	51.04	
		Prob > Chi <sup>2</sup>	0.0060	0.0003	0.0068	0.0010	
		Generalized R <sup>2</sup>	0.0782	0.1097	0.0872	0.1209	
Controls		Facility age	0.000146	0.000129	0.000171	0.000142	
		Number of ORs	-0.0569	-0.0903	-0.125	-0.136	
		For-profit facility	-1.208***	-1.290***	-1.309***	-1.365***	
		Ownership chain	0.111	0.212	0.145	0.212	
		Corporation owned	-0.356	-0.478	-0.247	-0.331	
		Partnership owned	-0.727	-0.839	-0.583	-0.746	
		Pct public pay	0.33	0.9	0.627	1.536	
		Pct private pay	1.062	1.484	1.203	1.928	
		Nbr of specialties	0.0798	0.0771	0.092	0.083	
Physician Statistics		Total nbr of MDs	-0.0221*	-0.0218*	-0.0248**	-0.0233*	
		Avg nbr of facilities	0.0197	0.136	0.00468	0.13	
		Avg PFI	0.00475	0.00458	0.00451	0.00434	
Competition	ASC	Local	Overlap	0.0517	0.158***	0.116*	0.286***
		Nonoverlap		-0.0291*	-0.0959**	-0.0223	-0.0868
	Diffuse	Overlap				0.0246	0.105
		Nonoverlap				-0.0304	-0.0973
	HOSP	Local	Overlap		0.0312		-0.0325
		Nonoverlap			0.032		0.022
	Diffuse	Overlap					0.0623
		Nonoverlap					0.0331
Outpatient Demand	ASC	Local	Nbr of procedures	-3.47E-05	-0.000187***	-5.49E-05	-0.000299***
		Diffuse	Nbr of procedures			-2.36E-05	-0.000135*
	HOSP	Local	Nbr of procedures		1.28E-06		5.45E-05
		Diffuse	Nbr of procedures				-2.13E-05

Note: Entry/exit dates validated by licensure data. Time-varying independent variables lagged by one quarter.  
 \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4: Hospital Exit – Cox Proportional Hazard Model**

Category	Facility Location	Measure	Model 1	Model 2 Facility	Model 3 Geography	Model 4 Facility Geography	
Breakdown(s)							
Model Statistics	Observations		7621	7621	7621	7621	
	Number of subjects		221	221	221	221	
	Number of failures		9	9	9	9	
	Log likelihood		-35.3112	-31.2408	-32.0864	-26.9391	
	Likelihood Ratio Chi <sup>2</sup>		24.46	32.6	30.91	41.21	
	Prob > Chi <sup>2</sup>		0.0799	0.0267	0.0564	0.0296	
	Generalized R <sup>2</sup>		0.1048	0.1371	0.1305	0.1701	
Controls	Facility age		-0.000277	-0.000381	-0.000441	-0.000502	
	Number of beds		-0.00101	-3.47E-06	-0.000562	0.00123	
	For-profit facility		0.352	0.13	-0.0843	-0.206	
	Ownership chain		0.0035	-0.25	0.239	-0.165	
	Corporation owned		-0.998	-0.172	-1.27	0.332	
	Government owned		-0.381	-0.259	-0.431	0.257	
	Pct public pay		-3.023	0.00828	-2.668	0.201	
	Pct private pay		-7.174**	-4.988	-6.826**	-4.339	
	Nbr of specialties		-0.155	-0.171	-0.204	-0.354	
Physician Statistics	Total nbr of MDs		-0.0152	-0.0153	-0.0233	-0.0246	
	Avg nbr of facilities		0.739	0.912	0.548	0.671	
	Avg PFI		-1.038	-1.426	-0.173	-0.716	
Competition	ASC	Local	Overlap	0.126*	0.443**	0.152	0.41
		Nonoverlap	-0.05	-0.059	0.0286	-0.0289	
	Diffuse	Overlap			0.241*	0.924**	
		Nonoverlap			-0.108	-0.0248	
	HOSP	Local	Overlap		0.424**	0.326	
		Nonoverlap			-0.134	0.247	
	Diffuse	Overlap				0.667*	
		Nonoverlap				-0.678	
Outpatient Demand	ASC	Local	Nbr of procedures	-0.000154**	-0.000624***	2.19E-05	-0.000405
		Diffuse	Nbr of procedures		-0.000182**	-0.000379***	-0.00130**
	HOSP	Local	Nbr of procedures				2.73E-05
		Diffuse	Nbr of procedures				-0.000396*
Inpatient Demand	HOSP	Local	Nbr of procedures	0.000151**	2.83E-05	-6.99E-05	-3.86E-05
		Diffuse	Nbr of procedures			0.000337*	6.88E-05

Note: Entry/exit dates validated by licensure data. Time-varying independent variables lagged by one quarter.

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### III. FINDINGS

#### A. Results

Our Cox proportional hazard models yielded log likelihood statistics that were highly significant ( $p \leq 0.0001$ ). They produced a pseudo R-squared of 0.152 for our ASC exit model (Model 4) and 0.199 for our hospital exit model (Model 4), which represents the explanatory power of the independent variables (Allison, 1995; Magee, 1990). Our models generally produced coefficients with the expected signs. Higher levels of market demand for outpatient procedures from ASCs are associated with a lower probability of ASC exit (Models 2 and 4,  $p < 0.05$ ) while higher levels of demand for hospital procedures are associated with a higher likelihood of exit (Models 4,  $p < 0.05$ ). Hospital exit also has a negative association with levels of outpatient demand from ASCs (Models 2 and 4,  $p < 0.05$ ) and from hospitals (Models 2 and 4,  $p < 0.10$ ), though the diffuse effects appear to be much stronger than local effects. For both ASCs and hospitals, a higher number of practicing physicians is associated with a significantly lower likelihood of exit in all models (Models 1 to 4,  $p < 0.01$ ). We also found that for-profit surgery centers had a significantly lower likelihood of exit than non-profit surgery centers (Models 1 to 4,  $p < 0.01$ ) and that the number of specialties that surgery centers participated in had a negative relationship with exit rates (Models 2 and 4,  $p < 0.05$ ) such that multi-specialty surgery centers had a higher likelihood of exit. We ran accelerated failure time models with an exponential distribution to check the robustness of our results and found that none were substantively different, although some coefficients gained significance.

Regarding our hypotheses, an encouraging sign is the fact that our predictions issued from niche overlap theory appear to hold true in this setting. We find strong support for hypothesis 1, which suggests that niche overlap density is positively related to the exit rate, and

more limited support for hypothesis 2, which suggests that niche non-overlap density is negatively related to the exit rate. Niche overlap density among ASCs is associated with significantly higher ASC exit rates (Models 2 and 4,  $p < 0.01$ ) while niche non-overlap density among ASCs is associated with significantly lower ASC exit rates (Model 2,  $p < 0.05$ ). ASCs do not appear to be affected at all by hospital niche overlap or non-overlap. We also find evidence that niche overlap among outpatient facilities is positively associated with hospital exit rates (Model 1,  $p < 0.05$ ) and this appears to be true of both ASC niche overlap (Models 2 and 4,  $p < 0.05$ ) and hospital niche overlap (Model 2,  $p < 0.05$ ). We find no effect of niche non-overlap on hospital exit among either type of facility.

We also find support for the hypotheses suggesting that asymmetric competition exists between different organizational forms. Our results lend strong support to hypothesis 3 since we found that ASC niche overlap is positively associated with hospital exit rates (Models 2 and 4,  $p < 0.05$ ). Competition with overlapping ASCs is associated with elevated hospital exit rates. However, we find somewhat more limited support for hypothesis 4 since hospital overlap density appears to have no relationship surgery center exit rates. Table 5 summarizes our results by presenting the predicted coefficients alongside the actual coefficients produced by our models.

**Table 5: Predicted and Actual Coefficients for Exit Models**

		Niche Overlap Density Competition from			Niche Non-Overlap Density Presence of		
			ASC	HOSP		ASC	HOSP
Predicted Coefficients	Exit by	ASC	+	-	Exit by	ASC	-
		HOSP	+	+		HOSP	
Actual Coefficients <sup>1</sup>	Exit by	ASC	+++		Exit by	ASC	--
		HOSP	++	++		HOSP	

<sup>1</sup> Actual results emerge from model 2, which is broken down by facility type.  
+++  $p < 0.01$ , ++  $p < 0.05$ , +  $p < 0.1$

Although we had suggested that ASCs would benefit from legitimacy and resource spillovers posed by the presence of nearby hospitals with overlapping niches, there are several reasons to believe that these empirical results may not necessarily disprove hypothesis 4. Within the lower left-hand table, the upper right-hand cell representing the neutral relationship between hospital overlap density and ASC exit rate still stands in stark contrast to the other cells in the that table which display significantly positive coefficients.

The fact that the effects of overlap density are so striking in every other circumstance suggests at the very least that ASCs are not hurt by the presence of hospitals with overlapping niches. Perhaps the detrimental effect of competition with overlapping facilities and the beneficial effects of operating in markets with nearby hospitals tend to cancel each other out. Alternatively, it is possible that the competitive advantage enjoyed by surgery centers permits them to operate autonomously without being affected – either positively or negatively – by hospitals. In fact, surgery centers may simply be forced to locate near general hospitals in order to accommodate surgeons who practice in both ASCs and hospitals, or because they must transport emergency cases to a nearby hospital.

### ***B. Implications***

Our exit model results indicate that there is asymmetric competition between surgery centers and hospitals. Hospital exit rates are significantly higher in markets characterized by the presence of surgery centers with overlapping niches. Meanwhile, surgery center exit rates do not appear to be affected one way or another by the presence of nearby hospitals with overlapping or non-overlapping niches. Our findings from a related study on firm entry lend additional support to this argument since we found that hospitals tend to avoid markets with overlapping surgery centers, although there is no indication that surgery centers tend to enter markets that are already

occupied by hospitals (Housman, 2009). At a minimum, these results indicate that surgery centers and hospitals affect one another in fundamentally different ways and that competition between these two organizational forms is asymmetric.

These findings contradict conventional knowledge about how specialists compete with generalists. Resource partitioning theory suggests that specialists tend to locate in peripheral areas of the market in order to avoid direct competition with other firms (Carroll, 1985). However, the theory also imposes the assumption that no real price competition occurs between firms in the market. Generalists possess a competitive advantage over specialists and so they are able to locate in core areas of the market while specialists avoid direct competition with them. However, we know that there are a variety of settings – most notably service environments – in which specialists maintain a lower cost structure than generalists and are able to behave like focused factories. Under these circumstances, our results contradict this conventional wisdom and suggest that specialized organizational forms are capable of competing directly with generalists in core areas of the market and may, in fact, be able to enter these markets without experiencing any adverse effects as a result of competition with these generalists.

Given the recent evolution of the health care industry towards service line competition and the emergence of specialized facilities, these findings carry additional weight. Further research should explore whether the results apply to specialty hospitals and other specialized facilities that are entering markets that have traditionally been served by the general hospital, which include lithotripsy, cardiac catheterization, diagnostic imaging, and radiation therapy. Our results suggests that these providers may be relatively unaffected by competition with hospitals but that entry by these providers may cause hospitals to exit markets. These findings have

implications for the ability of hospitals to treat vulnerable populations and cross-subsidize less profitable lines of service since hospital closures clearly affect patient access to care.

This begs the question: how applicable are these results to settings outside the health care industry? It seems plausible that the mechanisms by which this process occurs are present outside the market for outpatient surgery. Clearly, phenomena like physician ownership and the ability to send emergency cases to nearby hospitals are specific to the health care industry. However, hospitals offer surgery centers the same legitimacy and resource spillovers that generalists present to emerging specialists in a variety of other industries. In fact, surgery centers have less of an opportunity to appeal to more price discriminating consumers than specialized forms in other industries since third-party reimbursement makes health care consumers less price sensitive (Newhouse & RAND Corporation., 1993). This is typically considered to be one of the primary advantages of specialized forms that can emerge as low-cost alternatives within industries populated by more generalized forms. Additional research should apply these methods to other settings in order to ascertain whether specialized and generalized organizational forms exhibit patterns of asymmetric competition outside the health care sector.

### ***C. Limitations***

Although the empirical techniques employed here represent an improvement over much of the existing work in this area, there are several limitations to this study. To begin, we are unable to infer causality from these methods. In other words, we cannot determine whether firm exit is caused by competitive intensity within markets or whether firms choose to enter markets that experience exits, perhaps because these exits may suggest that an opportunity for entry exists. Lagging all of the right-hand side variables in our model by one quarter does address this issue somewhat. However, in the absence of some exogenous change that causes a shock to

facility entry or exit rates, there is no obvious solution to these endogeneity issues. Yet this limitation does not undermine our findings since we are primarily concerned with the relationship between firm density and entry/exit rates, and not necessarily the causal relationships that exist between them.

Another limitation is fact that we based our market definitions on travel patterns for inpatient care, which may not necessarily mirror travel patterns for outpatient care (Makuc et al., 1991; Weber, 2008). Although we indirectly tested the sensitivity of this assumption by dividing HSAs into their local and diffuse components, our use of the health service area (HSA) as the primary unit of geographic analysis may be problematic if patients frequently travel across HSAs for outpatient procedures. The fact that ASCs and hospitals in our exit models were affected differently by local and diffuse competition suggests that there may be some opportunity to refine these boundaries by using ZIP code information available from the Florida patient data.

Although we do control for facility ownership characteristics and physician practice patterns in several different ways, there are several constructs that we could not generate from the Florida patient data. Namely, we could not observe how surgeons organize within physician groups and so we could not ascertain whether these physician groups – as opposed to the supply of physicians – had an impact on facility entry and exit rates. Likewise, we included dummy variables representing facilities that were owned by an individual, partnership, corporation, or government entity, but these variables did not indicate whether surgery centers were physician and/or hospital owned. We contacted the state of Florida about obtaining this information from corporation records or recent surveys of facility ownership patterns but neither proved to be a viable approach.

#### IV. CONCLUSIONS

The literature on organizational niche has evolved significantly over time. Population ecologists first suggested that organizational niche was a product of environmental variation (Hannan & Freeman, 1977). Over time, several theories emerged and argued instead that organizational niche was dictated by market position and organizational concentration but they differed in their level of analysis. For example, resource partitioning theory developed a model of competition between specialists and generalists that was predicated upon certain assumptions about the presence of economies of scale (Carroll, 1985). Its focus on the macro-processes of competition between specialists and generalists was complemented by alternate theories that explored the micro-processes of niche localized competition among similar organizational forms. Niche overlap theory filled this gap by developing our understanding of competitive dynamics within organizational niches (Baum & Singh, 1994a, 1994b). However, this focus on competition within organizational micro-niches has not been applied to markets characterized by competition between specialist and generalist organizations occupying different macro-niches.

This study is the first to reconcile the dynamics of competition within both the macro- and micro-niche. It extends niche overlap theory by identifying a setting characterized by well-defined organizational niches in which a specialized organizational form has emerged and grown rapidly. This specialist also possesses a competitive advantage over generalists within the market since it behaves like a focused factory and enjoys significantly lower operating costs as a result. By manipulating patient-level datasets from the state of Florida, we were able to measure competition, market demand, and firm entry/exit with a higher level of precision than previous studies in this area. Both the characteristics of this market and the availability of this detailed data make this an ideal setting to test these theories from the literature on macro-organizational

behavior. Yet this setting is also interesting from the perspective of health services research because surgery centers represent just one example of specialized providers that have caused a variety of services to migrate away from the general hospital.

In keeping with our predictions from niche overlap theory, we found that niche overlap density tends to elevate exit risks while there was weaker evidence to suggest that niche non-overlap tends to reduce exit risks. Both surgery centers and hospitals experienced higher exit rates in markets with high niche overlap among surgery centers while hospitals also tended to exit markets with high hospital niche overlap. Meanwhile, surgery centers displayed lower exit rates in markets with high niche non-overlap among surgery centers. Taken together, these results generally confirm our first two hypotheses and validate niche overlap theory in a setting other than the child day care industry.

Yet there are idiosyncratic characteristics of the market for outpatient surgery that permitted us to test an extension of this theory; we confirmed the presence of asymmetric competition between specialist and generalist organizations. Although hospitals had a higher likelihood of exit in markets with overlapping surgery centers, surgery centers appeared to be unaffected by competition with overlapping hospitals. Under these circumstances, our results contradict the assumptions of resource partitioning theory and suggest that specialists are capable of competing directly with generalists in core areas of the market. This asymmetric competition was hypothesized to result from the fact that generalists create the market initially while specialists possess a lower cost structure that allows them to attract consumers and steal market share. In fact, we had hypothesized that specialists might actually benefit from the presence of nearby generalists due to the legitimacy and resource spillovers that they offer. Yet we did not

find this to be the case, either because these effects were relatively weak or because we studied this industry too late in its evolution to observe them.

These findings pose interesting implications for the emergence of specialized organizational forms. Within the health care industry, the rapid growth of ambulatory surgery centers and specialty hospitals signifies a change within the competitive landscape that emphasizes service line competition. Yet these organizations represent just the tip of the iceberg as there has been similar growth among other specialized providers dedicated to gastrointestinal endoscopy, diagnostic imaging, sleep disorders, peripheral vascular disease, cosmetic surgery, radiation therapy, lithotripsy, cardiac catheterization, and cancer chemotherapy (Berenson et al., 2006). These facilities may have a competitive advantage when competing with general hospitals as a result of their leaner organizational form. This advantage may be particularly acute in the health care industry since physician ownership can strongly influence referral patterns (Kouri et al., 2002; Lynk & Longley, 2002).

There are other industries – ranging from airlines to mail order computer manufacturers – in which specialized organizational forms are emerging as leaner, low-cost versions of existing forms (Rao & Singh, 2001). This research represents a critical first step toward understanding how these specialists compete against generalist forms within organizational niches. The competitive advantage that these firms appear to possess, coupled with their success in the health care industry, may indicate that there are even more industries ripe for entry by specialized organizational forms. Additional research should test these ideas in other settings in order to determine whether the results are context dependent or readily generalizable extensions of niche overlap theory.

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