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Hospital Investment in Urgent Care: Impacts on Emergent, Outpatient, and Ambulatory Surgery Volumes

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

by

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List of Abbreviations

ACA	Affordable Care Act
AHA	American Hospital Association
AHRF	Area Health Resource File
AHRQ	Agency for Healthcare Research and Quality
ASC	Ambulatory Surgery Center
CDC	Centers for Disease Control and Prevention
CMI	Case Mix Index
CMS	Center for Medicare and Medicaid Services
CT	Contingency Theory
DRG	Diagnosis-Related Group
ED	Emergency Department
HCUP	Healthcare Cost and Utilization Project
HHI	Herfindahl-Hirschman Index
HMO	Health Maintenance Organization
ICD-9	International Classification of Diseases, Ninth Revision
ICD-10	International Classification of Diseases, Tenth Revision
LOS	Length of Stay
OLS	Ordinary Least Squares
OSHPD	Office of Statewide Health Planning and Development
PCP	Primary Care Provider
SEDD	State Emergency Department Databases

SMT	Strategic Management Theory
UCAOA	Urgent Care Association of America
UCC	Urgent Care Center

Abstract

HOSPITAL INVESTMENT IN URGENT CARE: IMPACTS ON EMERGENT, OUTPATIENT, AND AMBULATORY SURGERY VOLUMES

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As the popularity of urgent care centers (UCCs) has grown, hospitals have increasingly chosen to invest in this care model. Hospital interest in UCCs is largely driven by two key factors. First, hospitals aim to use UCCs to generate referrals, which generate additional patient volume for downstream hospital services. Secondly, hospital UCC investment presents an opportunity to ease the demand for non-urgent care in the emergency department (ED) by diverting low-acuity ED patients to the more appropriate UCC setting. No study to date has evaluated the impact of hospital UCC investment on referrals or downstream service volumes. A few studies have examined the association between UCCs and ED visits, but these have produced mixed results and none have specifically focused on hospital-owned UCCs.

This study integrates Strategic Management Theory and Contingency Theory to conceptualize the relationship between hospital UCC investment and the volume of low-acuity ED visits, outpatient visits, and ambulatory surgeries. The study utilizes a retrospective, longitudinal panel study design with hospital-level data for years 2010 through 2015 from multiple public and private data sources. Poisson regression methodology and Ordinary Least Squares regression methodology are employed to test study hypotheses.

Hospital UCC investment is not associated with a reduction in low-acuity ED visits, even when financial pressure and stressed ED capacity are included as moderators. This is an important consideration for hospital leaders and policy makers as they evaluate options for reducing ED pressure and redirecting low-acuity ED utilization to lower cost settings. However, hospital UCC investment is associated with increased outpatient visits and ambulatory surgeries for HMO owners in later years of UCC ownership. Thus, this study identifies UCC investment as a viable strategy for hospitals to retain/increase revenue and potentially gain competitive advantage by attracting patients to their UCC that would otherwise go to a competitor's facility.

Chapter 1. Introduction

Hospitals continually seek out new strategies to deal with their rapidly changing competitive landscape. In past decades, hospital strategies have primarily focused on the provision of specialty services to attract new patients and achieve market growth. However, in recent years, more hospitals have begun to adopt a strategy known as geographic service expansion. Under this strategic approach, hospitals expand their services into new geographic market areas as a means to engage with previously untapped, financially advantageous patients. This is often accomplished by establishing an outpatient care facility, such as an urgent care center (UCC) or freestanding emergency department (ED), in a suburban area with a fast-growing or younger and more affluent population on the outer reaches of the hospital's typical market area (Carrier, Dowling, & Berenson, 2012; Felland, Grossman, & Tu, 2011). These outpatient care settings then generate referrals, which in turn, generate additional patient volume for downstream hospitals services and increase the hospital's market share (Carrier, Dowling, & Berenson, 2012).

This dissertation specifically focuses on hospital investment in urgent care as a means to achieve service and referral expansion. Despite being one of the fastest growing segments in the U.S. health care delivery system, urgent care is a widely understudied area in the health services research literature. This is largely due to a lack of comprehensive data source for urgent care facilities. Moreover, to the author's knowledge, no study to date has examined the impact of hospital-owned urgent care facilities on other hospital service volumes. Accordingly, this dissertation begins to fill this critical literature gap.

The Study Problem

Urgent care has experienced rapid growth in recent years, largely due to increasing consumer demand for convenient, fast, and affordable healthcare delivery (Stempniak, 2015). As the popularity of UCCs has grown, an increasing number of hospitals have chosen to invest in this model of care delivery; according to the Urgent Care Association of America [UCAOA] (2017), 15% of UCCs are hospital-owned and 16% are a joint venture with a hospital. As previously alluded to, hospital investment in urgent care offers the potential for hospitals to funnel patients from the UCC to other profitable hospital services, including ambulatory surgery and outpatient care (Girdley & Jones, 2017). By integrating urgent care into their continuum of care, hospitals have the opportunity to direct downstream referrals and subsequent service delivery to their own facilities. Traczyk and Peterson (2016) estimated that the typical UCC generates approximately 2,500 specialty referrals each year, presenting a significant revenue opportunity for hospitals if referrals are made to hospital-owned services. However, no research to date has evaluated whether this performance benefit has been realized.

The potential for market growth is not the only reason hospitals are attracted to urgent care; hospital investment in a UCC also presents an opportunity to ease the demand for non-urgent care in the emergency department (ED) (Budryk, 2015; Girdley & Jones, 2017; Weiner, 2017). Non-urgent visits have been identified by some research as a key contributor to ED overcrowding (Asplin et al., 2003; Cheney, 2015; Weinick et al., 2010), which has been associated with decreased patient satisfaction as well as increased patient morbidity and mortality (Pines et al., 2008). Weinick, Burns, and Mehrotra (2010) estimated that up to 27 percent of all ED visits could be treated in a “convenient care” setting such as a UCC or retail clinic. Accordingly, by investing in a UCC, hospitals aim to alleviate the negative consequences of ED overcrowding by diverting low-acuity patients from the ED setting to the more appropriate urgent care setting where they can be treated in a fraction of the cost and time.

However, the few existing studies that have examined the impact of UCCs on ED use have produced mixed results. For instance, Llovera and colleagues’ (2019) study found that the opening of UCCs within 5 miles of a hospital ED was associated with a significant decrease in two low-acuity ED diagnoses (pharyngitis and bronchitis). On the other hand, Yakobi (2017) found that the presence of a UCC within 2 miles of EDs in New York City was not associated with a significant decrease in overall ED census. Additionally, Martsolf and colleagues (2016) found that the concentration of retail clinics opened near EDs was not associated with a significant reduction in low-acuity ED visits. Although this study focused on retail clinics, which are not as well equipped as UCCs to treat more complex low-acuity conditions, the findings suggest a need to evaluate the impact of hospital investment in urgent care on the volume of low-acuity ED visits.

Although the strategic implications of hospital investment in urgent care are frequently discussed in industry literature, there has been little attention to this topic in the field of health services research. To the author’s best knowledge, no study to date has evaluated the impact of investment in urgent care on referrals or patient volumes for downstream services. Although a few studies have started to examine the association between UCCs and ED visits, none have specifically focused on hospital-owned UCCs or examined the impact of UCCs on ED visits for a variety of low-acuity conditions. This study aims to fill that gap in the literature.

Study Objective and Aims

The objective of this dissertation is to assess whether investment in urgent care offers operational performance advantages for hospitals. Specific aims are:

1. To evaluate whether hospital investment in urgent care is associated with a significant reduction in low-acuity visits to the emergency department.
2. To evaluate whether hospital investment in urgent care is associated with a significant increase in the volume of outpatient hospital visits.
3. To evaluate whether hospital investment in urgent care is associated with a significant increase in hospital-based ambulatory surgery volumes.

Conceptual Framework

This study employs a multi-theoretical framework integrating Strategic Management Theory and Contingency Theory. This study uses Strategic Management Theory to conceptualize the relationship between UCC investment and three aspects of hospital operational performance: the volume of low-acuity ED visits, outpatient visits, and ambulatory surgeries. Contingency Theory is used to identify relevant structural (hospital level) and environmental (market level) characteristics that may moderate the relationship between UCC investment and hospital performance or directly influence hospital performance. This integrated conceptual framework is used to develop hypotheses for all three study aims.

Scope and Approach

This study utilizes a retrospective, longitudinal panel study design to examine the relationship between hospital investment in UCCs and the volume of low-acuity ED visits (Aim 1), outpatient visits (Aim 2), and ambulatory surgeries (Aim 3). Poisson regression methodology is employed to test the hypotheses for Aim 1, as the dependent variable is a ratio of low-acuity

ED visits to total ED visits. Ordinary Least Squares (OLS) regression methodology is employed to test the hypotheses for study Aims 2 and 3. A three-pronged approach to estimation is employed for all study aims. A model is first estimated using a binary UCC investment variable. A second model including both a binary UCC investment variable and a length of UCC ownership variable is then estimated. Finally, a third model including the UCC investment and length of ownership variables as well as interaction terms for the moderating variables (financial pressure and stressed ED capacity) is then estimated through various equations by including and replacing one moderator at a time. All models incorporate hospital and time fixed effects.

The study sample for Aim 1 is comprised of a convenience sample of all non-federal, general-acute care hospitals in California, Florida, New York, and New Jersey for years 2010 through 2015. Limited funding resources coupled with high ED visit data costs restrict the Aim 1 study sample to these select states. A separate study sample is used for Aims 2 and 3. This sample includes all hospitals in the Aim 1 study sample, but is expanded to also include a convenience sample of all non-federal, general acute-care hospitals in six additional states: Illinois, Michigan, North Carolina, Ohio, Texas, and Wisconsin. These samples are generated from the American Hospital Association's (AHA's) Annual Survey of Hospitals.

The dependent variable for Aim 1 is the ratio of treat-and-release ED visits for select low-acuity conditions that commonly present in the urgent care setting (Weinick et al., 2010) to total treat-and-release ED visits as calculated using ED claims data. Claims data for treat-and-release ED visits comes from the Healthcare Cost and Utilization Project (HCUP) Statewide Emergency Department Database (SEDD) for Florida, New York and New Jersey and from a combination of HCUP SEDD and the Office of Statewide Health Planning and Development ED Database for the state of California. ICD-9 (ICD-10 for year 2015) diagnosis codes listed on ED claims are used to identify low-acuity conditions. The dependent variable for Aims 2 and 3 is the volume of outpatient hospital visits and hospital-based ambulatory surgeries, respectively, as identified in the AHA's Annual Survey. The independent variables, UCC investment and length of UCC ownership, are obtained from the AHA Annual Survey.

Study Contribution

To the author's best knowledge, this is the first study to evaluate the performance benefits of hospital investment in urgent care, addressing a critical gap in health services research literature. Study findings will inform hospital executives as to the strategic advantages of integrating urgent care into the hospital care continuum. First, this study clarifies whether investment in urgent care is a means to reduce ED utilization by non-urgent patients. This is an important consideration for health policy, as it will provide clarification on whether policy makers should encourage investment in UCCs as a means for reducing health spending in the broader health system (by substituting low-acuity ED utilization with services in the lower cost UCC setting).

This study also has important implications for hospital management as inappropriate ED use contributes to ED overcrowding and wait times, which are significantly associated with decreased patient satisfaction as well as increased patient morbidity and mortality (Pines et al., 2008). Secondly, by exploring whether hospitals that invest in urgent care see significant improvements in the volume of their profitable services such as outpatient care and ambulatory surgery, this study assesses a potential strategy for hospital managers to increase revenue and gain competitive advantage. In particular, this strategy may generate downstream referrals and attract patients to their UCC that would otherwise go to a competitor's facility. The study also identifies a potential strategy for improving coordination of patient care; as more patients are brought and kept within the hospital's network of providers, hospitals may be better able to manage the flow of patient information through shared information systems, which ultimately results in improved care coordination. In sum, this study provides hospital executives with information as to whether an investment in UCCs has the potential to improve financial performance, patient satisfaction, and overall quality of care.

Finally, this study employs a multi-theoretical perspective, answering an important call for theoretical pluralism in the analysis of health care organizations (Mick & Shay, 2014). An integration of Strategic Management Theory and Contingency Theory is employed to investigate all study aims. Under the strategic management perspective, organizational performance can be thought of as a function of the industry structure, the strategic position of the firm, and the supporting structural elements of the organization. Similarly, Contingency Theory recognizes that the organization's strategic and structural fit with the environment determines performance (Scott, 2003). Thus, this combined theoretical approach offers a more comprehensive understanding of the relationship between hospital strategy and operational performance.

Organization of Remaining Chapters

Chapter 2 presents a synthesis and critique of previous literature relevant to the study aims. Chapter 3 outlines and develops the study's conceptual framework and hypotheses. The research methodology is presented in Chapter 4. This consists of the study sample, data sources, measures, and analytical methodology. Results are described in Chapter 5. Lastly, the study findings are summarized in Chapter 6. Policy and practice implications, study limitations, and potential directions for future research are also presented there.

Chapter 2. Literature Review

Overview of Chapter Structure

The purpose of this chapter is to both provide background information on urgent care facilities as well as to summarize and identify gaps in the relevant literature relating to hospital investment in urgent care and its operational impacts. The chapter begins with an overview of urgent care and its relation to other convenient care models. The chapter then transitions into a discussion of the operational impacts of hospital investment in urgent care, beginning with the potential to reduce ED overcrowding. A connection between low-acuity visits and ED crowding is established. This is followed by a summary of empirical research linking hospital investment in urgent care and related convenient care models to a reduction in low-acuity ED visits. Then a summary of critical research gaps addressed by study Aim 1 is presented. The chapter then moves on to a discussion of hospital investment in urgent care as a means for service expansion and referral growth. Finally, a summary of the limited literature linking freestanding outpatient facilities to increased referral and patient volumes is presented, followed by a summary of the critical research gaps and the linkage to study Aims 2 and 3.

Urgent Care Overview

UCCs are ambulatory clinics with the ability to treat patients with non-life-threatening acute illnesses and injuries (Weinick et al., 2010). The UCAOA estimated that there were approximately 9,600 UCCs nationwide as of 2018, with over 85% of UCCs providing urgent or episodic care exclusively (UCAOA, 2019). However, an increasing number of UCCs are also providing ongoing primary care (UCAOA, 2018). Some of the most common diagnoses treated in the urgent care setting are influenza, acute sinusitis, respiratory problems, rashes and skin infections, and sprains and fractures (Weinick et al., 2010).

UCCs are commonly staffed by family physicians, though UCCs may also be staffed by physicians with specialties in areas such as emergency, internal, or pediatric medicine. Roughly half of UCCs also employ advanced practice providers (APPs) such as nurse practitioners and physician assistants typically working under physician supervision (depending on state scope of practice laws) (Weinick, Bristol & DesRoches, 2009).

The majority of UCCs do not participate with Medicaid due to low reimbursement rates, and instead primarily cater to the privately insured and Medicare beneficiaries (UCAOA, 2018; Yee, Lechner & Boukus, 2013). As of 2018, over half (55%) of total UCC visits were made by patients with commercial insurance, 22% were made by patients with Medicare or Medicaid, 7% were patients with occupational health or worker's compensation, and the remaining 16% were a combination of cash pay and patients with other forms of insurance (UCAOA, 2019a).

Urgent Care: A Convenient Care Model.

UCCs are an attractive option for patients seeking convenience as they accept walk-ins, offer expanded hours including nights and weekends, and generally have short visit times (Stoimenoff & Newman, 2018). Almost all UCCs (over 95%) are open seven days a week and operate a minimum of 14 hours per day (Gooch & Barnet, 2016). Additionally, over 90% of UCCs having a wait time of 30 minutes or less to see a provider and over 95% of UCCs have a 60-minute wait or less for the total patient visit (UCAOA, 2019a). Accordingly, urgent care is classified as a convenient care model, which, "loosely defined…offers patients extended hours, minimal wait times, and low out-of-pocket costs for low-acuity conditions (Raja & Mehrotra, 2016, p.1)."

UCCs are distinguished from another major convenient care model, retail clinics, in that they are able to treat more complex conditions due to the presence of radiology and laboratory services on-site. Additionally, retail clinics are usually staffed by advanced practice providers as opposed to family physicians (Merritt Hawkins, 2018). While retail clinics are specifically located within a retail shopping center, researchers have found that both UCCs and retail clinics tend to be located in populous, affluent, high density areas where they can generate significant vehicle and foot traffic (Rudavsky & Mehrotra, 2010; Pollack & Armstrong, 2009; Yee et al., 2013).

While UCCs may be a "step up" from retail clinics in the care continuum, they are a "step down" from another related convenient care model - freestanding EDs. Freestanding EDs are structurally distinct facilities from hospitals (though they may be hospital-affiliated) that provide continuous emergency care. As a result, they are much more heavily regulated than UCCs (Merritt Hawkins, 2018). The urgent care industry, on the other hand, as a whole has remained largely unregulated. Only a handful of states have established formal oversight, primarily through legislation granting state agencies licensing authority over UCCs (ASTHOExperts, 2018). While freestanding EDs do offer some of the same advantages as UCCs when compared to hospital-based EDs (i.e. convenient locations and shorter wait times), they do not typically provide as extensive a range of services as hospital-based EDs (Ho et al., 2017; Merritt Hawkins, 2018; Poon et al., 2019).

Although UCCs, retail clinics and freestanding EDs all offer lower-cost care when compared to hospital-based EDs, there remain significant pricing and cost differences between these three models. Several studies have established freestanding EDs as the costliest convenient care option, followed by UCCs then retail clinics (Mehrotra et al., 2009; Thygeson et al., 2008). Ho and colleagues (2017) found that freestanding ED prices per visit were 10 times higher than UCCs for the same diagnoses. This pricing difference was largely attributed to requirements that freestanding EDs provide on-call services and all-hour access to lab services and advanced imagery, which generate a substantial facility fee. It was estimated that over 80% of freestanding annual ED prices are attributable to this facility fee. Accordingly, critics have argued that freestanding EDs actually increase overall health spending because a large proportion of the care they provide could be delivered in a lower-cost setting. In fact, it is estimated that 75 percent of diagnoses treated at freestanding EDs could be treated in the lower-cost UCCs setting (Ho et al., 2017). While costs of care at retail clinics tend to be lower than at UCCs and EDs, the challenge with this setting is that the range of conditions they are able to treat is very limited (Mehrotra et al., 2009).

The Urgent Care Resurgence.

Urgent care has actually existed as an alternative care setting since the late 1970s, but was often disparaged as a "doc-in-the-box" until recent years (Merritt Hawkins, 2018). It was not until the past decade that UCCs have become a become a major player in the health care industry (Girdley & Jones, 2017). With an estimated 89 million patient visits annually as of 2018, UCCs now handle over 29 percent of all primary care visits and almost 15 percent of all outpatient physician visits (UCAOA, 2019b). The UCAOA (2019b) estimates that over 2,150 new UCCs were built between 2014 and 2017, which represented a 33% rate of growth over that time period. Accordingly, scholars and industry leaders assert that the U.S. is in the midst of a "new urgent care wave" or "urgent care 2.0" as the construction and use of urgent care continues to steadily increase (Fellows, 2015; Girdley & Jones, 2017). This growth is also reflected in claims data, which revealed a 1,725% increase in private insurance claim lines for UCCs from 2007 to 2016 (FAIR Health, 2019).

There are several factors that can be attributed to this resurgence of the urgent care model. A key factor is the increasing consumer demand for convenient access to affordable health care services (Girdley & Jones, 2017; Yee, Lechner, & Boukus, 2013). This demand is also driven by the rising costs of emergency care as well as changes in insurance design that introduced increased copayments or significant penalties for patients seeking non-emergent care in the emergency room (Hsu et al., 2006; Weinick, Bristol, & DesRoches, 2009). As a result, more and more patients are seeking out alternative settings for non-emergent care.

Additionally, inadequacies in the primary care system have contributed to the increasing popularity of UCCs. Supply side challenges such as the shortage of primary care providers, coupled with an increased insured population post-ACA, have contributed to long wait times for many health care services (Auerbach et al., 2013; Carrier, Yee & Stark, 2011; Yee et al., 2013). According to a 2017 Survey of Physician Appointment Wait Times by Merritt Hawkins, the average wait time for a new appointment with a primary care physician is 24 days - a 30 percent increase over the previous survey. The nation's aging population and prevalence of chronic disease have only exacerbated these challenges (New England Healthcare Institute [NEHI], 2010), further contributing to a gap in the health care system for patients seeking primary care services. With their walk-in availability, extended hours, and wide scope of services, UCCs have been able to help fill this gap for primary care service delivery and patient overflow and have experienced increased growth as a result (Weinick, Bristol, & DesRoches, 2009).

Hospital Investment in Urgent Care

The landscape of UCC ownership has changed significantly since the urgent care model's inception as the popularity of urgent care chains increased and both insurer and hospital interest in the model grew (Girdley & Jones, 2017). In the late 1970s and 1980s, UCCs were typically independently owned by physicians. As of 2017, physician investors owned fewer than 5% of UCCs while 39% of UCCs were owned by a corporate entity, and over 30% of UCCs had some form of hospital ownership (UCAOA, 2017).

Historically, hospitals have been resistant to urgent care because of its unattractive low-margins and pushback from hospital-affiliated primary care physicians concerned about increased competition (Kaissi et al., 2016). However, over the past decade hospital interest in urgent care has surged and many hospitals have made the decision to invest (Yee, Lechner & Boukus, 2013). Many hospitals have pursued urgent care as a strategic investment rather than allowing UCCs to threaten their organization's viability (Kaissi et al., 2016). Hospital investment in urgent care comes in many forms, including partnerships with existing providers of urgent care services, lease-spaced agreements, and joint ventures (Girdley & Jones, 2017; Raja & Mehrotra, 2016).

Hospital Investment in Urgent Care: Operational Impacts.

Much of hospitals' interest in investing in UCCs derives from a need to address two key operational challenges: (1) ED overcrowding and (2) service area and referral base expansion. The subsequent sections outline these key operational challenges in detail, beginning with ED overcrowding, and draw on relevant health services literature to examine how hospital investment in urgent care may address these challenges.

However, before proceeding, it is important to first note that the literature on urgent care facilities is limited. Despite being one of the fastest growing segments in the U.S. health care delivery system, urgent care is a widely understudied area in the health services research literature. A major contributor to this research gap is the absence of a comprehensive data source on urgent care facilities or urgent care use. While an exhaustive summary of relevant health services literature is presented, the subsequent literature review relies heavily on an integration of academic journal articles and industry literature (e.g. industry white papers). This approach provides the most all-encompassing narrative of the relationship between hospital investment in UCCs and ED overcrowding and market expansion.

Hospital Investment in Urgent Care: Impacts on ED Overcrowding.

ED crowding is defined as "a situation in which the identified need for emergency services outstrips available resources in the ED" (Asplin et al., 2003, p.174). ED overcrowding is a serious and growing problem in many U.S. hospitals. As the rate of ED visits per 100,000 population has continued to climb year-after-year across all age groups, the problem has only worsened over time (Sun, Karaca & Wong, 2018). Researchers estimate that ED visits have increased almost 25 percent in the past 10 years, and over 60 percent in the past 20 years (Centers for Disease Control and Prevention [CDC], 2019). In the most recent Emergency Department data tables, the CDC estimates that ED visits increased from 136.9 million to 145.6 million (a 6.4% increase) from 2015 to 2016 (CDC, 2019; Augustine, 2019). As the volume of ED visits have increased, so have mean ED wait times; the average wait time for an ED patient to be taken to a room is currently over 1.5 hours and over 2 hours for discharge. Additionally, the number of ED patients who leave without being seen has nearly doubled in recent years (CDC, 2018; Savva & Tezcan, 2019).

Numerous studies have examined the negative consequences of ED overcrowding for patients. ED overcrowding has been associated with an increased risk of adverse clinical outcomes and negatively impacts critical care processes such as timely and accurate medication administration (E.B. Medicine, 2011; Fee et al., 2007; Gaieski et al., 2017; Hwang, 2008; Kulstad et al., 2010). ED overcrowding has also been associated with decreased patient satisfaction (Pines et al., 2008) as well as increased patient morbidity and mortality (Guttman et al., 2011; Pines et al., 2008; Sun et al., 2013). Redelmeier, Balir, and Collins (1994) also found ED overcrowding to be associated with increased incidences of ambulance diversions, which significantly increase transport times and the risk of adverse clinical outcomes. Negative consequences of ED overcrowding have also been found to extend to hospital employees, including an increased risk of patient violence toward ED staff (Medley, 2012). In recognition of these significant consequences, Asplin and colleagues (2003) called researchers to action to identify practical and effective solutions to the problem of ED overcrowding.

Since this call to action, several researchers have identified non-urgent visits as a key contributor to ED overcrowding (Asplin et al., 2003; Cheney, 2015; Weinick et al., 2010). Non-urgent visits – also referred to as avoidable or inappropriate ED visits – comprise a significant portion of ED visits nationwide. In a nationally representative study of hospital EDs, Weinick and colleagues (2010) found that up to 21 percent of ED visits could be handled in an urgent care or retail clinic setting. However, others have estimated that total inappropriate ED visits could be as high as 56% of all ED visits (Weinick, Billings & Thorpe, 2003). Many EDs are dealing with increasing volumes of these non-urgent cases and are already operating beyond capacity, leaving them overwhelmed and congested (Paradise & Dark, 2009). As a result, these non-urgent visits lead to excessive wait times and take much needed resources away from truly emergent patients.

Key reasons patients flock to the ED for non-urgent care include difficulty accessing timely primary care (e.g. long wait times) and the ease of obtaining care on weekends and after-hours (NEHI, 2010). Accordingly, a potential solution to ED overcrowding is to provide and direct nonemergent patients to an alternative care setting that caters to their desire for accessibility and convenience. This suggests that an urgent care facility may offer hospitals a solution to ED overcrowding and enable EDs to focus their resources on improving the quality and efficiency of care delivered to truly emergent patients. As Charles Lewis, executive director of emergency services and ambulatory care at St. Anthony's Hospital, stated: "Urgent care centers exist to relieve emergency departments of some of the burden of seeing too many patients. Every patient who seeks appropriate care at an urgent care center instead of the emergency department allows us to improve the care of our emergency patients" (Cheney, 2015, p.5).

Impact of UCCs on ED Visits.

To the author's knowledge, no study to date has investigated investment in urgent care as a means for hospitals to reduce ED utilization by non-urgent patients. However, a few inaugural studies have begun to examine the relationship between the proximity of UCCs to an ED and ED visit volumes. In a recent study by Llovera and colleagues (2019), the authors found that the opening of four new UCCs within 5 miles of a New York hospital was associated with a significant reduction in ED diagnoses of two low-acuity conditions commonly treated in the UCC setting, pharyngitis and bronchitis. Yakobi (2017) examined the impact of UCCs located within 2 miles of four different hospital EDs in New York City on overall ED census over a five-year period. However, the author found that the presence of UCCs near the ED did not significantly decrease ED census. A 2019 National Bureau of Economics Research working paper by Allen, Cummings, and Hockenberry examined the change in low-acuity ED visits once

UCCs in the local area closed for the day. The study focused on UCCs in six states - Arizona, Florida, Nebraska, New Jersey, New York, and Rhode Island – and aggregated ED visit data from the Healthcare Cost and Utilization Project (HCUP) State Emergency Department Databases (SEDD) to the zip-code level for analysis. The authors found a significant increase in low-acuity ED visits in zip codes with multiple UCCs once the last UCC closed for the day. However, this effect was found only among privately insured patients, and there was no significant difference in low-acuity ED visits in areas with only one UCC. The authors posited this latter finding may be a result of a single UCC having insufficient capacity to make a substantial impact on ED visit rates. However, these results are promising in that they suggest that UCCs can serve as a substitute for the ED setting when it comes to the treatment of low-acuity conditions.

While the aforementioned studies focus on the proximity of the *UCC* to the ED, Carlson and colleagues (2020) instead examined the link between *patient* proximity to the UCC and the likelihood of an ED visit for a low acuity condition. The authors developed a geospatial database reflecting ED visits to two academic medical centers in a large, urban integrated health system over a two-year period. They applied logistic regression to estimate the relationship between patients' UCC proximity (defined as living within a mile of a hospital-affiliated UCC), ED diagnosis, and the likelihood of a low-acuity ED visit. UCC proximity was found to be associated with a decrease in the likelihood of a low-acuity ED visit at one of the academic medical centers; however, no significant difference was observed at the other medical center.

Finally, a Chilean study by Pacheco, Cuadrado, and Martínez-Gutiérrez (2019) offers some support for hospital investment in UCCs as a solution to ED overcrowding. This natural experiment assessed the impact of the implementation of a UCC in local health districts on total

ED and primary care visits, and found that UCC implementation was associated with a significant reduction in ED visits. While the quasi-experimental design of this study is certainly a strength, its context in Chile's public health system does make these findings difficult to generalize to the U.S. health care delivery system. Additionally, the study revealed a potential downside of UCC implementation; the authors found that UCC implementation was also associated with a significant reduction in primary care visits, concluding that UCCs could also serve as a substitute for primary care and potentially negatively impact quality and continuity of care.

In sum, the current stream of literature surrounding UCCs and low-acuity ED visits is sparse and has produced mixed results. Additionally, the scope of these studies has typically been limited to a few hospitals in a small geographic area, making results difficult to generalize. Further research is needed to provide clarification and insights.

Impact of Other Convenient Care Models on ED Visits.

Given the lack of research focusing on urgent care facilities, this section examines the literature on retail clinics and freestanding EDs, as well as primary care offices offering after-hours care, and the relationship of these to ED utilization. These organizations offer similar benefits as UCCs such as extended hours and/or walk-in appointments, and can provide some insight as to the potential for UCCs to reduce low-acuity ED visits.

Within the retail clinic literature, Alexander, Currie, and Schnell (2019) examined the impact of patient proximity to a retail clinic on ED visits for a subset of minor, primary care treatable conditions including influenza, sprains and strains, and urinary tract infections. In this individual level-analysis of ED visits in New Jersey from 2006 to 2014, the authors found that individuals living in close proximity to an open retail clinic were up to 12% less likely to visit the ED for these low-acuity conditions. Similarly, Hollingsworth (2014) found that access to a Florida retail clinic within 5 miles of an ED reduced annual visits to the ED for bronchitis by 10% and acute respiratory clinics by almost 15%. The freestanding ED literature tells a similar story. Simon and colleagues (2012) found that the opening of two freestanding EDs significantly decreased total monthly patient volume in a hospital's main ED.

On the extended primary care side, a recent pilot project by the Neighborhood Health Plan found that expanding community health center hours on night and weekends was associated with an 8% reduction in ED visits within 18 months (NEHI, 2018). An Australian study by Buckley, Curtis, and McGirr (2010) found that the opening of an after-hours general practitioner clinic was associated with a significant reduction in daily presentations of low-acuity patients in the ED. Similarly, Whittaker and colleagues' (2016) study in the United Kingdom found that extending primary care opening hours was associated with over a 25% reduction in ED visits for low-acuity conditions in the first year, although the reduction in total ED visits was insignificant. All of these study findings support the notion that investment in a proximally located convenient care model may bring about a reduction in the presentation of low-acuity visits in a hospital's ED.

However, not all existing literature supports the notion that convenient care models reduce low-acuity visits. Martsolf and colleagues' (2016), in particular, found that the concentration of retail clinics located near a hospital was not associated with a significant reduction in low-acuity visits to the ED. However, the current study will focus on UCCs, which are able to treat more complex conditions than can be treated in a retail clinic setting, and thus are a closer substitute for the ED. Accordingly, a greater reduction in low-acuity visits is anticipated.

At an even more fundamental level, there is still much disagreement as to whether low-acuity visits are a true driver of ED overcrowding. It has even been deemed a persistent "myth" behind the problem, with numerous studies supporting this argument (LaCalle & Rabin, 2010; Morley et al., 2018; Richardson & Mountain, 2009). A study by Schull and colleagues (2006) found that the volume of low-acuity patients was not associated with a significant increase in ED length of stay or time until initial physician contact for higher-acuity ED patients. As a result, the authors concluded that reducing the volume of low-acuity patients will not significantly impact ED crowding.

Derlet and Richards (2000) argued that it is actually higher-complexity and higher-acuity patients that are the major contributor to ED overcrowding. They posited that as the portion of the population with chronic diseases and comorbidities increases, these patients not only present at the ED more frequently to address complications, but they also require a longer and more complicated evaluation process, creating congestion in the ED. LaCalle and Rabin's (2010) systematic review of literature on frequent ED users provides corroborating evidence for this argument. Their study findings suggested that it is actually repeat ED users with chronic illnesses, as opposed to those with low-acuity conditions, which are the true source of ED overcrowding. Similarly, Woodrum (2016) suggested that hospital investment in chronic care clinics, as opposed to UCCs, may actually be the solution that is needed to effectively address ED overcrowding. Thus, it is possible that any impact hospital investment in UCCs may have on ED overcrowding may be limited.

Patient Receptiveness to Urgent Care Centers.

However, assuming low-acuity visits *are* a key driver of ED crowding, reducing ED overcrowding via a hospital owned UCC would still require that patients be receptive to seeking care for nonurgent conditions in the urgent care rather than the ED setting. A recent study by Corwin and colleagues (2016) examining the care-seeking behaviors of the Medicare population suggested that this may be the case. The study found that Medicare beneficiaries were 6 times more likely to seek care for non-urgent conditions in urgent care centers compared to emergency departments. Additionally, Merritt and colleagues (2000) found that once patients in a New York hospital visited a UCC for the first time, their UCC visits increased by nearly 50% while their nonemergent ED use decreased without negatively impacting hospitalization rates. Accordingly, there is promise that hospitals can successfully divert a large volume of low-acuity patients to a hospital-owned UCC and see significant improvements in ED overcrowding.

That being said, in order for UCCs to improve ED overcrowding, patients must be able to discern the severity of their condition and which setting – the UCC or ED - would be better equipped to treat them. Coyle (2017) noted that self-triage can be a difficult task for patients, especially when their injury or illness heightens their emotional state. As a result, some patients may prefer to refer themselves to the ED rather than engage in the self-triage process (Jaffe, Kocher & Ghaferi, 2018; Uscher-Pines et al., 2013).

Summary of Literature Gap.

ED overcrowding is a serious problem facing many hospitals, and has substantial negative consequences for both patients and hospital employees. A handful of studies have suggested that low-acuity ED visits are a major driver behind ED overcrowding (Asplin et al., 2003; Cheney, 2015; Weinick et al., 2010). The present study argues that hospitals may be able to reduce ED overcrowding by redirecting low-acuity patients to a hospital-owned UCC.

Numerous studies have suggested there is potential for convenient care models such as UCCs and retail clinics to play a role in reducing low-acuity visits (Alexander, Currie, &

Schnell, 2017; Allen, Cummings, & Hockenberry, 2019; Hollingsworth 2014; Pacheco, Cuadrado, & Martínez-Gutiérrez, 2019). However, other studies have had contradictory findings (Ashwood et al., 2016; Martsolf et al., 2017). The current study aims to bring clarity to the impact of convenient care models on ED overcrowding by investigating the role of hospital-owned UCCs in reducing low-acuity visits.

Empirical research on UCCs is severely lacking, largely due to limited data sources on urgent care facilities. While a few inaugural studies have examined the link between UCC proximity and ED visits (Allen, Cummings, & Hockenberry, 2019; Carlson et al., 2020; Llovera et al., 2019; Pacheco, Cuadrado, & Martínez-Gutiérrez, 2019), no study to date has examined whether hospital investment in urgent care is associated with a reduction in low-acuity ED visits. This study aims to fill this gap in the literature.

Investment in Urgent Care: Impacts on Service Area and Referral Growth

Hospitals may also see investment in urgent care as an opportunity to achieve service area and referral growth. The subsequent section summarizes the relevant literature on this competitive strategy, known as geographic service expansion, and identifies critical gaps in the literature.

Geographic Service Expansion.

In past decades, hospitals have primarily competed by providing niche, specialty services (e.g. cardiac or cancer care) or advanced technology to attract new patients; however, a more popular strategy in recent years has been geographic service expansion (Carrier, Dowling & Berenson, 2012; Girdley & Jones, 2017; Landro, 2016). In this newly dubbed "geographic expansion race," hospitals aim to expand their services into new geographic market areas – often suburban areas on the outskirts of their typical market area with a fast-growing population or predominately populated with younger, affluent, and/or well-insured patients (Carrier, Dowling,

& Berenson, 2012; Felland, Grossman, & Tu, 2011). The ultimate goals of this geographic competitive strategy are to attract new patients and funnel them into the hospital's network of lucrative services (Carrier, Dowling, & Berenson, 2012; Felland, Grossman, & Tu, 2011; Patidar et al., 2017).

Hospitals can take several different approaches to geographic service expansion. For instance, hospitals can acquire or establish a new physician practice or hospital, or establish regional emergency medical transport systems (Carrier, Dowling, & Berenson, 2012). However, an increasingly popular approach is to establish a freestanding outpatient care setting, such as a UCC or freestanding ED, that enables financially advantageous patients to initially engage with the hospital system without physically coming to the hospital (Kutscher, 2012). The resulting referrals from these care settings then generate additional patient volume for other hospital service providers, which in turn increase the hospital's market share and, ultimately profit margin (Carrier et al., 2012).

According to the Healthcare Financial Management Association (HFMA), one of the key factors driving hospital investment in freestanding EDs is that they enable the hospital to enhance referrals and patient volumes for hospital-based services. Moreover, it enables hospitals to achieve this growth without incurring significant capital costs associated with building a new hospital.

In interviews with hospital leaders, Carrier and colleagues (2012) found that some hospitals specifically establish freestanding EDs in outlying communities near competing facilities in order to siphon both emergent cases and inpatient admissions from their competitors. This strategy is successful because the freestanding ED is able to transfer patients requiring further care to the affiliated hospital, regardless of the proximity of the competing hospital. They also found that hospitals may employ this strategy as means to gain a "first mover" advantage in a previously unreached, but growing community. Finally, the interview evidence also suggested that investment in freestanding EDs has improved hospital financial performance through increased referral volume.

Summary of Research Gap.

To the author's knowledge, there have been no studies to date quantifying the impact of hospital investment in UCCs on referral or patient volumes for downstream hospital services. The empirical literature that does exist is severely limited and primarily focused on hospital characteristics associated with investment in freestanding EDs or where hospitals chose to locate their freestanding EDs. For example, Patidar and colleagues (2017) found that larger hospitals, system members, and hospitals operating in more munificent and competitive environments were more likely to operate a freestanding ED. Schuur and colleagues (2016) found that freestanding EDs preferentially located in areas with higher proportions of the population with private insurance, higher median income, and higher rates of population growth. However, such studies have not examined how investing in such convenient care models impact hospital operations. This study addresses this gap by being the first to examine the impact of hospital investment in UCCs on patient volumes for two key hospital services to which UCC providers commonly refer: outpatient care and ambulatory surgeries.

Chapter 3. Conceptual Framework

Overview of Chapter

The purpose of this chapter is to develop the conceptual framework addressing the study aims put forth in Chapter 1. This study employs a multi-theoretical framework integrating Strategic Management Theory and Contingency Theory to examine the relationship between investment in urgent care and three aspects of hospital performance: the volume of low-acuity ED visits, outpatient visits, and ambulatory surgeries. First presented is an overview Strategic Management Theory, followed by an overview of Contingency Theory. Next, areas of overlap and distinction between the two theories are presented. Strategic Management Theory is then applied to establish a relationship between environmental conditions in the hospital industry, investment in urgent care, and operational performance. This is followed by a first set of hypotheses for study Aims 1-3. Contingency Theory is then adapted to the study to account for the moderating effect of two contingency factors, hospital financial pressure and stressed ED capacity, on the relationship between hospital strategy and operational performance. Then a second set of hypotheses for study Aims 1-3 are articulated.

Strategic Management Theory

The foundations of Strategic Management Theory (SMT) are often traced back to

Chandler's (1962) *Strategy and Structure.* In this seminal work, Chandler asserted that an organization's strategic changes are "responses to opportunities or needs created by the external environment (Hoskisson, 1999, p.422)" and that strategic change leads to structural change. Other foundational works from Ansoff (1965) and Andrews (1971) emphasized the situational nature of organizations and evaluated the relationship between environmental conditions and strategic decision making. Subsequently, the 1970s saw the emergence of strategic management as a formal management subdiscipline with studies such as Child (1972) and Miles and Snow (1978) focusing on the question of why some firms succeed and others fail (Boyd et al., 2012). The study of organizational strategy continues to focus on this question, or alternatively, why some organizations experience better performance than others (Boyd et al., 2012).

The strategic management perspective addresses how organizations adapt to changing environmental conditions through strategic decision making. Chakravarthy (1982) defined strategic management as the "process of continuously adapting to the changes in a firm's environment…through which a manager ensures the long-term survival and growth of a firm (p.35)." Therefore, looking at the ability of organizations to continuously adapt to environmental changes is key to understanding why some organizations succeed and others fail.

A key assumption of SMT is that an organization selects, interprets, responds to, and shapes its environment through its strategy as a means to gain competitive advantage (Keats & Hitt, 1988). As external threats and opportunities arise, organizations adopt new strategies in order to achieve fit between their environment and organizational competencies, structure, and conduct (strategy). The better the fit, the better the strategic positioning of the firm and the greater the competitive advantage (Chakravarthy, 1982; Porter, 1991).

SMT's emphasis on evaluating external threats and opportunities as an initial step in the strategy formulation process reflects its basis in the market structure view of the firm; however, the strategic management perspective also adopts aspects of the resource-based view of the firm. This is reflected in the subsequent step in the strategy formulation process – an internal assessment of the organization's strengths and weaknesses, including an evaluation of the organization's resources, capabilities, and activities. Once these two steps are completed, managers formulate strategies and commit certain organizational resources to enacting those chosen strategies, leading to improved performance and sustained competitive advantage (Luke et al., 2004).

Another key assumption of SMT is that a firm's organizational structure is the mechanism through which strategic change is implemented. Successful strategy implementation requires an appropriate organizational structure be in place that enables mobilization of resources and alignment of organizational activities to the selected strategy (Hoskisson et al., 1999; Porter, 1991). Accordingly, structure follows strategy, and thus the fit between the two impacts performance. Structural changes lead to behavioral changes that ultimately impact performance; in this way, structure can contribute to competitive advantage (Scott & Davis, 2007).

Although SMT directly addresses the role that strategic decision-making plays in the alignment between organizations and their environments, it is often criticized for a "lack of clear theoretical formulations and coherent arguments" (Shay, 2014, p. 115) when compared to other organizational theories. Hofer (1975) suggested that this lack of simple, coherent argument may be attributable to scholars' assumption that strategy is situational. Alternatively, it may also be attributable to SMT being a collection of elements from multiple theoretical perspectives (e.g. population ecology, transaction cost economics, agency theory) as opposed to a true, stand-alone theory (Shay, 2014). However, Hoskisson and colleagues (1999) asserted that the complex nature of strategy problems actually requires that strategic management be a "multi-paradigmatic discipline, requiring varied theoretical perspectives and methodologies…in order to help explain firm performance (p.444)." Thus, despite such criticisms, SMT continues to prevail as a fundamental macro-organizational theory that enables scholars to recognize the role of manager's agency to respond to changes in the organization's environment, improve performance, and attain competitive advantage (Shay, 2014).

SMT did not become popular with health services researchers until dramatic environmental changes rocked the health care industry beginning in the 1970s and continuing through the 1990s (Luke & Begun, 1988; Luke et al., 2004; Kimberly & Zajac, 1985; Shay, 2014). Since then, numerous scholars have applied SMT to study health care organizations. For example, SMT has been used in studies to examine whether environmental changes predict changes in hospital strategy as well as investigate the association between organizational characteristics and hospital strategy selection (Ginn, 1990; Luke & Begun, 1988; Mick et al., 1993). Additional studies have applied SMT to examine the influence of reimbursement policy changes on multiple facets of hospital performance (Jiang et al., 2006; Trinh & O'Connor, 2002; Zajac & Shortell, 1989).

It is widely noted that some key tenets of SMT – particularly its emphasis on fit as a determinant of performance and the assertion that there is no one best strategy for all organizations - closely mirror the central tenets of Structural Contingency Theory (Bourgeois, 1980, 1985). The subsequent section describes the key tenets of Contingency Theory, and is followed by a brief discussion of the similarities and differences between the two theories.

Contingency Theory

Coined by Lawrence and Lorsch (1967), "Contingency Theory" (also known as

Structural Contingency Theory) emerged in the late 1950s and early 1960s as part of the burgeoning open systems view of organizations, acknowledging that an organization's environmental context influences behavior and performance (Mick & Shay, 2014; Scott & Davis, 2007). Contingency Theory (CT) asserts that the degree of fit between organizational characteristics, such as strategy and structure, and environmental demands influences performance (Donaldson, 2001). CT also argues that there is no one "best" way to organize and that not all ways of organizing are equally effective (Scott & Davis, 2007). This is because organizations are subject to various contingencies, which may be internal or external to the organization, that place different requirements on organizations. Therefore, there may be "better" ways of organizing depending upon the nature of the organization's contingencies (Mick & Shay, 2014).

Contingencies reflect the unique situations of organizations and help to explain variations in their performance. High levels of performance result from fitting organizational characteristics to these contingencies. When an organization's strategy or structure do not fit the level of contingency, performance suffers (Lawrence & Lorsch, 1967; Scott & Davis, 2007). Accordingly, contingencies can be defined as factors that moderate the relationship between organizational characteristics and performance. Early CT studies primarily focused on technology (Hage & Aiken, 1969), strategy (Chandler, 1962), organizational size (Child, 1975), and environmental stability (Burns & Stalker, 1961) as contingency factors influencing the relationship between organizational structure and performance (Donaldson, 2001). This list of contingencies has since expanded to include factors such as geography, cultural differences, and resource dependency (Lawrence, 1993; Scott & Davis, 2007).

Donaldson (1995, 2001) made significant contributions to another key element of the contingency perspective - the concept of fit - through his development of the structural-adaptation-to-regain-fit (SARFIT) model. The model asserted that an association exists between contingency and organizational structure such that the two can exhibit fit or misfit; the fit between contingency and structure positively influences performance. Contingency change creates a state of misfit, lowering performance. This leads to adaptive, organizational structural change to regain fit and maintain previous performance levels. Given that environmental changes will continue to occur, organizations will continually ebb and flow out of states of fit and misfit, and organizational structures will continually change in response (Donaldson, 2001; Shay, 2014).

However, one of the criticisms of CT is that the argument surrounding fit and performance is a tautology: fit is positively associated with performance because fit is the combination of contingency and structure that produces high performance. Other critics also express concern that the concept of fit is ill-defined in its measurement. An additional criticism is that the theory puts forth descriptions of the environment that are too simplistic, and thus, requires the theory be supplemented with other perspectives to accurately model environmental conditions (Donaldson, 1995, 2001). However, despite such criticisms, CT remains one of the most widely used organizational theories and is an important member of the organizational theory "canon" (Mick & Shay, 2014; Scott, 2003; Scott & Davis, 2007).

Health services researchers have leveraged CT to examine a variety of structure-contingency-performance relationships. Early studies include examination of input uncertainty and coordination in the emergency department setting (Leatt & Schneck, 1984) and the fit between technical and nursing subunit organization (Alexander & Randolph, 1985). More recent studies include Schneider and colleagues' (2019) investigation of the association between environmental and organization contingencies and hospitals' use of strategic human resource management for physicians and nurses as well as Palazollo and Ozcan's (2018) study examining the association between the use of electronic health records by primary care providers and ACO operational performance. Other recent studies include Trinh and Begun's (2017) study examining the relationship of two contingency factors – health system membership and market competition – with the diffusion of elective services and equipment as well as Shay and Ozcan's (2013) study of the relationship between inpatient rehabilitation facility structural fit and performance following Medicare regulation changes. Given the uncertainty introduced to the health care industry in recent years by forces such as the Affordable Care Act, opportunities to leverage CT to examine structure-contingency-performance relationships continue to abound.

Areas of Overlap and Distinction: SMT and CT

Some scholars (e.g. Donaldson, 2001) have failed to recognize strategic management as a distinct theory, and have instead advocated for a "strategic contingency" framework within which organizational strategy is viewed as a contingency factor influencing the fit-performance relationship. The present study, however, adopts the perspective that SMT is distinct from Structural Contingency Theory. On the most basic level, SMT focuses on the fit between organizational *strategy* and the environment, with structure being an outcome of strategy and a means to support strategy implementation; Structural Continency Theory, on the other hand, directly examines the relationship between organizational *structure* and the environment (Shay, 2014). Thus, while the two theories may overlap, they are fundamentally distinct (Zajac et al., 2000).

Additional scholars have offered support for a distinction between the two arguments at a deeper level, primarily focusing on Structural Contingency Theory's lack of attention to the agency of organizational decision makers. Child (1972), for instance, criticized Structural

Contingency Theory for its failure to recognize the ability of managers to exercise "strategic choice" and influence the relationships between organizational structure, environmental demands, and performance. He argued that "strategic choice" rather than structure "is the critical variable in a theory of organizations" (p. 15) and called for recognition of how strategic decisions influence organizational design and shape the organization's environment.

Adaptation of SMT

This study applies SMT to establish a link between changing environmental conditions, hospital investment in urgent care, and improvements in aspects of hospital operational performance. The conceptual framework (Figure 1) proposes that the U.S. hospital industry faces changing environmental conditions. In particular, the industry faces a resurgence of convenient care models in response to increasing healthcare consumerism, with private firms establishing clinics to capitalize on increasing consumer demand for convenient, affordable health care services and improved patient experience (Stempniak, 2015). Hospitals are also operating in an environment where UCCs are becoming an increasingly popular choice for patients seeking low-acuity care due to limited capacity in the primary care system. This limited capacity can largely be attributed to a shortage of primary care providers coupled with an increased insured population post-Affordable Care Act (Janke et al., 2015).

This increasing popularity of UCCs presents several opportunities for hospitals. On one hand, UCCs may be a solution for hospitals eager to reduce ED overcrowding. Investment in a UCC may enable hospitals to divert low-acuity patients from the ED to the urgent care setting, freeing up ED capacity while still delivering quality care in a fraction of the cost and time. On the other hand, UCCs also present the opportunity for hospitals to increase their market share of hospital services such as ambulatory surgery and outpatient care. UCCs opened in new geographic service areas can attract new (and potentially more profitable) patients into the hospital's network of hospital services that may have instead gone to a competitor's facility. Moreover, integrating UCCs into their continuum of care creates an opportunity to refer UCC patients to other hospital services and manage their downstream care delivery, thus driving increases in hospital-based outpatient services.

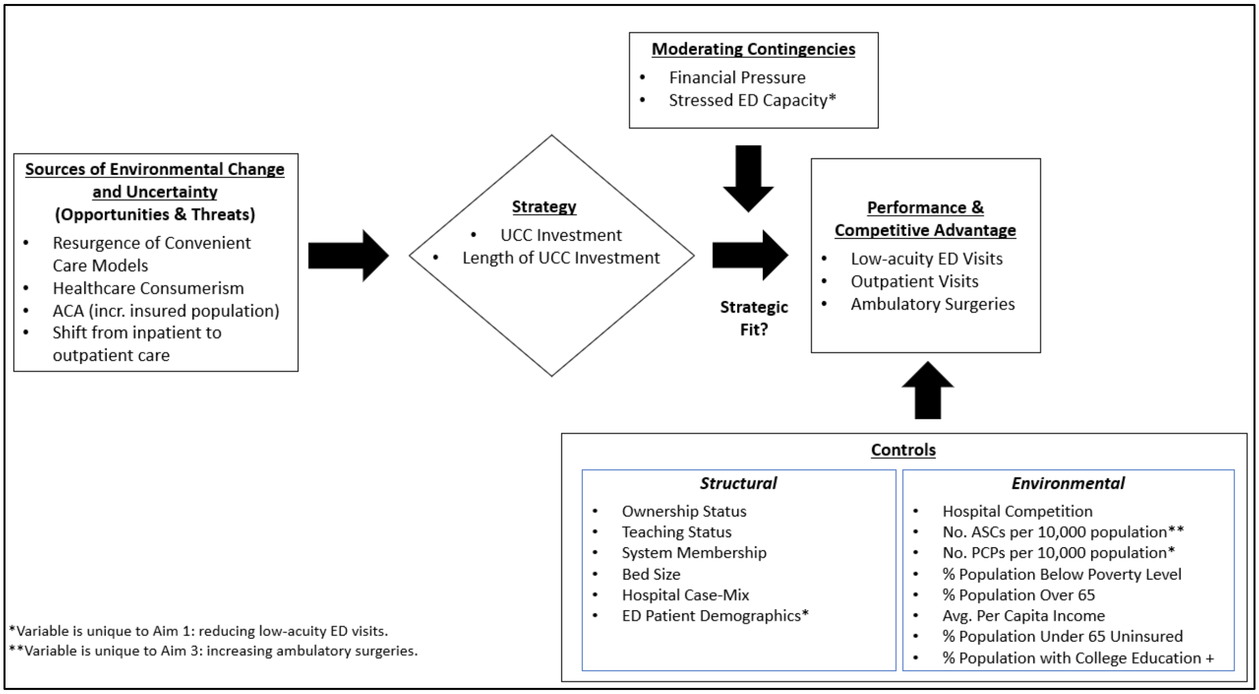

Figure 1. Integrated Conceptual Framework

Under current environmental conditions, hospitals face a strategic opportunity to invest in urgent care in order to achieve the best fit with environmental demands; this "fit" leads to improved operational performance and competitive positioning. For purposes of this study, improved operational performance is examined in three respects: a reduction in low-acuity ED visits, increased volume of outpatient care visits, and increased volume of ambulatory surgeries. Accordingly, it is hypothesized that:

Hypothesis 1 (Aim 1): Hospital investment in urgent care is associated with a reduction in low-acuity visits to the emergency department.

Hypothesis 2 (Aim 2): Hospital investment in urgent care is associated with an increase in the volume of outpatient hospital visits.

Hypothesis 3 (Aim 3): Hospital investment in urgent care is associated with an increase in the volume of hospital-based ambulatory surgeries.

Adaptation of Contingency Theory

The conceptual framework for this study (Figure 1) applies CT to account for the moderating effect two key contingencies (hospital financial pressure and stressed ED capacity) may have on the relationship between hospital strategy (investment in urgent care) and operational performance.

Hospital Financial Pressure.

Financial pressure on hospitals can stem from a variety of sources, both internal and external to the organization. For example, hospitals that own and operate a health plan must effectively operate as cost-conscious insurers. Similarly, hospitals operating in markets with higher levels of managed care penetration face greater pressure to reduce costs than hospitals in markets with lower managed care penetration because of selective contracting practices that result in lower negotiated prices (Devers et al., 2003; Dugan, 2014; Jiang, Friedman, & Jiang, 2013).

In recent years, financial pressure on hospitals has reached unprecedented levels as public payers have continued to constrain spending growth for health care services while private payers have simultaneously demanded significant price discounts and enacted volume controls (Felland, Cunningham & Cohen, 2010; Hadley et al., 1996; Litvak & Bisognano, 2011; Nurettin Oner et al., 2016; Orszag & Emanuel, 2010; Wilson & Cutler, 2013). Additionally, as technological advancement continues to shift services from the inpatient to outpatient setting, hospitals are increasingly forced to compete with other hospitals as well as outpatient providers to, at minimum, maintain patient volumes and revenue (Hadley et al., 1996; Kutscher & Evans, 2013; Shi & Singh, 2013). Accordingly, hospitals must "respond to the dual dilemma of greater constraints on their revenues and stiffer competition for patients [that] will affect…how many of them remain financially viable... (Hadley et al., 1996, p. 205)."

Under conditions of financial pressure, hospitals seek to implement strategic changes that can help (1) control costs and/or, depending on the source of pressure, (2) offset costs by increasing revenue in order to maintain or improve performance (Hadley et al., 1996). As discussed in preceding sections, hospital investment in urgent care has the potential to be both an effective cost-cutting strategy (enabling redirection of low-acuity patients to the more cost-effective urgent care setting) as well as a means to increase hospital revenue (generating new patients and facilitating management of subsequent downstream referrals). Thus, this conceptual framework proposes that hospitals that invest in urgent care exhibit fit with the contingency of financial pressure.

The conceptual framework also proposes that hospital operational performance will vary according to the degree of fit between UCC investment and the *level* of financial pressure. More specifically, this study argues that the greater the financial pressure facing a hospital, the greater the fit with the strategy of UCC ownership. Hospitals facing higher levels of financial pressure have greater motive to deploy resources and make process changes that support successful implementation of the UCC investment strategy in pursuit of curbing and/or offsetting costs. These hospitals, for instance, may make greater efforts to design programs that effectively educate patients about conditions that can be treated in the urgent care versus ED setting.

Alternatively, these hospitals may devote more resources into developing marketing communications to attract new patients to the UCC. Consequently, this study predicts that hospitals operating under higher levels of financial pressure will reap greater benefits from investing in urgent care than hospitals with lower levels of financial pressure.

Accordingly, it is hypothesized that:

Hypothesis 4 (Aims 1-3): Hospital financial pressure will moderate the association between hospital investment in urgent care and operational performance such that the greater the financial pressure, the greater the reduction in low-acuity ED visits and the greater the increase in the volume of outpatient visits and ambulatory surgeries.

Stressed ED Capacity.

Overcrowding is a common problem facing hospital EDs, and is associated with significant negative consequences for patients. When demand for emergency health care services exceeds capacity (in other words, when EDs are operating under conditions of stressed capacity), patients can experience prolonged waiting times, increased suffering, and adverse clinical outcomes (EB Medicine, 2011; Pines et al., 2008). Low-acuity visits to the ED, which can also be treated in an urgent care setting, have been identified by some research as a key contributor to ED overcrowding (Asplin et al., 2003; Cheney, 2015; Weinick et al., 2010). Hospital investment in urgent care creates an opportunity for EDs to redirect these low-acuity patients to the more appropriate urgent care setting and free up capacity to treat truly emergent cases. Thus, the conceptual framework (Figure 1) posits that the strategy of hospital investment in urgent care exhibits fit with the contingency of stressed ED capacity. This study's conceptual framework also argues that reductions in low-acuity ED visits will vary according to the degree of fit between UCC investment and the *level* of stressed ED capacity.

Hospitals must take action to shift low-acuity care from their ED to a hospital-owned UCC. For example, hospitals may need to train ED providers to educate patients about when to seek low-acuity care at the UCC. A hospital's motivation to make such efforts may vary depending on whether its ED is operating at, under, or overcapacity. This is because while low-acuity patients can be treated in a fraction of the time in the urgent care setting, low-acuity patient visits to the ED also often offer high margins, helping to offset high ED operational costs and losses (Cheney, 2015). This study argues that hospitals that value relief of capacity constraints over higher visit margins may regard low-acuity ED visits more unfavorably than others. Their primary operational concern is relieving their capacity constraints, and thus they are eager to deploy the necessary changes to help redirect these patients to a hospital-owned UCC. Hospitals with EDs operating at or under capacity, however, may view low-acuity ED visits favorably as they are not facing significant capacity constraints. Moreover, hospitals whose EDs have *excess* capacity may even be interested in keeping at least some portion of low-acuity visits in the ED to take advantage of their high margins and financial benefits.

Thus, the study posits that the strategy of hospital investment in urgent care exhibits the *greatest* degree of fit with hospitals that have capacity constrained EDs, and that these hospitals will experience higher levels of performance when compared to hospitals with EDs at or under capacity. Consequently, it is hypothesized that:

> **Hypothesis 5 (Aim 1):** Stressed ED capacity will moderate the association between hospital investment in urgent care and operational performance, such that hospitals with EDs operating under greater degrees of stressed capacity will experience a greater reduction in low-acuity ED visits.

Accounting for Other Influences on Operational Performance

SMT and CT recognize that both organizational context and the nature of the external environment influence organizational strategy and performance. Accordingly, it is important to account for other factors that may also influence hospital volumes of low-acuity visits, outpatient visits, and ambulatory surgeries in the conceptual framework. At the hospital-level, these factors include hospital bed size; type of ownership; teaching status; system membership; and hospital case-mix (Courtemanche & Plotzke, 2010; Martsolf et al., 2017). The first four hospital-level factors are primarily (though not exclusively) included to account for the fact that larger hospitals will tend to exhibit larger service volumes (and nonprofit, teaching, and system-affiliated hospitals tend to be larger). Hospital case-mix is included as a proxy for ED/outpatient care case-mix in order to account for the influence of patient acuity on hospitals' overall service volumes. ED patient demographics, aggregated to the hospital level, are also included as control variables for Aim 1 only (low-acuity ED visits). In particular, gender, age, race/ethnicity, and insurance status are included because they are known to influence the likelihood of nonurgent ED use (He et al., 2011; Uscher-Pines et al., 2013).

Several market factors are also included in this study, with the market defined as county. Hospital competition is included in order to control for the competitive environment of the hospital's ED, outpatient care, and ambulatory surgery services. The number of primary care physicians per 10,000 population (a measure of primary care physician supply), is included in the analysis for Aim 1 to control for the primary care system capacity; lower capacity may be negatively associated with low-acuity visits to the ED. Additionally, the number of ambulatory surgical centers (ASCs) per 10,000 population in is included as a unique control for Aim 3 (ambulatory surgeries), as the presence of ASCs in the market can reduce hospitals' ambulatory surgery volumes (Bian & Morrisey, 2006; Courtemanche & Plotzke, 2010).

Finally, factors that reflect the resource availability in the hospital environment and may affect demand for a hospital's services are included as market-level controls. These include average per capita income; percentage of the population below the poverty level; percentage of the population over 65; percentage of the population under 65 without health insurance; and percentage of the population with a college education (Bian & Morrisey, 2006; Martsolf et al., 2017). All of the aforementioned hospital (structural) and market (environmental) control variables are captured in the conceptual framework, as shown in Figure 1.

Summary of Conceptual Framework

The conceptual framework (Figure 1) put forth in this dissertation posits that environmental change and uncertainty influence a hospital's strategic decision to invest in urgent care. Moreover, the framework posits that choosing to invest in urgent care enables hospitals to improve operational performance and achieve sustained performance and competitive advantage. Hypotheses 1 through 3, which link UCC investment variables (hospital strategy) to low-acuity ED visits, outpatient visits, and ambulatory surgeries (performance and competitive advantage), respectively, are derived using SMT. Hypotheses 4 and 5 capture the posited moderating effects of financial pressure and stressed ED capacity, and are derived separately using CT.

Chapter Summary

This chapter presented the study's conceptual framework, which integrates SMT and CT, and developed five testable hypotheses linking investment in urgent care to improved hospital operational performance. The subsequent chapter operationalizes this framework for empirical analysis. More specifically, Chapter 4 develops variables and measures from the conceptual framework and presents the various analytical methodologies used to test the hypotheses for all three study aims.

Chapter 4. Methodology

Overview of Chapter Structure

Chapter 4 begins with a description of the data sources and study samples for all three study aims. Next, the measures for dependent, independent, moderator, and control variables are presented. Finally, the analytical methodologies used to test the hypotheses for each study aim are discussed. This includes an overview of descriptive analysis, regression methodology, postestimation, and sensitivity analysis.

Data Sources

This study uses a combination of publicly and privately maintained health care databases frequently used in health services research. Data on hospital investment in urgent care (including length of investment) come from the American Hospital Association's (AHA's) Annual Survey of Hospitals. The AHA database provides comprehensive data on a nationally representative sample of approximately 6,200 hospitals and 400 hospital systems, including fields related to physician arrangements, hospital organizational structure, service lines, and service utilization (American Hospital Association, 2020). The AHA Annual Survey database is also the source of data for volumes of outpatient visits and ambulatory surgeries.

ED visit data primarily come from the Healthcare Cost and Utilization Project (HCUP) Statewide Emergency Department Databases (SEDD), sponsored by the Agency for Healthcare

Research and Quality (AHRQ), for the following states: California, Florida, New York and New Jersey. This data source captures information about treat-and-release visits to hospital emergency departments including all diagnoses, patients' expected payment source, and patient demographics (e.g. race, age). As California ED data is only available in HCUP for years 2010 and 2011, treat-and-release visit data for years 2012 through 2015 are obtained directly from the State of California through the California Office of Statewide Health Planning and Development (OSHPD). This data source is similar in format to the HCUP SEDD, although it does not include data related to ED length of stay (e.g. admission or discharge hour). All ED data are aggregated to the hospital-level for analyses. AHA data are merged with the HCUP SEDD data using the unique AHA hospital ID. AHA data and OSHPD CA ED data, on the other hand, are merged using the hospital's Medicare Provider Number.

The publicly available Area Health Resource File (AHRF) is the source of data for market-level variables. AHRF provides county-level data relating to health care access, including population characteristics and data on health facilities and health care professions supply/demographics (Healthy People, 2020). For purposes of this study, a hospital's "market area" is defined as the county in which a hospital operates. Market-level data are merged with hospital-level data using the county-unique Federal Information Processing Standards (FIPS) code.

Study Population and Sample

This study is conducted at the hospital level of analysis for all study aims. The population of interest for all study aims is non-federal, general acute care hospitals across the U.S.

Aim 1 Study Sample.

The study sample for Aim 1 is comprised of a convenience sample of 630 non-federal, general-acute care hospitals in California, Florida, New York, and New Jersey for years 2010 through 2015. Limited funding resources coupled with high ED visit data costs restrict the Aim 1 study sample to these select states. However, as ED length of stay data is not available for California through the OSHPD, a second study sample using only the hospitals in Florida, New York, and New Jersey is also employed for Aim 1 moderator analysis. This three-state sample is comprised of 393 non-federal, general-acute care hospitals. All hospitals with missing data for required variables were eliminated from the study sample.

Aims 2 and 3 Study Sample.

Separate study samples are used for Aims 2 and 3. Theses samples include all hospitals in the Aim 1 study sample, but are expanded to also include a convenience sample of all non-federal, general acute-care hospitals in six additional states: Illinois, Michigan, North Carolina, Ohio, Texas, and Wisconsin. These states are selected based on their high volume of hospitals owning UCCs during the study period and provide more widespread geographic representation in the sample. The resulting Aim 2 study sample is comprised of 1,149 hospitals and the Aim 3 study sample is comprised of 1,433 hospitals. Again, all hospitals with missing data elements are eliminated from the study, leading to the different sample sizes for Aims 2 and 3.

Variable Measurement

Dependent Variables.

The dependent variable for Aim 1 is the ratio of low-acuity treat-and-release ED visits to total treat-and-release ED visits. Note that this study only examines treat-and-release ED visits for adult patients (age 18 and older). This study focuses on select low-acuity conditions that commonly present in the urgent care setting and account for approximately 66.7% of annual UCC visits (Martsolf et al., 2016; Weinick et al., 2010). These low-acuity conditions are:

cellulitis or abscess; contusion; dental condition; dislocation or sprain; fracture; joint and muscle pain, tendonitis, or bursitis; laceration; and urinary problem other than UTI. ICD-9 (ICD-10 for year 2015) diagnosis codes listed on ED claims are used to identify low-acuity conditions (see Table 1 for a full list of diagnosis codes). Claims data for treat-and-release ED visits come from the Healthcare Cost and Utilization Project (HCUP) Statewide Emergency Department Database (SEDD) for Florida, New York and New Jersey and from a combination of HCUP SEDD and the Office of Statewide Health Planning and Development ED Database for the state of California. Approximately 97 million ED claims records over the study period are aggregated to the hospital level to create the dependent variable. The dependent variables for Aims 2 and 3 are the volume of outpatient hospital visits and hospital-based ambulatory surgeries, respectively, each calendar year as reported in the AHA's Annual Survey database.

Explanatory Variables.

The independent variable of interest for all study aims is UCC investment; however, UCC investment is operationalized in two ways. First, there is a time-varying, binary UCC investment variable which is set to "1" for each year of the study in which a hospital reports owning a UCC in the AHA Annual Survey and is zero otherwise. The second operationalization of UCC investment is the length of UCC ownership. This is defined as the number of years a hospital has owned a UCC since year 2000. The choice of the year 2000 was necessary because this study only had access to AHA Annual Survey Data from that year forward. Length of ownership is thus calculated by identifying the years in which a hospital reported owning a UCC in the AHA Annual Survey for survey years 2000 through 2015.

Moderating Variables.

There are two sets of moderators in this study: hospital financial pressure and stressed ED

Table 1

Low Acuity Conditions and Diagnosis Codes

Low-Acuity Condition	**Relevant Diagnosis Codes**
Bronchitis	4660, 4661, 46611, 46619, 490
Upper Respiratory Infection/Sinusitis	460, 4610, 4611, 4612, 4613, 4618, 4619, 4640, 46400, 46410, 46420, 4644, 4650, 4658, 4659, 4730, 4731, 4732, 4733, 4738, 4739, 4781, 47819
Conjunctivitis	0770, 0771, 0772, 0773, 0774, 0778, 0779, 07798, 07799, 1301, 37040, 37044, 37200, 37201, 37202, 37203, 37204, 37205, 37206, 37210, 37211, 37212, 37213, 37214, 37215, 37220, 37221, 37222, 37230, 37231, 37233, 37234, 37239
Urinary Tract Infection	5950, 5951, 5952, 5953, 5954, 59581, 59582, 59589, 5959, 5970, 59780, 59781, 59789, 5990, 7881
Fracture	8020, 80700, 80701, 80702, 80703, 80704, 80705, 80706, 80707, 80708, 80709, 8072, 8080, 8082, 80841, 80842, 80849, 8088, 8090, 81000, 81001, 81002, 81003, 81100, 81101, 81102, 81103, 81109, 81200, 81201, 81202, 81203, 81209, 81220, 81221, 81230, 81231, 81240, 81241, 81242, 81243, 81244, 81249, 81300, 81301, 81302, 81303, 81304, 81305, 81306, 81307, 81308, 81320, 81321, 81322, 81323, 81340, 81341, 81342, 81343, 81344, 81345, 81346, 81347, 81380, 81381, 81382, 81383, 81400, 81401, 81402, 81403, 81404, 81405, 81406, 81407, 81408, 81409, 81500, 81501, 81502, 81503, 81504, 81509, 81600, 81601, 81602, 81603, 8170, 8180, 8190, 8220, 82300, 82301, 82302, 82320, 82321, 82322, 82340, 82341, 82342, 82380, 82381, 82382, 8240, 8242, 8244, 8246, 8248, 8250, 82520, 82521, 82522, 82523, 82524, 82525, 82529, 8260
Dislocation/sprain	7361, 83100, 83101, 83102, 83103, 83104, 83109, 83110, 83111, 83112, 83113, 83114, 83119, 83200, 83201, 83202, 83203, 83204, 83209, 83210, 83211, 83212, 83213, 83214, 83219, 8322, 83400, 83401, 83402, 83410, 83411, 83412, 8360, 8361, 8362, 8400, 8401, 8402, 8403, 8404, 8405, 8406, 8407, 8408, 8409, 8410, 8411, 8412, 8413, 8418, 8419, 84200, 84201, 84202, 84209, 84210, 84211, 84212, 84213, 84219, 8430, 8431, 8438, 8439, 8440, 8441, 8442, 8443, 8448, 8449, 84500, 84501, 84502, 84503, 84509, 84510, 84511, 84512, 84513, 84519, 8460, 8461, 8462, 8463, 8468, 8469, 8470, 8471, 8472, 8473, 8474, 8479, 8480, 8481, 8482, 8483, 84840, 84841, 84842, 84849, 8485, 8488, 8489

capacity. Hospital financial pressure is divided into two dimensions: health maintenance organization (HMO) ownership and managed care penetration. HMO ownership is constructed as a binary variable equal to “1” for each year the hospital reports owning a health maintenance organization in the AHA annual survey and zero otherwise. Medicare managed care market penetration from AHRF is used as a proxy for overall managed care penetration in a hospital’s market (where market is the county in which the hospital is located). While overall managed care penetration is the preferred measure, it is unavailable in publicly available datasets. The operationalization of managed care penetration is made binary by ranking counties in the study according to their Medicare managed care penetration rate, dividing them into quartiles, and assigning the top quartile a value of “1,” with all other counties assigned a value of zero.

Stressed ED capacity is constructed in terms of extended ED length of stay (LOS) each calendar quarter. Extended ED LOS was identified as a key measure of stressed ED capacity by Welch et al. (2006) as part of the ED Performance Measures and Benchmarking Summit. ED LOS is calculated as the duration, in hours, from ED admission to discharge for treat-and-release visits and is calculating using the HCUP SEDD. In this study, *extended* ED LOS is defined as an ED length of stay greater than 4 hours; 4 hours is chosen based on a review of prior literature (Agustin et al., 2017; Case et al., 2012; Fee et al., 2012; Mason et al., 2011; Rahman et al., 2019) and the distribution of ED LOS among hospitals (approximately 50% of hospitals in the present study have an ED LOS greater than 4 hours). The extended ED LOS moderator is operationalized using a binary variable set to “1” for hospitals whose average ED LOS is greater than 4 hours and zero otherwise. However, given that there is some lack of consensus on the definition of extended ED LOS for U.S. hospitals, this study also conducts a sensitivity analysis using an alternate definition of extended ED LOS. Namely, the study examines an ED LOS greater than 6 hours, as has also been used by numerous health services researchers (Allaudeen et al., 2017; Chalfin et al., 2007; Diercks et al, 2007; Henneman et al., 2010; Rose et al., 2016). Length of stay for treat and release ED patients is being used so that it reflects the same population as the dependent variable, namely a count of certain treat and release ED patients.

Hospital-Level Control Variables.

Hospital-level control variables included in all analytical models are as follows: ownership status; teaching status; system membership; hospital case-mix; and bed size. The AHA Annual Survey is the data source for these variables with the exception of hospital case-mix, which is obtained from the Center of Medicare and Medicaid Services Case Mix file.

Ownership status is measured using a set of three binary variables representing for-profit, church-affiliated, and other non-profit hospitals. Public hospitals are the reference group. Teaching status and system membership are measured using a binary variable set to "1" for hospitals that are COTH members or system members, respectively, and zero otherwise. Hospital case-mix is a continuous variable measured based on hospitals' inpatient DRG case-mix index for its Medicare discharges, and is used as a proxy for ED case-mix to control for patient acuity. Bed size is also a continuous variable representing the number of total facility beds set up and staffed.

ED patient demographics are also included as control variables for Aim 1. ED patient age, sex, race/ethnicity, and primary payer data are constructed from the HCUP SEDD and the CA OSHPD ED database and aggregated to the hospital level. Patient age is measured as the percentage of ED patients aged 19 to 64. Sex is measured as the percentage of patients that are female. Race/ethnicity is measured as the percentage of patients with minority status (all race/ethnicity groups other than white). Finally, primary payer is measured using the percentage of ED patients with private insurance as the primary payer.

Market-Level Control Variables.

Market-level control variables are county-level variables primarily obtained from the AHRF. These variables include average per capita income; the percentage of the population with income below the federal poverty level; percentage of the population over age 65; percentage of the population under 65 without health insurance; and the percentage of the population with at least a college education. Primary care physician supply is included as a unique control for Aim 1 and is operationalized as the number of primary care providers (family practice, internal medicine, and general practice physicians) per 10,000 population. Additionally, the number of ambulatory surgical centers in the market is included as a continuous control variable for Aim 3.

Finally, hospital competition is measured using the Herfindahl-Hirschman Index (HHI), calculated by taking the sum of the squared market share of each hospital in the market. HHI is calculated uniquely for each study aim; for Aim 1, market share is calculated using a particular hospital's total ED visits in the numerator and total ED visits in the market in the denominator. For Aim 2, this is calculated using a hospital's proportion of total outpatient visits, and, for Aim 3, using a hospital's proportion of total ambulatory surgeries. Total ED visit, outpatient visit, and ambulatory surgery counts are derived from the AHA Annual Survey database. A summary of all variable measures is presented in Table 2.

Analytical Approach

This study uses a retrospective, longitudinal panel study design to examine the relationship between UCC investment and the volume of low-acuity ED visits (Aim 1), outpatient visits (Aim 2), and ambulatory surgeries (Aim 3). The section begins with an

Table 2

Summary of Variable Measures

Variable	**Aim**	**Definition**	**Source**
Dependent Variables			
Low-acuity ED Visits	1	Continuous variable. Ratio of treat-and-release ED visits for select low-acuity conditions to total treat-and release ED visits.	HCUP SEDD; CA ED
Outpatient Visits	2	Continuous variable. Annual volume of outpatient visits.	AHA
Ambulatory Surgeries	3	Continuous Variable. Annual volume of ambulatory surgeries.	AHA
Independent Variables			
UCC Investment	1, 2, 3	Binary 0/1 variable. 1 if hospital owns a UCC.	AHA
Length of UCC Investment	1, 2, 3	Continuous variable. Length of UCC investment since year 2000.	AHA
Moderating Variables			
HMO Ownership	1, 2, 3	Binary 0/1 variable. 1 if hospital owns health maintenance organization.	AHA
Managed Care Penetration	1, 2, 3	Binary 0/1 variable. 1 if hospital operates in county falling in top quartile of Medicare Advantage penetration rates.	AHRF
Stressed ED Capacity	1	Binary 0/1 variable. 1 if hospital has average ED LOS of 4+ hours.	HCUP SEDD
Hospital-Level Control Variables			
Ownership Status	1, 2, 3	Set of 3 Binary 0/1 variables (for-profit, church-affiliated, non-profit other). Public hospitals are reference group. 1 if hospital is for-profit; 1 if hospital is church-affiliated; 1 if hospital is non-profit other.	AHA
Teaching Status	1, 2, 3	Binary 0/1 variable. 1 if hospital is a COTH member.	AHA
System Membership	1, 2, 3	Binary 0/1 variable. 1 if hospital is a member of a multi-hospital system.	AHA

(Table 2, continued)

Summary of Variable Measures

Hospital-Level Control Variables			
Bed Size	1, 2, 3	Continuous variable. Number of total staffed and set up beds.	AHA
Case Mix	1, 2, 3	Continuous variable. Medicare inpatient case mix index.	CMS
ED Patient Age	1	Continuous variable. Percentage of ED patients aged 19 to 64.	HCUP SEDD; CA ED
ED Patient Sex	1	Continuous variable. Percentage of ED patients that are female.	HCUP SEDD; CA ED
ED Patient Race/Ethnicity	1	Continuous variable. Percentage of patients with minority status (all race/ethnicity groups except white).	HCUP SEDD; CA ED
ED Patient Payment Method	1	Continuous variable. Percentage of ED patients with private insurance as the primary payer.	HCUP SEDD; CA ED
Market-Level Control Variables			
% Population below Poverty Level	1, 2, 3	Continuous variable. Percentage of county population with income below the federal poverty level.	AHRF
% Population over 65	1, 2, 3	Continuous variable. Percentage of county population over age 65.	AHRF
Avg. Per Capita Income	1, 2, 3	Continuous variable. Average per capita income in county.	AHRF
% Population with College Education +	1, 2, 3	Continuous variable. Percentage of county population with at least a college degree.	AHRF
Hospital Competition	1, 2, 3	Continuous variable. Herfindahl-Hirschman Index calculated based on hospital market share of emergency visits (Aim 1), outpatient visits (Aim 2), and ambulatory surgery visits (Aim 3).	AHA
% Population <65 without Health Insurance	1, 2, 3	Continuous variable. Percentage of population under age 65 without health insurance.	AHRF

(Table 2, continued)

Summary of Variable Measures

Market-Level Control Variables			
No. Ambulatory Surgical Centers	3	Continuous variable. Number of ambulatory surgical centers in county.	AHRF
Primary Care Physician Supply	1	Continuous variable. Number of primary care providers per 10,000 county population.	AHRF

overview of the approach to descriptive statistics followed by a presentation of the three-step regression methodology used for all three study aims.

Descriptive Statistics.

This study presents descriptive analysis in the study base year for the full samples for each study aim and then separately for hospitals owning a UCC and hospitals that do not own a UCC. Paired t-tests are employed for continuous variables in order to compare the mean values across UCC ownership status. Chi-square tests are used for binary variables in order to compare the percentage of observations where variables are equal to "1" across UCC ownership status. Both the paired t-tests and the chi-square tests provide insight into whether study variables differ significantly across UCC ownership status.

Regression Methodology.

A three-step regression methodology is used for all three study aims. First, a regression model incorporating only the binary UCC ownership variable is estimated. A second regression model is then estimated incorporating the binary UCC variable and an interaction between the binary UCC variable and mean-centered length of UCC ownership. Mean length of ownership is calculated in the study base year for all hospitals owning a UCC. The primary advantage of this approach is that it allows for a more meaningful marginal effect interpretation. For example, in the step 2 regression model, the parameter estimate for the binary UCC variable can now be interpreted as the marginal effect of UCC ownership for a hospital with the *mean* length of UCC ownership. (Note that postestimation techniques are later used to develop point estimates for the marginal effects of UCC ownership over time; this is discussed in a subsequent section.) Finally, in the third step, regression models are estimated with all step 2 terms incorporated as well as interaction terms for the moderating variables. In each model, the appropriate hospital and market-level control variables are included. In summary, the three-step approach is as follows:

Step 1: Regressions with a UCC (0/1) variable

Step 2: Regressions with a UCC (0/1) variable and a UCC (0/1)*(Length of Ownership minus Mean Length of Ownership) term.

Step 3: Regressions that include the Step 2 terms as well as interaction terms for the moderating variables.

The subsequent sections provide a more detailed overview of these models for each study aim. All models incorporate hospital and time fixed effects. Additionally, all models incorporate standard errors robust to heteroskedasticity and clustered at the hospital level.

Aim 1 Analysis.

Poisson regression methodology is employed to test the hypotheses for Aim 1, as the dependent variable is the count of low-acuity ED visits, offset by the number of total ED visits. All Aim 1 analyses are also conducted using a four-state sample as well as a three-state sample, with California hospitals removed, as there is no ED LOS data for California hospitals. The empirical specifications for the three-step approach for Aim 1 are presented in Equations 1 through 3.

Aim 1 Equations.

[Equation 1] $$\ln\left(\frac{EDVisits_{it}}{TotalEDVisits_{it}}\right) = \beta_0 + \mu_i + \sigma_t + \delta_t + \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 UCC_{it} + \varepsilon_{it}$$

[Equation 2] $$\ln\left(\frac{EDVisits_{it}}{TotalEDVisits_{it}}\right) = \beta_0 + \mu_i + \sigma_t + \delta_t + \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 UCC_{it} + \beta_4 UCC_{it} * \left(UCCLength_{it} - \overline{UCCLength_i}\right) + \varepsilon_{it}$$

[Equation 3] $$\ln\left(\frac{EDVisits_{it}}{TotalEDVisits_{it}}\right) = \beta_0 + \mu_i + \sigma_t + \delta_t + \beta_1 X_{it} + \beta_2 Z_{it} + \beta_3 UCC_{it} + \beta_4 UCC_{it} * (UCCLength_{it} - \overline{UCCLength_i}) + \beta_5 Mod_{it} + \beta_6 (Mod_{it} * UCC_{it}) + \beta_7 UCC_{it} * \left(UCCLength_{it} - \overline{UCCLength_i}\right) * Mod_{it} + \varepsilon_{it}$$

where all variables are indexed *i* for a given hospital and *t* for quarter (in line with the structure of HCUP's SEDD data). $EDVisits_{it}$ represents the volume of low-acuity ED visits while $TotalEDVisits_{it}$ is the total number of treat-and-release ED visits in a given hospital. μ_i is hospital fixed effects, σ_t is year fixed effects, and δ_t is quarter fixed effects. UCC_{it} is a binary variable capturing time-varying urgent care ownership. $UCCLength_{it}$ represents hospitals' length of UCC ownership since the year 2000 and $\overline{UCCLength_i}$ represents mean length of ownership in the study base year, 2010. Mod_{it} represents the moderating variables in the study (managed care penetration, HMO ownership, and extended ED LOS). Finally, X_{it} represents time-varying ED patient characteristics aggregated to the hospital-level, Z_{it} represents other time-varying hospital- and market-level characteristics, and ε_{it} is a random error term.

Aims 2 and 3 Analysis.

Ordinary Least Squares (OLS) regression methodology is used to test the hypotheses for study Aims 2 and 3. The empirical specifications for the three-step approach for Aim 2 are presented in Equations 4 through 6, and for Aim 3 in Equations 7 through 9 below.

Aim 2 Equations.

[Equation 4] $\ln(OPVisits_{it}) = \beta_0 + \mu_i + \sigma_t + \beta_2 Z_{it} + \beta_3 UCC_{it} + \varepsilon_{it}$

[Equation 5] $\ln(OPVisits_{it}) = \beta_0 + \mu_i + \sigma_t + \beta_2 Z_{it} + \beta_3 UCC_{it} + \beta_4 UCC_{it} * (UCCLength_{it} - \overline{UCCLength_i}) + \varepsilon_{it}$

[Equation 6] $\ln(OPVisits_{it}) = \beta_0 + \mu_i + \sigma_t + \beta_2 Z_{it} + \beta_3 UCC_{it} + \beta_4 UCC_{it} * (UCCLength_{it} - \overline{UCCLength_i}) + \beta_5 Mod_{it} + \beta_6 (Mod_{it} * UCC_{it}) + \beta_7 UCC_{it} * \left(UCCLength_{it} - \overline{UCCLength_i}\right) * Mod_{it} + \varepsilon_{it}$

where all variables are indexed *i* for a given hospital and *t* for year. $OPVisits_{it}$ represents the volume of outpatient visits. μ_i is hospital fixed effects and σ_t is year fixed effects. UCC_{it} is a binary variable capturing time-varying urgent care ownership. $UCCLength_{it}$ represents hospitals' length of UCC ownership since the year 2000 and $\overline{UCCLength_i}$ represents mean length of ownership in the study base year, 2010. Mod_{it} represents the moderating variables in the study (managed care penetration and HMO ownership). Finally, Z_{it} represents other time-varying hospital- and market-level characteristics, and ε_{it} is a random error term.

Aim 3 Equations.

[Equation 7] $\ln(Surgeries_{it}) = \beta_0 + \mu_i + \sigma_t + \beta_2 Z_{it} + \beta_3 UCC_{it} + \varepsilon_{it}$

[Equation 8] $\ln(Surgeries_{it}) = \beta_0 + \mu_i + \sigma_t + \beta_2 Z_{it} + \beta_3 UCC_{it} + \beta_4 UCC_{it} * (UCCLength_{it} - \overline{UCCLength_i}) + \varepsilon_{it}$

[Equation 9] $\ln(Surgeries_{it}) = \beta_0 + \mu_i + \sigma_t + \beta_2 Z_{it} + \beta_3 UCC_{it} + \beta_4 UCC_{it} * \left(UCCLength_{it} - \overline{UCCLength_i}\right) + \beta_5 Mod_{it} + \beta_6 (Mod_{it} * UCC_{it}) + \beta_7 UCC_{it} * \left(UCCLength_{it} - \overline{UCCLength_i}\right) * Mod_{it} + \varepsilon_{it}$

where all variables are indexed *i* for a given hospital and *t* for year. $Surgeries_{it}$ represents the volume of ambulatory surgeries. μ_i is hospital fixed effects and σ_t is year fixed effects. UCC_{it} is a binary variable capturing time-varying urgent care ownership. $UCCLength_{it}$ represents hospitals' length of UCC ownership since the year 2000 and $\overline{UCCLength_i}$ represents mean length of ownership in the study base year, 2010. Mod_{it} represents the moderating variables in the study (managed care penetration and HMO ownership). Finally, Z_{it} represents other time-varying hospital- and market-level characteristics, and ε_{it} is a random error term.

Postestimation.

Once all equations are estimated, this study uses the Stata postestimation command, *lincom*, to generate point estimates for the effects of UCC ownership and the moderators on ED visits, outpatient visits, and ambulatory surgeries at different lengths of UCC ownership. All point estimates are calculated using the respective step 3 models that include all moderating interaction terms for each study aim (Equations 3, 6, and 9). Point estimates are generated for the minimum (1 year) and maximum value (16 years) length of ownership in the study. Point estimates are also generated for the first, second, and third quartiles of length of ownership in the base year of analysis, rounded to the nearest whole year.

Sensitivity Analysis.

This study conducts all analyses using both an unbalanced panel (primary approach) and balanced panel design. Additionally, this study conducts sensitivity analysis using an alternate definition of extended ED LOS using a threshold of an ED LOS greater than 6 hours rather than 4 hours as used in the primary analysis.

Chapter 5. Results

Overview of Chapter Structure

This chapter presents the results for the analyses described in Chapter 4. First, descriptive statistics for study samples are presented for the overall sample and by UCC ownership status (i.e. hospitals owning a UCC compared to hospitals that do not); separate descriptive statistics are presented for each study aim. Next, hospital-level Poisson regression results are presented for the Aim 1 analysis, followed by OLS regression results for Aims 2 and 3. Finally, the chapter concludes with a presentation of sensitivity analyses results followed by a brief summary of results.

Results for Descriptive Statistics

Descriptive statistics for the samples for all study aims are presented in the subsequent sections, beginning with Aim 1. Unless otherwise noted, the descriptive statistics presented are calculated for the study base year, 2010, for hospitals with non-missing variables.

Aim 1 Descriptive Statistics.

Descriptive statistics for the dependent, independent, and hospital and market level control variables for study Aim 1 are presented in Table 3. Note that there are two samples for the Aim 1 analyses: the full, four-state sample and a three-state sample (CA omitted). ED LOS data is unavailable for California, so California hospitals are excluded in the second sample. Descriptive statistics are presented for the full sample as well as by UCC ownership status. The study tests whether significant differences exist between hospitals who do and do not own a UCC using paired sample t-tests are for continuous variables and chi-squared tests for binary variables. In both cases, the tests are conducted at a significance level of α = 0.05.

Table 3

Descriptive Statistics of Aim 1 Variables in 2010 Overall and by UCC Ownership

	Four-State Sample			Three-State Sample		
	Full Sample (n=475)	No UCC (n=294)	UCC (n=181)	Full Sample (n=358)	No UCC (n=226)	UCC (n=132)
Dependent Variable						
% Low-Acuity ED Visits (average)	24.01 (0.39)	24.01 (0.51)	24.00 (0.61)	28.11 (0.26)	28.18 (0.34)	27.55 (0.41)
Moderator Variables						
% HMO Owner (average)	13.89 (34.63)	9.18** (13.38)	21.55** (28.93)	12.57 (33.20)	7.96** (27.13)	20.45** (40.49)
% Managed Care Penetration (average)	27.89 (0.62)	28.20 (0.78)	27.38 (1.01)	26.03 (0.73)	25.83 (0.92)	25.49 (1.20)
Stressed ED Capacity (%)				44.13 (2.63)	46.02 (3.32)	40.91 (4.30)
Hospital Level Control Variables						
Ownership Status (%)						
For Profit	17.05 (3.65)	24.83** (43.28)	4.42** (20.61)	20.95 (40.75)	29.20** (45.57)	6.82** (25.30)
Church Affiliated	10.32 (49.42)	10.54 (50.01)	9.94 (39.60)	8.94 (28.57)	9.29 (29.10)	8.33 (27.74)
Non Profit Other	57.89 (37.65)	52.72** (43.28)	66.30** (30.01)	57.54 (49.50)	53.10* (50.01)	65.15* (47.83)
Teaching Hospital (%)	13.05 (1.55)	11.22 (1.84)	16.02 (2.73)	13.69 (1.82)	11.95 (2.16)	16.67 (3.26)
System Member (%)	61.68 (2.23)	60.20 (2.86)	64.09 (3.58)	60.06 (2.59)	57.96 (3.29)	63.36 (4.20)

(Table 3, continued)

Descriptive Statistics of Aim 1 Variables in 2010 Overall and by UCC Ownership

	Four-State Sample			Three-State Sample		
	Full Sample (n=475)	No UCC (n=294)	UCC (n=181)	Full Sample (n=358)	No UCC (n=226)	UCC (n=132)
Hospital Level Control Variables						
Bed Size (average)	318.49 (11.19)	281.56** (12.44)	378.47** (20.57)	324.52 (4.09)	287.64** (15.27)	387.65** (27.09)
Medicare Case Mix (average)	1.46 (0.01)	1.42** (0.01)	1.53** (0.02)	1.43 (0.01)	1.39** (0.02)	1.49** (0.02)
% ED Patients Age 19 to 64 (average)	81.60 (0.32)	81.71 (0.41)	81.46 (0.50)	81.89 (0.43)	81.38 (0.58)	82.78 (0.61)
% ED Patients Female (average)	57.80 (0.18)	57.58 (0.23)	58.17 (0.29)	58.21 (0.20)	58.03 (0.25)	58.51 (0.32)
% ED Patients Minority (average)	42.40 (1.23)	42.28 (1.58)	42.67 (1.97)	37.78 (1.48)	36.59 (1.90)	39.83 (2.33)
% ED Patients Private Pay (average)	31.80 (0.63)	32.18 (0.82)	31.17 (0.99)	37.41 (0.85)	37.50 (1.11)	37.26 (1.30)
Market Level Control Variables						
% Population below Poverty Level (average)	14.70 (0.23)	14.70 (0.30)	14.67 (0.36)	12.61 (0.24)	12.81 (0.29)	12.28 (0.41)
% Population over Age 65 (average)	16.50 (0.22)	16.77 (0.29)	16.16 (0.32)	17.56 (0.25)	17.85 (0.32)	17.07 (0.39)
Per Capita Income in 000s (average)	42.72 (0.76)	42.55 (1.02)	42.98 (1.14)	42.25 (0.93)	42.14 (1.21)	42.45 (1.46)
% Population with College Education + (average)	28.20 (42.00)	28.07 (0.54)	28.35 (0.66)	24.51 (0.45)	23.81* (0.57)	25.70* (0.71)

(Table 3, continued)

Descriptive Statistics of Aim 1 Variables in 2010 Overall and by UCC Ownership

	Four-State Sample			Three-State Sample		
	Full Sample (n=475)	No UCC (n=294)	UCC (n=181)	Full Sample (n=358)	No UCC (n=226)	UCC (n=132)
Market Level Control Variables						
Hospital Competition (average)	2998.00 (120.48)	3042.76 (156.77)	2926.39 (187.86)	3404.82 (144.40)	3385.67 (185.00)	3437.61 (231.19)
% Population Under Age 65 without Health Insurance (average)	16.60 (0.19)	16.52 (0.25)	16.65 (0.30)	16.33 (0.23)	16.31 (0.30)	16.36 (0.37)
PCPS per 10,000 population (average)	85.00 (1.94)	82.37* (2.49)	89.74* (1.94)	85.61 (2.43)	82.61 (3.05)	90.75 (3.99)

*p-value ≤ 0.05, ** p-value ≤ 0.01
Note: Hospitals that own a UCC are compared to hospitals that do not own a UCC for significance testing. Standard deviations are in parentheses.

Four-State Sample.

In the four-state sample (n=475), 39.9% of hospitals own a UCC as of 2010. There are no significant differences in the mean percentage of low-acuity visits for hospitals that own a UCC compared to those that do not, nor are there any significant difference in ED patient characteristics (e.g. percent female or minority). The only significant difference in moderating variables is for HMO ownership, with a higher percentage of UCC owners owning an HMO (21.6%) compared to hospitals that do not own a UCC (9.2%). There are also no significant differences in any of the market-level variables across UCC ownership status, with the exception of the number of PCPs per 10,000 population, with UCC owners tending to operate in counties with a higher PCP ratio (89.7 compared to 82.4). There are, however, several significant differences in hospital-level variables across UCC ownership. UCC owners have a larger bed size (378.5 compared to 281.6) and higher Medicare case-mix index (1.53 compared to 1.42), on average. Additionally, a higher percentage of hospitals owning a UCC fall under other nonprofit ownership (66.3% compared to 52.7%), while a higher percentage of hospitals that do not own a UCC are for-profit (24.8% compared to 4.4%).

Three-State Sample.

In the three-state sample (n=358), 36.9% of hospitals own a UCC. As with the four-state sample, there are no significant differences in the percentage of low-acuity visits for hospitals that own a UCC compared to those that do not, nor are there any significant difference in ED patient characteristics. A significantly higher percentage of UCC owners own an HMO (20.5%) compared to hospitals that do not own a UCC (7.95%). Additionally, a greater percentage of hospitals that own a UCC have other non-profit ownership status (65.2% compared to 53.1%), while a greater percentage of hospitals that do not own a UCC are for-profit (29.2% compared to 6.8%). Also, as with the four-state sample, hospitals that own a UCC have a significantly larger bed size (387.7 compared 287.6) and higher case-mix index (1.49 compared to 1.39), on average. Finally, there are no significant differences in market variables across UCC ownership status in the three-state sample, with one exception: compared to hospitals that do not own a UCC (23.8%), UCC owners tend to be located in counties with a higher percentage of the population having attained at least a college education (25.7%).

Aim 1 Descriptive Statistics: Low-Acuity ED Visits Over Time.

Figures 2 and 3 (representing the four and three state samples, respectively) provide further insight into differences in the dependent variable, low-acuity ED visits, over time across UCC ownership status. Each figure displays three lines, representing the percentage of low-

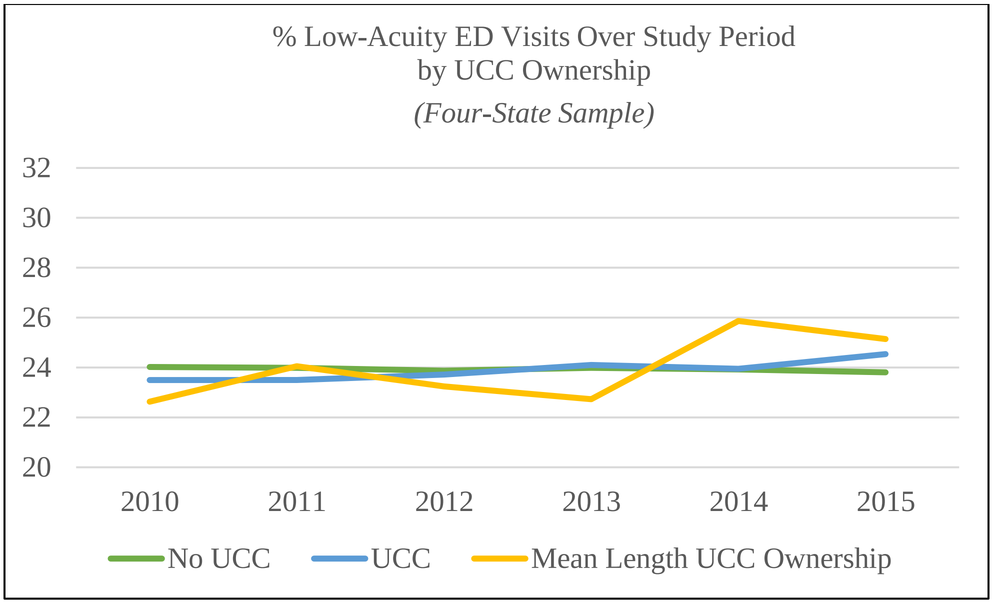

Figure 2. Proportion of Low-Acuity ED Visits over Study Period by UCC Ownership for Four-State Sample

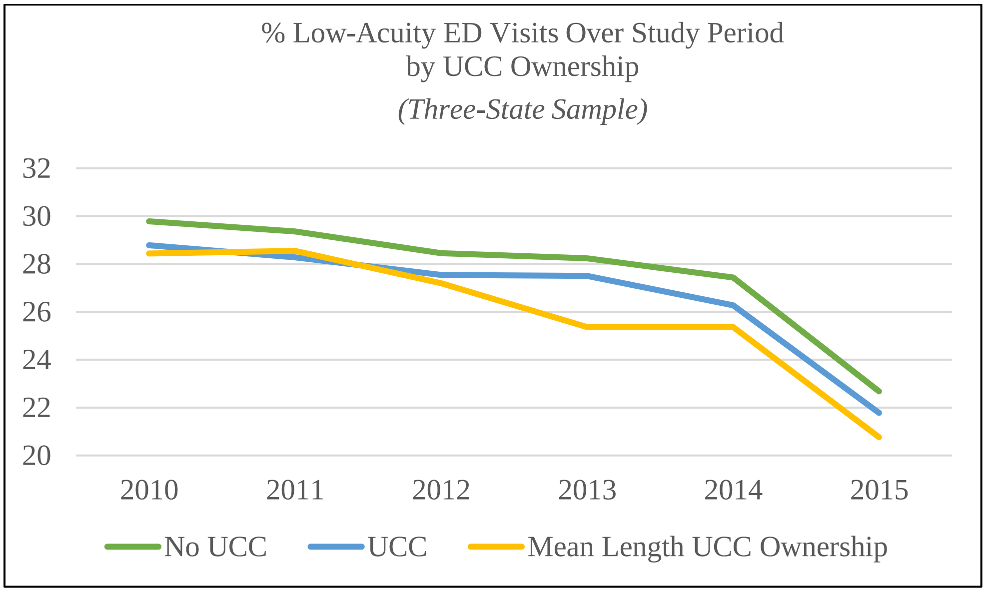

Figure 3. Proportion of Low-Acuity ED Visits over Study Period by UCC Ownership for Three-State Sample

acuity ED visits for (1) hospitals that do not own a UCC, (2) UCC owners, and (3) hospitals that own a UCC for the mean length of ownership in the study (7 years as of 2010). The percentage of low-acuity ED visits is charted across the six-year study period, years 2010 through 2015.

In the full, four-state sample (Figure 2), the percentage of low-acuity ED visits is relatively stable over time for hospitals without a UCC, while the percentage of low-acuity ED visits increases just slightly over time for UCC owners, as is demonstrated by Figure 1. In the first year of the study (2010), 24.0% percent of ED visits are for low-acuity conditions, on average, in hospitals without a UCC; this increases to 23.8% in 2015. In 2010, the percentage of low-acuity ED visits for UCC owners is 23.5%, increasing to 24.5% by the end of the study period. As for hospitals that own a UCC for the mean length of ownership, 22.6% of their ED visits are for low-acuity conditions in 2010, increasing to 25.1% in 2015.

In the three-state sample (Figure 3), there is a distinct decline in the percentage of low-acuity ED visits over time for all three groups. In 2010, 29.8% of ED visits are for low-acuity conditions in hospitals without a UCC; this percentage drops to 22.7% in 2015. Similarly, the proportion of ED visits for low-acuity conditions in hospitals with a UCC falls from 28.8% in 2010 to 21.8% at the end of the study period. For hospitals with the mean length of UCC ownership (7 years), 28.4% of their ED visits, on average, are for low-acuity conditions in 2010, decreasing to 20.8% in 2015.

Aim 2 Descriptive Statistics.

Descriptive statistics for the dependent and independent variables as well as hospital and market level control variables for study Aim 2 are presented in Table 4. Descriptive statistics are presented for the full sample of hospitals across ten states, as well as by UCC ownership status. Paired sample t-tests are used for continuous variables while chi-squared tests are used for binary variables. In both cases, the tests are conducted at a significance level of α = 0.05.

Table 4

Descriptive Statistics of Aim 2 Variables in 2010 Overall and by UCC Ownership

	Full Sample (n=1449)	No UCC (n=875)	UCC (n=574)
Dependent Variable			
Outpatient Visits in 000s (average)	156.26 (248.99)	104.90 ** (160.26)	234.55** (327.61)
Moderator Variables			
% HMO Owner (average)	15.53 (36.22)	9.71** (29.63)	24.39** (42.98)
% Managed Care Penetration (average)	23.84 (12.87)	23.46 (13.36)	24.41 (12.08)
Hospital Level Control Variables			
Ownership Status (%)			
For Profit	19.88 (39.92)	29.03** (45.41)	5.92** (23.63)
Church Affiliated	14.01 (34.72)	11.66** (32.11)	17.60** (38.11)
Non Profit Other	51.35 (50.00)	43.89** (49.65)	62.72** (48.40)
Teaching Hospital (%)	9.59 (29.46)	6.17** (24.08)	14.81** (35.55)
System Member (%)	63.29 (48.22)	60.80* (48.85)	67.07* (47.04)
Bed Size (average)	246.48 (226.10)	203.54** (191.15)	311.94** (257.59)
Medicare Case Mix (average)	1.44 (0.27)	1.40** (0.28)	1.51** (0.23)
Market Level Control Variables			
% Population below Poverty Level (average)	13.87 (4.87)	14.39** (5.05)	13.08** (4.46)

(Table 4, continued)

Descriptive Statistics of Aim 2 Variables in 2010 Overall and by UCC Ownership

	Full Sample (n=1449)	No UCC (n=875)	UCC (n=574)
Market Level Control Variables			
% Population over Age 65 (average)	15.51 (4.28)	15.85** (4.65)	14.99** (3.59)
Per Capita Income in 000s (average)	38.30 (0.33)	37.70* (0.45)	39.21* (0.49)
% Population with College Education + (average)	23.25 (8.92)	22.36** (9.05)	24.60** (8.54)
Hospital Competition (average)	4122.35 (3167.48)	4224.81 (3299.14)	3673.01 (2951.49)
% Population Under Age 65 without Health Insurance (average)	16.46 (5.54)	17.54** (5.40)	14.80** (5.34)

*p-value ≤ 0.05, ** p-value ≤ 0.01
Note: Hospitals that own a UCC are compared to hospitals that do not own a UCC for significance testing. Standard deviations are in parentheses.

In the Aim 2 sample (n=1,149), 49.96% of hospitals own a UCC as of 2010. On average, UCC owners have significantly higher volumes of outpatient visits (234.6) than hospitals that do not own a UCC (104.9). Additionally, a significantly higher percentage of UCC owners own an HMO (24.4%) compared to non-UCC owners (9.7%). There are no significant differences between groups for Medicare managed care penetration.

There are significant differences in all hospital-level control variables across UCC ownership status. More UCC owners have church-affiliated (17.6%) or non-profit other ownership status (62.7%) compared to non-UCC owners (11.7% and 43.9%, respectively), while a larger percentage of non-UCC owners have for-profit status (29.0% compared to 5.9%). A greater percentage of UCC owners are also teaching hospitals (14.8%) and system members (67.1%), compared to hospitals without a UCC (6.2% and 60.8%, respectively). Additionally, UCC owners have a larger bed size (311.9 compared to 203.5) and higher Medicare case-mix index (1.51 compared to 1.40), on average, compared to non-UCC owners.

There are also significant differences in all market-level control variables across UCC ownership status, with the exception of hospital competition. Hospitals with UCCs tend to operate in markets with a greater percentage of the population living below the poverty level (14.4% versus 13.1%), over the age of 65 (15.9% versus 14.99%), and uninsured (under age 65) (17.5% versus 14.8%) compared to hospitals without a UCC. Additionally, UCC owners tend to operate in markets with a higher average per capita income (39.2 compared to 37.7) and percentage of the population with at least a college education (24.6% versus 22.4%), when compared to hospitals without a UCC.

Aim 2 Descriptive Statistics: Outpatient Visits Over Time.

As can be observed in Figure 4, average annual outpatient visits remain relatively stable over time for hospitals that do not own a UCC. In 2010, average outpatient visits for non-UCC owners are 104,895 and decrease slightly to 104,841 by the end of the study in 2015. Average outpatient visits are much higher at the beginning of the study period for both groups of UCC owners (234,550 and 217,902) compared to hospitals without a UCC (104,895). Additionally, average outpatient visits increase slightly over time for hospitals that own a UCC and hospitals that own a UCC for the mean length of ownership (6 years as of 2010). The average volume of outpatient visits for UCC owners in 2010 is 234,209 and increases to 260,399 in 2015. The average volume of outpatient visits for hospitals with mean length of UCC ownership is 217,902 in 2010 and increases to 251,228 by the end of the study period.

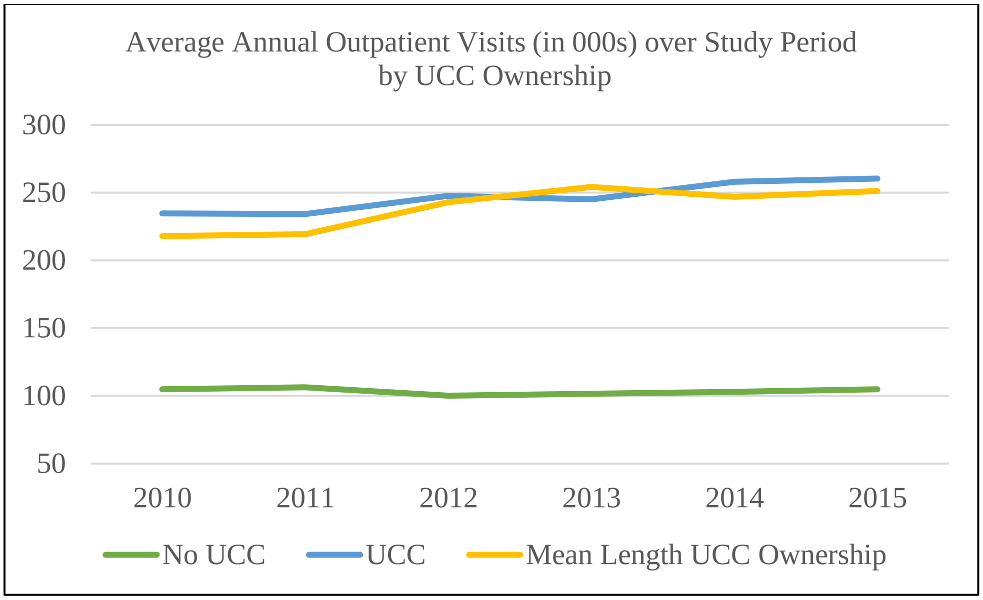

Figure 4. Average Annual Outpatient Visits over Study Period by UCC Ownership

Aim 3 Descriptive Statistics.

Descriptive statistics for the dependent and independent variables as well as hospital and market level control variables for study Aim 3 are presented in Table 5. Descriptive statistics are presented for the full sample as well as by UCC ownership status. Paired sample t-tests are used for continuous variables while chi-squared tests are used for binary variables. In both cases, the tests are conducted at a significance level of $\alpha = 0.05$.

Table 5

Descriptive Statistics of Aim 3 Variables in 2010 Overall and by UCC Ownership

	Full Sample (n=1433)	No UCC (n=861)	UCC (n=572)
Dependent Variable			
Ambulatory Surgeries (average)	5311.42 5893.79	4628.73** (4775.15)	6880.92** (6976.09)
Moderator Variables			
% HMO Owner (average)	15.49 (36.20)	9.52** (29.37)	24.48** (43.03)

(Table 5, continued)

Descriptive Statistics of Aim 3 Variables in 2010 Overall and by UCC Ownership

	Full Sample (n=1433)	No UCC (n=861)	UCC (n=572)
Moderator Variables			
% Managed Care Penetration (average)	23.94 (12.86)	23.65 (13.36)	24.37 (12.07)
Hospital Level Control Variables			
Ownership Status (%)			
For Profit	19.75 (39.82)	29.04** (45.19)	5.77** (23.34)
Church Affiliated	14.17 (34.88)	11.85** (32.33)	17.66** (38.16)
Non Profit Other	51.71 (49.99)	44.25** (49.90)	62.94** (48.34)
Teaching Hospital (%)	9.70 (29.61)	6.27** (24.26)	14.86** (35.60)
System Member (%)	63.85 (48.06)	61.56* (48.67)	67.31* (46.95)
Bed Size (average)	248.62 (226.25)	206.32** (191.41)	312.30** (257.75)
Medicare Case Mix (average)	1.44 (0.27)	1.40** (0.28)	1.51** (0.23)
Market Level Control Variables			
% Population below Poverty Level (average)	13.81 (4.83)	14.30** (5.00)	13.08** (4.47)
% Population over Age 65 (average)	15.45 (4.19)	15.75** (4.52)	14.99** (3.59)
Per Capita Income in 000s (average)	38.40 (12.72)	37.86* (13.24)	39.22* (11.85)
% Population with College Education + (average)	23.36 (8.87)	22.54** (9.01)	24.60** (8.87)

(Table 5, continued)

Descriptive Statistics of Aim 3 Variables in 2010 Overall and by UCC Ownership

	Full Sample (n=1433)	No UCC (n=861)	UCC (n=572)
Market Level Control Variables			
Hospital Competition (average)	3805.40 (3324.79)	3897.63 (3453.59)	3666.58 (3118.73)
% Population Under Age 65 without Health Insurance (average)	16.42 (5.54)	17.50** (5.41)	14.79** (5.34)
No. of ASCs (average)	23.54 (47.70)	26.67** (53.44)	18.84** (36.99)

*p-value ≤ 0.05, ** p-value ≤ 0.01
Note: Hospitals that own a UCC are compared to hospitals that do not own a UCC for significance testing. Standard deviations are in parentheses.

In the Aim 3 sample (n=1,433), 39.9% of hospitals own a UCC as of 2010. On average, UCC owners have significantly higher ambulatory surgery volumes (6880.9) compared to hospitals that do not own a UCC (4628.7). Additionally, a significantly higher percentage of UCC owners own an HMO (24.5%) compared to non-UCC owners (9.5%). There are no significant differences between groups for Medicare managed care penetration.

There are significant differences in all hospital-level control variables across UCC ownership status. More UCC owners have church-affiliated (17.7%) or non-profit other ownership status (62.9%) compared to non-UCC owners (11.9% and 44.3%, respectively), while a larger percentage of non-UCC owners have for-profit status (29.0% compared to 5.8%). A greater percentage of UCC owners are also teaching hospitals (14.9%) and system members (67.3%) compared to hospitals without a UCC (6.3% and 61.6%, respectively). Additionally, UCC owners have a larger bed size (312.3 compared to 206.3) and higher Medicare case-mix index (1.51 compared to 1.40), on average, than hospitals that do not own a UCC.

There are significant differences in all market-level control variables across UCC ownership status, with the exception of hospital competition. Hospitals with UCCs tend to operate in markets with a higher average per capita income (39.2) and a greater percentage of the population with at least a college education (24.6%), when compared to hospitals without a UCC (37.9 and 22.5%, respectively). Hospitals without a UCC, on the other hand, tend to operate in markets with a higher percentage of the population below the poverty level (14.3% compared to 13.1%), over age 65 (15.8% compared to 14.99%), and under age 65 without health insurance (17.5% compared to 14.8%). Finally, UCC owners tend to operate in markets with fewer ambulatory surgical centers (18.8) compared to hospitals without a UCC (26.7).

Aim 3 Descriptive Statistics: Ambulatory Surgeries over Time.

Figure 5 depicts changes in the Aim 3 dependent variable, ambulatory surgeries, over the study period by UCC ownership status. A slight decline in ambulatory surgeries is observed for hospitals without a UCC over the study period, decreasing from an average of 4,269 surgeries annually in 2010 to 4,100 surgeries in 2015. Hospitals with a UCC and with mean length of UCC ownership (6 years), on the other hand, experienced a slight increase in ambulatory surgeries over time. As is clearly depicted in Figure 5, hospitals with a UCC have a significantly higher average volume of ambulatory surgeries at the beginning of the study period compared to non-UCC owners. Hospitals with a UCC deliver an average of 6,881 ambulatory surgeries in 2010, increasing to an average of 7,071 in 2015. Hospitals with mean length of UCC ownership (6 years as of 2010) deliver 6,509 ambulatory surgeries in 2010, increasing to 7,361 surgeries at the end of the study period. Non-UCC owners deliver 4,269 ambulatory surgeries in 2010 and 4,100 in 2015.

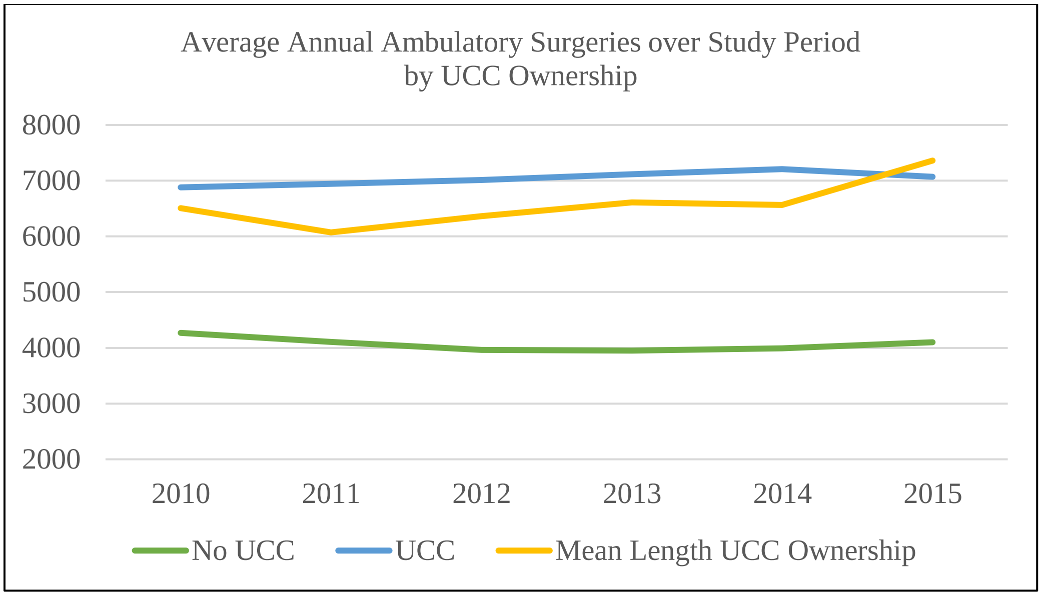

Figure 5. Average Annual Ambulatory Surgeries over Study Period by UCC Ownership

Aim 1 Poisson Regression Results

This section describes the analysis used to address study Aim 1. Based on Strategic Management Theory, the study hypothesizes that hospitals that invest in a UCC will see a reduction in low-acuity ED visits, all else equal. The study also draws upon Contingency Theory to hypothesize that financial pressure, operationalized as managed care penetration and HMO ownership, will moderate the relationship between UCC investment and low-acuity ED visits, such that the greater the financial pressure, the greater the reduction in low-acuity ED visits. Finally, Contingency Theory is also used to generate the hypothesis that stressed ED capacity will moderate the association between hospital investment in urgent care and low-acuity ED visits, such that hospitals with EDs operating under greater degrees of stressed capacity will experience a greater reduction in low-acuity ED visits. Hospitals are considered to be operating under conditions of stressed ED capacity if their average ED LOS is greater than 4 hours.

Three Poisson regression models are estimated for each Aim 1 sample (for a total of six models), as presented below. Model 1 uses a binary UCC ownership variable to operationalize the independent variable. Model 2 includes the binary UCC variable and incorporates an interaction between the binary UCC variable and mean-centered length of UCC ownership. Finally, Model 3 includes all Model 2 terms as well as interaction terms for the moderating variables. All models incorporate hospital and time fixed effects; additionally, all models incorporate standard errors robust to heteroscedasticity and clustered at the hospital level. Aim 1 results are presented in Table 6. Note that all marginal effects reported in the subsequent tables are converted into percentages in the text to aid interpretation of results. This is repeated for all study results (Aims 1, 2, and 3). All percentages are relative to hospitals that do not own a UCC.

Aim 1 results for both the four and three-state samples indicate no significant association between hospital UCC investment and the proportion of low-acuity ED visits. In fact, contrary to expectations, results for Models 2 and 3 convey a positive marginal effect of UCC ownership for a hospital with mean length of UCC ownership, though this effect is not significant. Note that for Models 2 and 3, the parameter for the UCC variable estimates the effect of having a UCC when interaction variables are at their respective means. One term, UCC x (Length of Ownership - Mean) x HMO, is marginally significant for the four-state sample ($p \leq 0.10$), but cannot be interpreted as a standalone term.

For more meaningful interpretations of results, this study develops point estimates (Table 7) for the marginal effects of UCC ownership over time using the Stata postestimation command, lincom. All of the point estimates are calculated using the respective, fully specified Model 3 equations. Point estimates are generated for the minimum (1 year) and maximum (16 years) length of UCC ownership in the study. Point estimates are also generated for the first, second, and third quartiles of length of UCC ownership in the base year of analysis (2010).

Table 6

Aim 1 Poisson Regression Analysis Results, Count of Low-Acuity ED Visits[†§]

	Four-State Sample			Three-State Sample		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
UCC Measures						
0/1 UCC Ownership (UCC)	.017 (.013)	.010 (.029)	.026 (.033)	.007 (.006)	.012 (.011)	.016 (.012)
UCC x (Length of Ownership – Mean)		-.001 (.004)	.002 (.005)		.001 (.002)	.002 (.002)
Financial Pressure Measures						
0/1 HMO Ownership (HMO)			.010 (.014)			.012 (.010)
UCC x HMO			-.019 (.022)			-.009 (.012)
UCC x (Length of Ownership – Mean) x HMO			-.006* (.004)			.0001 (.002)
Medicare Managed Care Ranking (MCRMC)			-.006 (.010)			.011 (.008)
UCC x MCRMC			-.019 (.014)			-.002 (.013)
UCC x (Length of Ownership - Mean) x MCRMC			-.002 (.002)			-.003 (.002)
Stressed ED Capacity Measures						
0/1 ED Length of Stay 4+ Hours (EDLOS4)						.001 (.01)
UCC x EDLOS4						-.002 (.013)
UCC x (Length of Ownership - Mean) x EDLOS4						-.0003 (.003)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01
[†]Standard errors are robust to heteroscedasticity and clustered at the hospital level. Model controls for hospital, year, and quarter fixed effects in addition to the following time-varying hospital and market-level characteristics: hospital ownership, teaching status, system membership, bed size, Medicare case-mix, ED patient demographics (sex, age, primary insurance aggregated to hospital-level) as well as hospital competition, PCPs/10,000 population, % population below poverty level, % population over age 65, average per capita income, % population under age 65 uninsured, and % population with college education.
[§]Count of low-acuity ED visits is offset by the total number of ED visits.

Table 7

Point Estimates for Aim 1 Analysis, Log of Low-Acuity ED Visits

	Four-State Sample *Length of UCC Ownership*				
Marginal Effect of:	1 Year	3 Years	7 Years	11 Years	16 Years
UCC Ownership	.017 (.012)	.015 (.016)	.010 (.031)	.004 (.047)	-.002 (.068)
UCC ownership for hospitals that own an HMO	.027 (.019)	.020 (.018)	.006 (.031)	-.009 (.051)	-.027 (.078)
UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration	.007 (.019)	.007 (.022)	.008 (.035)	.009 (.051)	.010 (.072)
	Three-State Sample (CA Omitted) *Length of UCC Ownership*				
Marginal Effect of:	1 Year	3 Years	7 Years	11 Years	16 Years
UCC Ownership	.005 (.009)	.009 (.008)	.015 (.014)	.022 (.022)	.031 (.033)
UCC ownership for hospitals that own an HMO	-.003 (.015)	-.00002 (.014)	.007 (.018)	.013 (.025)	.021 (.036)
UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration	.021 (.016)	.017 (.014)	.011 (.017)	.005 (.024)	-.004 (.035)
UCC ownership for hospitals with stressed ED capacity	.001 (.009)	.007 (.008)	.017 (.014)	.028 (.022)	.041 (.033)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01
Note: All estimates are calculated using Model 3. Standard errors are presented below point estimates.

In the four-state sample, the marginal effect of UCC ownership on the proportion of low-acuity ED visits in the first year of UCC ownership is 1.71% (calculated as exp[.017]-1). This effect remains positive but decreases in magnitude over time, until the effect becomes negative in the last year of UCC ownership (16 years) with a value of -0.2%. The opposite pattern is observed in the three-state sample, in which the marginal effect of hospital's UCC ownership on the proportion of low-acuity ED visits in the first year of UCC ownership is positive, with the magnitude of the positive effect continuing to grow over time, ending with a marginal effect of 3.1% in year 16. However, none of these marginal effects are statistically significant.

Marginal effects remain statistically insignificant once the influence of moderating variables are considered, however there are some patterns to note. First, in the four-state sample, the average marginal effect of UCC ownership on low-acuity ED visits for hospitals that own an HMO and are in their first year of UCC ownership is large and positive (30.9%), but over time decreases and becomes large in magnitude and negative by year 16 (-23.7%). When California hospitals are omitted, this marginal effect is small and negative in the first year of UCC ownership (-0.3%) and becomes increasingly large and positive over time, ending with a value of 2.1% in year 16 of UCC ownership.

In the four-state sample, the average marginal effect of UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration remains relatively stable over time, slowly increasing from 0.7% in the first year of UCC ownership to 1.0% in year 16 of UCC ownership. When California hospitals are removed, this marginal effect is positive in the first year of UCC ownership (2.1%) and decreases over time until the marginal effect is small and negative in year 16 of UCC ownership (-0.4%). Again, however, it is important to note that none of these marginal effects are statistically significant.

Finally, point estimates for the three-state sample also shed light on the marginal effects of UCC ownership over time for hospitals operating under conditions of stressed ED capacity. Results indicate that the marginal effect of UCC ownership on low-acuity ED visits increases over time for hospitals operating under conditions of stressed ED capacity, with a marginal effect of 0.1% in year 1 and increasing to a marginal effect of 4.2% in year 16. However, again, these estimates are not statistically significant.

Aim 2 OLS Regression Results

This section describes the analysis used to address study Aim 2. Based on Strategic Management Theory, the study hypothesizes that hospitals that invest in a UCC will see an increase in hospital-based outpatient visits, all else equal. The study also draws upon Contingency Theory to hypothesize that financial pressure, operationalized as managed care penetration and HMO ownership, will moderate the relationship between UCC investment and outpatient visits, such that the greater the financial pressure, the greater the increase in outpatient visits.

Three OLS regression models are estimated: Model 1 uses only a binary UCC ownership variable to operationalize the independent variable; Model 2 incorporates the binary UCC variable and an interaction between the binary UCC variable and mean-centered length of UCC ownership; Model 3 includes all Model 2 terms as well as interaction terms for the moderating variables. The study incorporates mean-centered length of UCC ownership in Models 2 and 3 so that the parameter for the UCC variable estimates the effect of having a UCC when interaction variables are at the respective means. All models incorporate hospital and time fixed effects, and all models incorporate standard errors robust to heteroscedasticity and clustered at the hospital level. Aim 2 results are presented in Table 8. Note that marginal effects are translated into percentages in the text and are relative to hospitals without a UCC.

In Model 1, the average marginal effect of UCC ownership on outpatient visits, all else equal, is -9.0% ($p \leq 0.01$). Contrary to this study's hypothesis, this statistically significant result

Table 8

Results of Aim 2 OLS Regression Analysis, Log of Annual Outpatient Visits

	Model 1	Model 2	Model 3
UCC Measures			
0/1 UCC Ownership (UCC)	-.094*** (.031)	-.046 (.033)	-.035 (.033)
UCC x (Length of Ownership – Mean)		.012** (.005)	.008 (.005)
Financial Pressure Measures			
0/1 HMO Ownership (HMO)			-.163*** (.041)
UCC x HMO			.076 (.053)
UCC x (Length of Ownership - Mean) x HMO			.006 (.007)
0/1 Medicare Managed Care Ranking (MCRMC)			-.014 (.039)
UCC x MCRMC			-.042 (.050)
UCC x (Length of Ownership - Mean) x MCRMC			.007 (.006)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01

†Model controls for hospital and year fixed effects in addition to the following time-varying hospital and market-level characteristics: hospital ownership, teaching status, system membership, bed size, and Medicare case-mix, as well as hospital competition, % population below poverty level, % population over age 65, average per capita income, % population under age 65 uninsured, and % population with college education.

suggests that hospital investment in UCCs is associated with a decrease in outpatient visits. Although this term is not statistically significant in Models 2 and 3, both estimates are negative (-4.5% and -3.4%, respectively). When mean-centered length of ownership is incorporated into the equations for Models 2 and 3, the marginal effect of UCC ownership for hospitals that have owned a UCC for the mean length of ownership is positive (1.2% and 0.8% for Models 2 and 3, respectively) and statistically significant in Model 2. The only other statistically significant term in Aim 2 analysis is HMO ownership. This HMO term (-.163) indicates that regardless of UCC ownership status, outpatient visits are approximately 15% lower for hospitals that own an HMO. The study also develops point estimates using the Model 3 equation to examine the marginal effects of UCC ownership on outpatient visits over time. Point estimates for Aim 2 analyses are presented in Table 9.

Table 9

Point Estimates for Aim 2 Analysis, Log of Annual Outpatient Visits

	Length of UCC Ownership				
	1 Year	3 Years	6 Years	11 Years	16 Years
Marginal Effect of:					
UCC ownership	-.104*** (.032)	-.080*** (.030)	-.043 (.034)	.017 (.051)	.078 (.073)
UCC ownership for hospitals that own an HMO	-.026 (.068)	.003 (.060)	.045 (.055)	.116* (.069)	.187* (.099)
UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration	-.149** (.061)	-.118** (.056)	-.072 (.054)	.005 (.067)	.081 (.092)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01
Note: All estimates are calculated using Model 3. Standard errors are presented below point estimates.

The point estimates for Aim 2 analysis provide a great deal of insight into the association between UCC ownership and outpatient visits. The marginal effect of UCC ownership on outpatient visits is negative and significant at the .01 level of significance in the first and third year of UCC ownership (-9.9% and -7.7%, respectively). This suggests that in a hospital's early years of UCC ownership, outpatient visits significantly decrease in volume, contrary to expectations. Over time, the marginal effect of UCC ownership becomes increasingly positive, though these marginal effects are not statistically significant.

The marginal effect of UCC ownership for hospitals that own an HMO is also negative (-2.6%) in the first year of UCC ownership, but becomes increasingly large and positive as length of ownership increases. In line with expectations that HMO ownership positively moderates the relationship between UCC ownership and outpatient visits, the marginal effect of UCC ownership for hospitals that own an HMO is positive and statistically significant with values of 12.3% and 20.6% in years 11 and 16 of UCC ownership, though only at marginally significant levels.

Finally, the marginal effect of UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration is negative and statistically significant at the .05 level of significance for the first and third year of UCC ownership. These values are -13.8% and -11.1%, respectively. This is contrary to the expectation that managed care penetration will positively moderate the relationship between UCC investment and outpatient visits. This marginal effect does increase over time, becoming positive in years 11 and 16 of UCC ownership, but these estimates are not statistically significant.

Aim 3 OLS Regression Results

This section describes the analysis used to address study Aim 3. Using Strategic Management Theory, it is hypothesized that hospitals that invest in a UCC will see an increase in ambulatory surgery volumes, all else equal. The study also draws upon Contingency Theory to hypothesize that financial pressure, operationalized as managed care penetration and HMO ownership, will positively moderate the relationship between UCC investment and ambulatory surgeries, such that the greater the financial pressure, the greater the increase in ambulatory surgeries.

As with the other study aims, three models are estimated: OLS Model 1 uses only a binary UCC ownership variable to operationalize the independent variable; OLS Model 2 incorporates the binary UCC variable and an interaction between the binary UCC variable and mean-centered length of UCC ownership; OLS Model 3 includes all Model 2 terms as well as interaction terms for the moderating variables. Again, Models 2 and 3 incorporate mean-centered length of UCC ownership means that the parameter for the UCC variable estimates the effect of having a UCC when interaction variables are at their respective means. All models incorporate hospital and time fixed effects; additionally, all models incorporate standard errors robust to heteroscedasticity and clustered at the hospital level. Aim 3 results are presented in Table 10. As with Aim 1 and 2 results, marginal effects are converted to percentages in the text and are relative to hospitals without a UCC.

Aim 3 results indicate no significant relationship between UCC investment and ambulatory surgery volumes. While the estimates for both UCC ownership terms (binary UCC ownership and the interaction between UCC ownership and mean-centered length of ownership) are positive for all models, consistent with expectations, none of these terms are statistically significant. There are two financial pressure measures that are statistically significant, the HMO ownership term and the interaction term between UCC ownership and Medicare managed care penetration. However, a more meaningful interpretation of results is achieved by looking at point estimates using the Model 3 equation. These point estimates shed light on the marginal effects of UCC ownership on ambulatory surgeries over time and are presented in Table 11.

Point estimates for Aim 3 analysis indicate that the marginal effect of UCC ownership is positive for all lengths of UCC ownership and increases with length of ownership. However,

Table 10

Results of Aim 3 OLS Regression Analysis, Log of Annual Ambulatory Surgeries†

	Model 1	Model 2	Model 3
UCC Measures			
0/1 UCC Ownership (UCC)	.009 (.016)	.032 (.032)	.010 (.026)
UCC x (Length of Ownership – Mean)		.006 (.004)	.005 (.004)
Financial Pressure Measures			
0/1 HMO Ownership (HMO)			-.057* (.032)
UCC x HMO			.058 (.034)
UCC x (Length of Ownership – Mean) x HMO			.002 (.004)
0/1 Medicare Managed Care Ranking (MCRMC)			-.016 (.028)
UCC x MCRMC			.045* (.026)
UCC x (Length of Ownership – Mean) x MCRMC			.001 (.003)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01
†Model controls for hospital and year fixed effects in addition to the following time-varying hospital and market-level characteristics: hospital ownership, teaching status, system membership, bed size, and Medicare case-mix, as well as hospital competition, number of ASCs, % population below poverty level, % population over age 65, average per capita income, % population under age 65 uninsured, and % population with college education.

none of these point estimates are statistically significant, indicating there is no significant association between UCC investment and hospital ambulatory surgery volumes. The marginal effect of UCC ownership for hospitals that own an HMO is also positive for all lengths of ownership, consistent with expectations. These estimates are statistically significant at 6, 11, and 16 years of ownership, suggesting that HMO ownership positively moderates the relationship between UCC investment and ambulatory surgeries in later years of UCC ownership.

Table 11

Point Estimates for Aim 3 Analysis, Log of Annual Ambulatory Surgeries

	Length of UCC Ownership				
	1 Year	3 Years	6 Years	11 Years	16 Years
Marginal Effect of:					
UCC ownership	.005 (.016)	.017 (.017)	.034 (.024)	.062 (.040)	.090 (.058)
UCC ownership for hospitals that own an HMO	.036 (.035)	.050 (.034)	.071* (.039)	.106** (.054)	.141* (.075)
UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration	-.030 (.029)	.041 (.028)	.057* (.031)	.085* (.045)	.112* (.063)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01
Note: All estimates are calculated using Model 3. Standard errors are presented below point estimates.

Finally, the marginal effect of UCC ownership for hospitals operating in a county with top 25% managed care penetration in their first year of UCC ownership is negative (-3.0%), contrary to expectations, but is not statistically significant. As length of ownership increases, this marginal effect becomes increasingly positive. At years 6, 11, and 16 of UCC ownership, this marginal effect is positive and statistically significant, indicating that managed care penetration positively moderates the relationship between UCC investment and ambulatory surgeries at later years of UCC ownership.

Sensitivity Analysis

As part of this study's sensitivity analyses, all models for the three study aims are also estimated using a balanced panel. Point estimates are also generated for different lengths of UCC ownership using the balanced panel sample. There are no material differences in the empirical results for Aim 1 analyses using a balanced panel, with no significant association between UCC investment and low-acuity ED visits. There are also no material differences in results for Aim 2 analyses using a balanced panel. The marginal effects of UCC investment and of UCC investment for hospitals operating in a county with top 25% Medicare managed care penetration remain negative and statistically significant in years 1 and 3 of UCC ownership. The marginal effect of UCC investment for hospitals that own an HMO remains positive and statistically significant in years 11 and 16 of UCC ownership.

In contrast, Aim 3 regressions using a balanced panel produce different results from those generated using an unbalanced panel in the primary analysis and now support the hypothesis that UCC investment is associated with an increase in ambulatory surgeries. Aim 3 balanced panel regression results are presented in Table 12. As with the unbalanced panel results, the estimates for both UCC ownership terms are positive, consistent with expectations, but not statistically significant. However, the binary HMO ownership term and the interaction between UCC ownership and HMO ownership are now statistically significant. The most important differences in results, however, come from differences in point estimates for different lengths of UCC ownership. Point estimates for Aim 3 using a balanced panel are presented in Table 13. Recall that in the unbalanced panel, the marginal effect of UCC ownership is positive for all lengths of UCC ownership, but none of these effects are statistically significant. When the balanced panel is used, the marginal effects remain positive, but become statistically significant for all lengths of UCC ownership. The marginal effect of UCC ownership for hospitals that own an HMO is also positive for all lengths of ownership, however, now the point estimate for 3 years of UCC ownership is also statistically significant in addition to 6, 11, and 16 years of ownership. This provides further support for the hypothesis that HMO ownership positively moderates the relationship between UCC investment and ambulatory surgeries in later years of

Table 12

Aim 3 Balanced Panel OLS Regression Results, Log of Annual Ambulatory Surgeries†

	Model 1	Model 2	Model 3
UCC Measures			
0/1 UCC Ownership (UCC)	.003 (.017)	.022 (.024)	.002 (.027)
UCC x (Length of Ownership – Mean)		.005 (.004)	.004 (.004)
Financial Pressure Measures			
0/1 HMO Ownership (HMO)			-.083** (.033)
UCC x HMO			.077** (.035)
UCC x (Length of Ownership – Mean) x HMO			.003 (.004)
0/1 Medicare Managed Care Ranking (MCRMC)			-.008 (.029)
UCC x MCRMC			.036 (.027)
UCC x (Length of Ownership – Mean) x MCRMC			.003 (.003)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01

†Model controls for hospital and year fixed effects in addition to the following time-varying hospital and market-level characteristics: hospital ownership, teaching status, system membership, bed size, and Medicare case-mix, as well as hospital competition, number of ASCs, % population below poverty level, % population over age 65, average per capita income, % population under age 65 uninsured, and % population with college education.

UCC ownership. Regarding the marginal effect of UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration, the average marginal effect is no longer statistically significant for any length of ownership, no longer supporting the hypothesis that higher managed care penetration positively moderates the relationship between UCC investment and ambulatory surgeries.

Table 13

Balanced Panel Point Estimates for Aim 3 Analysis, Log of Annual Ambulatory Surgeries

	Length of UCC Ownership				
	1 Year	3 Years	6 Years	11 Years	16 Years
Marginal Effect of:					
UCC ownership	.062* (.036)	.070* (.036)	.080** (.039)	.098* (.053)	.116* (.071)
UCC ownership for hospitals that own an HMO	.048 (.036)	.061* (.035)	.081** (.040)	.115** (.056)	.148* (.077)
UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration	.014 (.028)	.024 (.027)	.039 (.031)	.065 (.046)	.090 (.064)

*p-value ≤ 0.10, ** p-value ≤ 0.05, ** p-value ≤ 0.01
Note: All estimates are calculated using Model 3. Standard errors are presented below point estimates.

Finally, Aim 1 regressions are repeated using an alternate definition of stressed ED capacity. In the primary models, stressed ED capacity is defined as having an average ED LOS greater than 4 hours. The alternative definition used in this sensitivity analysis sets the threshold for stressed ED capacity at an average ED LOS greater than 6 hours. Findings using this alternative definition are consistent with the primary analysis findings, and all interpretations remain the same; stressed ED capacity does not moderate the relationship between UCC investment and low-acuity ED visits.

Overall Summary of Results

This chapter presented the descriptive statistics, empirical analyses, and sensitivity analyses results for the three study aims. Study Aim 1 examines the association between hospital investment in UCCs and low-acuity ED visits. Aim 1 regression results and point estimates for both study samples indicate that UCC investment is not significantly associated with a reduction in low-acuity ED visits, failing to support study Hypothesis 1. Additionally, the marginal effects of UCC ownership for hospitals that own an HMO or operate in a county with top 25% managed care penetration rates are not statistically significant at any length of UCC ownership, failing to support Hypothesis 4 that financial pressure negatively moderates the relationship between UCC investment and low-acuity ED visit volumes. Sensitivity analysis results are consistent with these findings.

Aim 2 regression results suggest that hospital investment in UCCs is not significantly associated with an increase in outpatient visits. Conversely, the marginal effects of UCC investment in years 1 and 3 of UCC ownership indicate that outpatient visits decrease significantly in these first years of UCC ownership. The marginal effects become positive over time, but are not statistically significant, failing to support Hypothesis 2. The marginal effect of UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration is also negative and statistically significant in the early years of UCC ownership. However, the marginal effect of UCC ownership for hospitals that own an HMO is positive and statistically significant in years 11 and 16 of UCC ownership. Thus, Hypothesis 4 is partially supported, with HMO ownership positively moderating the relationship between UCC investment and outpatient visits in later years of UCC ownership. Sensitivity analysis results are also consistent with these findings.

Aim 3 empirical results indicate no significant association between UCC investment and ambulatory surgery volumes, failing to support Hypothesis 3. However, the marginal effect of UCC ownership for hospitals that own an HMO is positive and statistically significant at 6, 11, and 16 years of UCC ownership, indicating that HMO ownership positively moderates the relationship between UCC investment and ambulatory surgeries in later years of UCC ownership. Similarly, the marginal effect of UCC ownership for hospitals operating in a county with top 25% managed care penetration is statistically significant and positive at years 6, 11, and 16 of UCC ownership, indicating that managed care penetration positively moderates the relationship between UCC investment and ambulatory surgeries at later years of UCC ownership. Thus, Hypothesis 4 is partially supported.

Sensitivity analysis using a balanced panel does produce different results for Aim 3 analysis. The marginal effect of UCC ownership is positive and statistically significant for all lengths of UCC ownership, supporting the Hypothesis 3 that UCC investment is associated with an increase in ambulatory surgeries. The marginal effect of UCC ownership for hospitals that own an HMO is now positive at 3, 6, 11, and 16 years of ownership, further supporting Hypothesis 4 that financial pressure positively moderates the relationship between UCC investment and ambulatory surgeries. However, the marginal effect of UCC ownership for hospitals operating in a county with top 25% managed care penetration is no longer statistically significant at any length of ownership, failing to support Hypothesis 4 when managed care penetration is the measure of financial pressure.

The next chapter presents a summary and interpretation of research findings, then addresses the study contribution and implications for health policy and practice. Chapter 6 concludes with a discussion of study limitations and potential directions for future research.

Chapter 6. Discussion

Overview of Chapter Structure

This chapter provides a summary and interpretation of the empirical results presented in Chapter 5. The chapter then addresses the contribution of the study and implications for policy and practice. Finally, the limitations of the study are discussed followed by a discussion of potential directions for future research.

Summary and Interpretation of Empirical Results

Aim 1: Low-Acuity ED Visits.

The primary objective of study Aim 1 is to assess whether hospital investment in urgent care is associated with a reduction in low-acuity ED visits. Aim 1 also examines whether the relationship between investment in urgent care and low-acuity ED visits is moderated by hospital financial pressure or stressed ED capacity. A multi-theoretical framework combining Strategic Management Theory and Contingency Theory is used to derive study variables. Poisson regression models are used for Aim 1 analyses using two operationalizations of UCC investment, a binary UCC variable and mean-centered length of UCC ownership. Interaction terms are added for the moderating variables. Additionally, point estimates are generated for the marginal effect of UCC ownership on low-acuity ED visits at different lengths of UCC ownership. Sensitivity analyses are also performed using a balanced panel and an alternate definition of stressed ED capacity.

The hypotheses for study Aim 1 are presented in Table 14 along with statements indicating whether the primary analysis supports each hypothesis. Results of the sensitivity analyses are not delineated as they do not change the interpretation. Study findings indicate that hospital investment in urgent care is not associated with a reduction in the proportion of low-acuity ED visits. This is true for the overall regression analysis and when examining the marginal effect of UCC investment at different lengths of UCC ownership. Results for models including interaction terms for the two financial pressure measures, HMO ownership and managed care penetration, fail to support financial pressure as a moderator of the relationship between hospital investment in UCCs and low-acuity ED visits. Finally, stressed ED capacity, operationalized as having an average ED LOS greater than 4 hours, is not found to moderate the relationship between hospital investment in urgent care and low-acuity ED visits. Accordingly, Hypotheses 1, 4, and 5 are not supported by study findings. However, these findings are consistent with a stream of prior research that suggests convenient care models are not associated with a significant reduction in ED visits (Ashwood et al., 2016; Martsolf et al., 2017; Yakobi, 2017).

There are several possible explanations for the lack of an association between UCC investment and low-acuity ED visits. One possibility is that hospitals must invest in more than one UCC in order to have enough capacity to make a significant impact on the volume of low-acuity ED visits (Allen, Cummings, & Hockenberry, 2019). The present study only accounts for whether a hospital has at least one UCC. It is also possible that hospitals must open a UCC on the hospital campus, as opposed to a freestanding building in the community, in order to see a significant reduction in low-acuity ED visits. An on-campus UCC would make it easier for ED staff to physically redirect low-acuity patients to the UCC, and require less effort on part of the

Table 14

Summary of Study Findings, Aim 1

Aim 1: To evaluate whether hospital investment in urgent care is associated with a significant reduction in low-acuity visits to the emergency department.		
Hypothesis		**Supported?**
Hypothesis 1:	Hospital investment in urgent care is associated with a reduction in low-acuity visits to the emergency department.	Not supported
Hypothesis 4:	Hospital financial pressure will moderate the association between hospital investment in urgent care and operational performance such that the greater the financial pressure, the greater the reduction in low-acuity ED visits.	Not supported
Hypothesis 5:	Stressed ED capacity will moderate the association between hospital investment in urgent care and operational performance, such that hospitals with EDs operating under greater degrees of stressed capacity will experience a greater reduction in low-acuity ED visits.	Not supported

patient to seek out the UCC alternative. The present study does not have information on the proximity of the UCC(s) to the hospital, and thus is not able to account for this possibility.

It is also possible that EDs may only see a significant reduction in low-acuity visits during time frames when the hospital-owned UCC is open and operating. For example, hospitals that invest in a UCC may see a reduction in low-acuity ED visits during day time UCC business hours (e.g. 8am to 8pm), but may alternatively see an increase in low-acuity ED visits over night when the UCC is closed for business. This would be consistent with findings from Allen, Cummings, and Hockenberry's (2019) zip-code level analysis of UCCs in six states, which found a significant increase in low-acuity ED visits once UCCs in the local area closed for the day. Note that the analyses reported in Chapter 5 do not distinguish low-acuity ED visits based on the hours of operation of a hospital UCC.

There is also a separate stream of literature that argues that the best way to decrease low-acuity visits to the ED is to focus on reducing repeat visits for the chronically ill. In other words, hospitals should invest in specialty chronic care clinics rather than general UCCs in order to reduce low-acuity ED visits (LaCalle & Rabin, 2010; Woodrum, 2016). This may be another possible explanation for why this study does not find an association between hospital investment in UCCs and low-acuity ED visits.

Finally, it is possible that hospital investment in UCCs does not significantly impact low-acuity ED volumes because patients have difficulty discerning the severity of their condition and which setting – the UCC or ED – would be more appropriate. Coyle (2017) notes that injury or illness heightens patients' emotional state, making it difficult for them to self-triage. As a result, patients may prefer to refer themselves to the ED rather than risk making potentially incorrect decisions about which setting is most appropriate for them (Jaffe, Kocher & Ghaferi, 2018; Uscher-Pines et al., 2013).

Aim 2: Outpatient Visits.

The primary objective of study Aim 2 is to determine whether hospital investment in urgent care is associated with an increase in hospital-based outpatient visits. Additionally, the study evaluates whether the relationship between investment in urgent care and outpatient visits is moderated by hospital financial pressure. OLS regression models are used to address study Aim 2. As with Aim 1, the moderation hypothesis is tested using interactions between hospital financial pressure variables and a binary UCC investment variable and mean-centered length of ownership. Point estimates are also generated to assess the marginal effect of UCC ownership at different lengths of UCC ownership. Table 15 presents the hypotheses for study Aim 2 along with statements indicating whether each hypothesis is supported in full or part by this study's analyses. Sensitivity analysis results are consistent with primary analysis findings.

Table 15

Summary of Study Findings, Aim 2

Aim 2: To evaluate whether hospital investment in urgent care is associated with a significant increase in the volume of outpatient hospital visits.		
Hypothesis		**Supported?**
Hypothesis 2:	Hospital investment in urgent care is associated with an increase in the volume of outpatient hospital visits.	Not supported
Hypothesis 4:	Hospital financial pressure will moderate the association between hospital investment in urgent care and operational performance such that the greater the financial pressure, the greater the increase in the volume of outpatient visits.	Partially supported for HMO ownership Not supported for managed care penetration

Study findings suggest hospital investment in UCC ownership is negatively associated with outpatient visit volumes and statistically significant ($p \leq 0.01$) in the early years of UCC ownership, contrary to expectations. In later years of UCC ownership (i.e. years 6, 11, and 16), the marginal effect of UCC investment on outpatient visits becomes positive, but is not statistically significant. Thus, Hypothesis 2 is not supported. Findings are similar when examining whether managed care penetration moderates the relationship between UCC investment and outpatient visits. The marginal effect of UCC ownership for hospitals operating in a county with top 25% Medicare managed care penetration is negative and statistically significant ($p \leq 0.05$) in the early years of UCC ownership (i.e. years 1 and 3), but becomes insignificant as length of ownership increases. Thus, Hypothesis 4 is not supported when using managed care penetration as a measure of financial pressure. However, when the measure of financial pressure is HMO ownership, findings suggest that HMO ownership positively moderates the relationship between UCC investment and outpatient visits in years 11 and 16 of UCC ownership ($p \leq 0.1$). As a result, Hypothesis 4 is partially supported.

UCC investment may be negatively associated with outpatient visit volumes in the early years of UCC ownership because the UCC acts as a direct substitute for hospital-based outpatient services. There is often overlap in the services provided by UCCs and hospital-based outpatient care, such as imaging services. Patients may prefer to seek out these services at the hospital-affiliated UCC because the UCC may be in a more accessible location or because it has more flexible operating hours. As a result, the UCC may actually siphon patient volumes from the hospital-based outpatient services, resulting in a decrease in annual outpatient visit volumes. The negative impact on outpatient visit volumes may be particularly strong in the early years of UCC ownership as the UCCs are still working on generating new patient visits, and thus initially the downstream referral volumes may not be large enough to offset the siphoning effect. While there is also overlap between the conditions that can be treated in the ED and urgent care setting, UCCs may actually be a better substitute for hospital outpatient care than low-acuity ED visits. For instance, hospital EDs operate 24 hours a day, 7 days a week and are mandated to see and treat patients regardless of their ability to pay (Hoot & Aronsky, 2008). UCCs, on the other hand, have more limited hours of operation and are able to be more selective of their patients (Raja & Mehrotra, 2016; Stoimenoff & Newman, 2018). Thus, in some cases, patients with low-acuity conditions may have no choice but to go to the ED due to the time of day, their insurance status, or their inability to pay. Additionally, some low-acuity patients may be inclined to go the ED rather than a UCC because they are unable to discern the severity of their condition, are in a heightened emotional state (Coyle, 2017; Jaffe, Kocher & Ghaferi, 2018; Uscher-Pines et al., 2013). However, when compared to hospital outpatient departments (which are not held to the same mandates as hospital EDs for treatment), UCCs offer extended hours and shorter wait times for treatment (Stoimenoff & Newman, 2018). Rather than waiting for a scheduled appointment time at the hospital's outpatient care facility, patients can seek out many of the same services such as labs and imaging on an unscheduled basis, often in a more convenient location, making UCCs a much more attractive option than the hospital's outpatient department.

There are two key reasons, however, why hospitals owning an HMO may experience an increase in outpatient visit volumes in the later years of UCC investment. First, HMO owners aim to retain care for their plan members inside the hospital system to prevent losses of revenue that may result from having to pay outside hospital systems to deliver care that the HMO owning hospital could provide. Accordingly, HMO owners may design their plan options (e.g. a lower copayment) such that HMO plan members are incentivized to seek downstream outpatient care services from the hospital that owns the HMO rather than obtain outpatient care from other hospitals in the community. Secondly, given the financial pressures of operating an HMO (in particular, the constrained, fixed revenues hospitals receive for HMO members), the hospital may use its UCC to attract new patients who are not enrolled in its HMO to generate a supplemental revenue source. Now, it is possible that in the early years of UCC ownership, the UCC does siphon patients from the hospital-based outpatient care setting, especially if patients seek certain outpatient services in the UCC setting. However, HMO owners are likely able to counteract these initial operational results if they determine how to best retain enrollees within their system of care as well as generate new referrals for additional hospital-based outpatient care services through their UCCs.

Aim 3: Ambulatory Surgeries.

The primary objective of study Aim 3 is to determine whether hospital investment in urgent care is associated with an increase in ambulatory surgery volumes. The study also evaluates whether the relationship between investment in urgent care and ambulatory surgeries is moderated by hospital financial pressure. OLS regression models are used to address study Aim 3, with UCC investment operationalized as a binary UCC investment variable and mean-centered length of ownership. Interactions between hospital financial pressure variables and UCC investment are included in models to test the moderation hypothesis. Point estimates are generated to assess the marginal effect of UCC ownership on ambulatory surgeries at different lengths of UCC ownership. Table 16 presents the hypotheses for study Aim 3 along with statements indicating whether the hypotheses are supported. For Aim 3, sensitivity analysis using a balanced panel does produce different conclusions. Thus, Table 16 also indicates whether sensitivity analysis supports the hypotheses.

Table 16

Summary of Study Findings, Aim 3

Aim 3: To evaluate whether hospital investment in urgent care is associated with a significant increase in ambulatory surgery volumes.			
Hypothesis		**Supported by Primary Analysis?**	**Supported by Sensitivity Analysis?**
Hypothesis 3:	Hospital investment in urgent care is associated with an increase in ambulatory surgery volumes.	Not supported	Supported
Hypothesis 4:	Hospital financial pressure will moderate the association between hospital investment in urgent care and operational performance such that the greater the financial pressure, the greater the increase in the volume of ambulatory surgeries.	Partially supported for HMO ownership Partially supported for managed care penetration	Partially supported for HMO ownership Not supported for managed care penetration

Results from the primary analysis, which uses an unbalanced panel, indicate that the marginal effect of UCC ownership on ambulatory surgeries is positive for all lengths of UCC ownership; however, none of these effects are statistically significant, failing to support Hypothesis 3. However, when a balanced panel is used in sensitivity analysis, the marginal effect of UCC ownership on ambulatory surgeries is not only positive, but statistically significant ($p \leq 0.05$) for all lengths of UCC ownership. Thus, findings from the sensitivity analysis support Hypothesis 3, suggesting that UCC investment is associated with an increase in ambulatory surgery volumes.

Primary analysis results provide partial support for Hypothesis 4 when HMO ownership is the measure of financial pressure. The marginal effect of UCC ownership for hospitals that own an HMO is positive for all lengths of ownership, but is only statistically significant in the latter years of UCC ownership (6,11, and 16 years). When a balanced panel is used, the marginal effect of UCC ownership for hospitals that own an HMO is also positive for all lengths of ownership, but is now also statistically significant ($p \leq 0.1$) at year 3 of UCC ownership, in addition to 6, 11, and 16 years ($p \leq 0.1$). Thus, both the primary and sensitivity analysis for Aim 3 provide partial support for Hypothesis 4, that financial pressure positively moderates the relationship between UCC investment and ambulatory surgeries.

Primary analysis results also provide partial support for Hypothesis 4 when managed care penetration is the measure of financial pressure. At years 6, 11, and 16 of UCC ownership, the marginal effect of UCC investment for hospitals operating in counties with top 25% managed care penetration is positive and statistically significant ($p \leq 0.1$), indicating that managed care penetration positively moderates the relationship between UCC investment and ambulatory surgeries at later years of UCC ownership. However, when a balanced panel is used for sensitivity analysis, the marginal effect is not statistically significant at any length of UCC ownership, failing to support Hypothesis 4.

This study argues that integrating UCCs into a hospital's continuum of care creates an opportunity for hospitals to refer UCC patients to in-network, hospital-based providers for follow-up care, such as ambulatory surgery. Musculoskeletal conditions (e.g. joint fractures) account for approximately 21.5% of all UCC visits (Weinick et al., 2010); thus, it is not surprising that investing in a UCC would help hospitals drive increases in their ambulatory surgery volumes through referral generation. Hospitals that own HMOs are even better positioned to encourage patients to seek this follow-up care from an in-network hospital provider. The financial pressure experienced by HMO owners makes them eager to prevent loss of revenue by having to pay other hospitals for surgeries that could be delivered by the hospital itself. As with outpatient visits, HMO owners can structure their plans in such a way (e.g. cost sharing) that plan members are incentivized to seek ambulatory surgery from providers within their hospital. Additionally, HMO owning hospitals may be motivated to use their UCC to increase ambulatory surgery volumes for non-HMO enrollees to supplement the constrained revenues from their HMO enrollees. It may, however, take time for UCCs to generate enough patient volume to warrant a significant increase in ambulatory surgeries. This might explain the failure to find a significant relationship between UCC investment and ambulatory surgeries in year 1 of UCC ownership.

Finally, in both study Aims 2 and 3, the hypothesis that financial pressure moderates the relationship between investment in UCCs and outpatient visit and ambulatory surgery volumes has minimal support when managed care penetration is the measure of financial pressure (and is not supported using a balanced panel for Aim 3). One possible explanation for this lack of support for the moderation hypothesis is that county level, Medicare managed care penetration is too broad a measure to accurately capture hospital-level financial pressure. Its hospital-level counterpart, HMO ownership, is found to moderate the relationship between investment in UCCs and both outpatient visits and ambulatory surgeries. Thus, perhaps a finer, hospital-level managed care penetration measure would be a better measure of financial pressure. Additionally, the study uses Medicare managed care penetration as a proxy for overall market managed care penetration due to lack of data availability. This may contribute to the lack of significant findings for Hypothesis 4.

As noted in the preceding paragraphs, sensitivity analysis using a balanced panel for Aim produces different results from the primary, unbalanced panel analyses. In particular, Hypothesis 3 is supported by the sensitivity analysis, but not by the primary analysis. Additionally, Hypothesis 4 is not supported by the sensitivity analysis when managed care penetration is the measure of financial pressure, but is partially supported in the primary analysis. These distinctions can be likely attributed to differences in hospital competition levels between UCC owners and non-UCC owners across the balanced and unbalanced samples. In the unbalanced sample, there is no statistically significant difference in competition levels between UCC owners and non-UCC owners. However, in the balanced sample, non-UCC owners tend to operate in counties with significantly higher ($p \leq 0.05$) levels of hospital competition when compared to UCC owners. As increased hospital competition is negatively associated with hospital ambulatory surgery volumes (Bian & Morrisey, 2007; Devers et al., 2003), this likely explains why the UCC owners in the sensitivity analysis, operating under less competitive market conditions, may see a greater increase in hospital ambulatory surgery volumes compared to hospitals without a UCC.

Study Contributions

UCC Investment and ED Visits.

This study makes an important contribution to the stream of health services literature examining the impact of urgent care facilities on ED use and overcrowding. The few existing studies that have examined the impact of urgent care on ED use have focused on either the proximity of the UCC to the ED or the proximity of the patient to the UCC, and have produced mixed results (e.g. Llovera et al., 2019; Yakobi, 2017). This is the first study to examine the impact of a hospital's own investment in a UCC on its low-acuity ED volumes, shedding light on whether hospitals can strategically use UCCs to address ED overcrowding. Much of the narrative in the industry literature argues that one of the main reasons hospitals are investing in UCCs is for their potential to reduce operational pressure on the hospital's ED (Cheney, 2015; Fellows, 2015; Weiner, 2017). In line with this narrative, this study posited that low-acuity ED visits are the main source of ED overcrowding and that hospital investment in UCCs creates an opportunity for hospitals to reduce ED overcrowding by funneling low-acuity patients from the ED to the hospital-owned UCC. However, study findings failed to support a reduction in the proportion of low-acuity ED visits as a performance benefit of hospital investment in urgent care.

This finding is important for hospital leaders to consider in their strategic decision making as they evaluate and weigh options for reducing pressure on their EDs. Should health care leaders still want to move forward with investment in UCCs, hospitals may want to put great efforts into educating patients on conditions that can be treated in the UCC setting to help patients more accurately self-triage. Moreover, hospital leaders may want to consider opening the UCC on the hospital-campus in order to make it easier for ED staff to physically redirect low-acuity patients to the UCC setting.

This finding is also an important consideration for health policy makers. Since this study found that hospital UCC investment did not result in a significant shift in low-acuity visits from the higher-cost ED to the lower-cost UCC setting, policy makers may not want to focus on hospital investment in UCCs as a means for curbing health spending in the broader health system. Recent research examining the impact of other convenient care models, including retail clinics and freestanding EDs, on health spending has reached similar conclusions. For example, Ashwood and colleagues (2016) found that retail clinics generate new health care utilization and, as a result, increase annual health care spending per person for low-acuity conditions. Similarly, Ho and colleagues (2017) found that entry of a freestanding ED increased local market spending on emergency care. Policy makers may instead find greater success in redirecting low-acuity ED utilization to lower cost settings through implementation of alternative policy approaches, such as chronic care clinics (O'Toole et al., 2010), case management programs (McCormack et al., 2013; Shah et al., 2011; Shumway et al., 2008), or acute disease management and education (Brown, 2006). Moreover, policy makers may want to consider that policy solutions for reducing low-acuity ED utilization and health spending are not as straightforward as creating or expanding new types of facilities (such as UCCs), but rather may entail more thorough, continuous patient education and active involvement in the patient's health care journey.

UCC Investment and Downstream Hospital Services.

Hospital investment is found to be associated with an increase in outpatient visits and ambulatory surgery volumes, particularly for hospitals that own an HMO, suggesting that the true performance benefit of hospital investment in urgent care is maintaining or growing referrals for these downstream hospital services. Thus, this study identifies UCC investment as a viable strategy for hospital managers to retain or increase revenue and potentially gain competitive advantage by attracting patients to their UCC that would otherwise go to a competitor's facility. In other words, investing in UCCs is one way in which hospitals can engage in the geographic expansion race, expanding their services into new, fast-growing geographic market areas with the dual goals of (1) attracting new (and potentially younger, affluent, and/or well-insured) patients and funneling them to other hospital services and (2) steering such patients away from their competitors (Carrier, Dowling, & Berenson, 2012; Felland, Grossman, & Tu, 2011; Patidar et al., 2017).

From a policy perspective, study findings raise questions as to whether hospital investment in UCCs could disrupt efforts on a policy front to rationalize the services and sites of care within a community. For example, critics may argue that hospital investment in urgent care could impede rationalization goals because it potentially creates further redundancy in outpatient care service lines (e.g. the same services are provided in both the hospital and outpatient setting). However, hospital investment in UCCs could be part of the solution to rationalize care, aiding with centralization of specialized care in the hospital setting while simultaneously increasing access points for low-acuity services should the UCCs be opened as freestanding facilities within the greater community (Kacik, 2019). Thus, while policy makers may not want to encourage hospital UCC investment as a means to reduce low-acuity visits, they may want to consider encouraging UCC investment as a part of the solution to rationalize care.

Theoretical Implications.

Finally, this study employs a multi-theoretical perspective, answering an important call for theoretical pluralism in the analysis of health care organizations (Mick & Shay, 2014). Strategic Management Theory is used to develop hypotheses about the relationship between hospital investment in urgent care and low-acuity ED visits, outpatient visits, and ambulatory surgeries. Contingency Theory is used to hypothesize that financial pressure and stressed ED capacity moderate these relationships. Study findings suggest that financial pressure, in the form of HMO ownership, does indeed moderate the relationship between UCC investment and downstream service volumes, demonstrating the value of a multi-theoretical perspective in gaining a more comprehensive understanding of the relationship between hospital strategy and operational performance.

Limitations

There are several noteworthy limitations in this study. As previously discussed in this chapter, this study does not have access to data to account for whether a hospital has more than one UCC or the proximity of the UCC to the hospital campus. The study also only has access to UCC ownership data dating back to the year 2000, thus the true length of UCC ownership is unknown. However, as several results are statistically significant in the later years of UCC ownership in the study (i.e. 6, 11, and 16 years), it is reasonable to assume that 16 years of ownership data is sufficient to assess the impacts of UCC ownership over time. It is also important to note the potential for reporting error, particularly as it relates to the potential misreporting of UCC ownership in the AHA Annual Survey Database. There were several cases in the data in which hospitals reported gaps in UCC ownership, which could be due to a hospital closing then reopening a UCC, or due to incorrectly reporting that it did not own a UCC during that time.

Using county as the definition of market, as opposed to a finer market definition such as hospital service area or zip code grouping, is also a potential study limitation, as this may not accurately reflect the state of the hospital's competitive environment. This study is also unable to control for all factors that may influence dependent variables, such as the total number of UCCs in the market.

Another noteworthy limitation is that this study explores the impact of UCC investment on ED volumes for a subset of low-acuity conditions that commonly present in the UCC. It is possible that expanding this to include a broader array of low-acuity conditions would result in a significant association between UCC investment and the proportion of low-acuity ED visits. However, the group of low-acuity conditions examined in this study does account for approximately 66.5% of all UCC visits (Weinick et al., 2010).

This study also does not directly measure referral volumes from UCCs to outpatient care and ambulatory surgery. Instead, it assumes that any increases observed in these service volumes are a result of the UCC referral process. Lastly, the generalizability of study findings is limited as this study is restricted to a convenience sample of general acute care hospitals in four states for Aim 1 analysis and ten states for Aims 2 and 3.

Implications for Future Research

As the first to examine the impact of hospital UCC investment on hospital operational performance, this study opens many opportunities for future research. First, researchers should leverage other available datasets to address many of the limitations noted above, such as accounting for the number of UCCs owned by a hospital or whether the UCC is physically located on the hospital campus. It is possible that hospitals with more than one UCC or hospitals that have an on-campus UCC are better positioned to reduce low-acuity visits to their ED. Additionally, hospitals with more than one UCC may see a greater impact on their outpatient visit and ambulatory surgery volumes because they are likely able to attract a greater volume of new patients across multiple sites and, as a result, generate more referrals to downstream services. Regarding Aim 1, future research focusing on ED visits during a UCC's hours of operation would help determine whether the impact of UCC ownership on the proportion of low-acuity ED visits is specific to the period of overlap between ED and UCC hours of operation. Researchers may also want to broaden the scope of low-acuity conditions examined in the analysis to more accurately capture the impact of UCC investment on low-acuity ED utilization. Additionally, future researchers may want to use alternate definitions of market, such as health service area or a combination of zip codes, in order to have a more precise measure of the hospital's competitive environment.

Alternate measures of hospital financial pressure should also be explored as moderators of the relationship between UCC investment and hospital operational performance to provide further clarity on the moderating role of financial pressure. There is also the potential that other factors, such as whether a hospital has a freestanding ED, may moderate the relationship between UCC investment and hospital operational performance. Future research should examine such possibilities. Ideally, future research will use a nationally representative sample of hospitals to improve the generalizability of findings.

Finally, the author encourages other researchers to continue leveraging multi-theoretical perspectives as they explore the relationships between convenient care models and hospital operational performance. For example, Institutional Theory might suggest that hospitals invest in convenient care models, even though it may not improve operational performance (e.g. reduce low-acuity ED visits), as a means to achieve legitimacy of their organizational structure, opening up access to necessary resources and ensuring their survival (Mick & Shay, 2014; Meyer & Rowan, 1977). Alternatively, Resource Dependence Theory might suggest that hospitals invest in convenient care models as a means to increase the size and power of the organization, enabling them to take control of critical resources in the environment – such as previously unreached patients in new geographic markets – which may result in supplemental revenue streams for the organizations (Mick & Shay, 2014; Pfeffer & Salancick, 2003; Scott & Davis, 2007). Accordingly, use of multiple theoretical paradigms may help future researchers better account for the intricacies of the health care environment when examining such relationships.

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Vita

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