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Hospital Merger and Acquisition Effects on Healthcare Quality and Cost

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By

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ABSTRACT

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Healthcare is as much a business subject to market dynamics as it is a public service, with enormous sums of money and resources devoted to it. Since a person's health is one of his or her most valuable assets, healthcare will always be in high demand, regardless of the price of medical goods and services. Considering healthcare's nature as a necessary good and the irreplaceable importance of a medical facility to its service area, any changes in capacity or method of healthcare delivery may have profound effects on the dependent population.

Situations in which a hospital merges with a healthcare system or another hospital exemplify such a change, for mergers entail potentially large-scale alterations to the local healthcare market and to the manner in which care is provided. The number of hospital mergers and acquisitions has been steadily increasing since 2003, with the number of deals growing over 40 percent from 2010 to 2015.

A concern is that larger institutions or systems wield greater market power and may gain the ability to control the majority of healthcare delivery in the local area; this decrease in competition can lead to rising costs without comparable improvements in quality. On the other hand, consolidations can also present the opportunity for better integration and efficiency of care, more abundant and valuable technological resources, elimination of duplicate services, collaboration among more adept healthcare providers,

and overall cost savings from economies of scale. This study explores the effects of hospital consolidation and resultant operational changes on patient outcomes and the costs associated with their care. Furthermore, the effect of hospital ownership status on quality and cost measures will also be assessed. This thesis differs from existing literature because it is the first known study to use hospital-level data from 2010 to 2014 to analyze whether hospital mergers significantly affect healthcare quality and cost.

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CHAPTER ONE
INTRODUCTION

Hospital administrators involved in mergers believe that hospital consolidation poses many benefits to not only the business and operations facet of medicine but also the direct line provision of healthcare service. They argue that mergers improve efficiency as well as access to and quality of care. Additionally, healthcare costs may decrease because in theory, the more care a hospital provides, the more efficient and less expensive it should become through economies of scale and scope; better access to skilled healthcare professionals and medical technologies should improve care delivery overall and ultimately benefit patient outcomes (Curfman, 2015; Ferrier and Valdmanis, 2004; Harris et al., 2000).

Despite the appeal of the consolidation business decision to the entities directly involved in the transaction, many health economists, rival hospitals, and healthcare consumers are rightfully wary of the growing number of hospital mergers. When individual hospitals merge into larger systems, their growing patient base and market share give them greater leverage over health insurance companies for higher reimbursement rates. These higher prices, in turn, fall to consumers in the form of higher premiums. Therefore, from the patient perspective, mergers may be unfavorable because of their potential to drive up healthcare costs (Curfman, 2015; Ferrier and Valdmanis, 2004; Harris et al., 2000).

The issue of hospital mergers and acquisitions (M&As) has been debated for years because they carry different costs and benefits for different constituents. Amidst the perpetual effort toward healthcare quality improvement and cost reduction consequent the passage of the Patient Protection and Affordable Care Act (ACA) in 2010, hospital,

health system, and hospital association leaders have contended that healthcare reform compels them to consolidate. On the other hand, others argue that mergers will, above all else, result in increased prices. As a result, merging hospitals continue to face scrutiny from healthcare providers and patients to prove the value of M&A deals and the benefits they provide to consumers. It is of question whether the theoretically improved capacity for procedural and clinical integration associated with mergers will actually come to fruition, for healthcare institutions with dissimilar missions, cultures, and operational structures may be unable to overcome the difficulties of achieving true assimilation of services. In light of these obstacles, however, integration strategies that capitalize on the distinct capabilities of the merging entities have been found to be successful; merging assets to maximize collaborative opportunities, to increase quality of care through greater available resources and expertise, and to contain costs via economies of scale will lead to more efficient, reliable, and accessible healthcare goods and services (Barnet et al., 2014).

Though there has been some distinction made in previous literature between local multi-hospital systems and local mergers – the former of which involves two or more hospitals that maintain separate physical facilities, do business under separate licenses, and keep separate financial records, and the latter of which involves two or more hospitals that do business under a single license, report unified financial records, and may or may not consolidate some physical facilities – both consolidations between health systems and hospitals as well as mergers between two individual hospitals will be considered (Dranove and Lindrooth, 2003).

The remainder of this thesis will analyze the various costs and benefits accompanying both such M&A transactions in further detail. The organization of the ensuing discussion is as follows. Chapter 2 provides an overview of the current healthcare industry and hospital consolidation trends. Chapter 3 is a literature review on hospital mergers and their effects on healthcare quality and cost. Chapter 4 introduces the statistical model to be tested and describes the data that will be used, followed by the results of the model in Chapter 5. Chapter 6 will then discuss the results of the previous chapter in a broader healthcare context. Finally, Chapter 7 concludes the thesis with a summary of important findings and provides recommendations and implications for further research.

CHAPTER TWO
BACKGROUND ON THE HEALTHCARE INDUSTRY

The medical industry comprises a robust collection of sectors that provide curative, preventive, rehabilitative, and palliative care to ailing patients. Considering the necessity of and increasing demand for its goods and services, healthcare is one of the world's largest and fastest-growing industries. Medical expenditures in the United States alone stood at $3.2 trillion in 2015, accounting for 17.8 percent of gross domestic product (GDP) (Appendix A). Of the $3.9 trillion allocated for federal spending in 2016, $588 billion was spent on Medicare and $368 billion on Medicaid (Appendix B). In 2014 Medicare and Medicaid spending comprised 20 percent and 16 percent of total national healthcare expenditures, respectively, while private health insurance spending and out-of-pocket spending made up 33 percent and 11 percent of the total. Additionally, hospital expenditures, physician and clinical services expenditures, and prescription drug spending all experienced greater growth rates relative to those in 2013. Households and the federal government together sponsored the majority of total health spending in 2014 (54 percent), private businesses accounted for 20 percent, state and local governments for 17 percent, and finally other private revenues for 7 percent (Centers for Medicare & Medicaid Services). Since medical expenditures consume over 10 percent of GDP in most developed countries, healthcare can represent an enormous part of a nation's economy (The Commonwealth Fund) (Appendix C).

In response to this perpetually growing demand for and cost of healthcare, the Patient Protection and Affordable Care Act (ACA) was passed in 2010 to provide consumers more affordable, accessible, and higher quality healthcare services. With more complete realization of its provisions in 2014, the ACA requires insurers to accept all

applicants, cover a specific list of conditions, and charge the same rates regardless of pre-existing conditions or sex. Additionally, inaugurating a Patient's Bill of Rights has allowed consumers greater control of their care, a capacity facilitated by coverage expansions and premium subsidies (Health and Human Services). Furthermore, for 2015 to 2025, medical spending is projected to grow at an average rate of 5.8 percent per year, 1.3 percentage points faster than GDP (Appendix D). For 2015 to 2016, continued enrollment growth in Medicaid and the marketplaces as well as enrollment increases in employer-sponsored plans have substantially reduced the uninsured population without drastically changing the growth rate in health spending. However, this growth is expected to accelerate and average 5.7 percent for 2017 through 2019 as a result of gradual increases in economy-wide and medical-specific prices; moreover, greater household disposable income will likely contribute to rising healthcare costs consequent higher use and intensity of medical goods and services. Finally, projected average growth surges to 6.0 percent for 2020 to 2025 due to strong Medicare enrollment growth amongst baby boomers and an increasingly higher share of Medicaid beneficiaries comprising comparatively aged and disabled individuals. Thus, by 2025, over one-fifth of the country's expenses will be attributed to medical care (Centers for Medicare & Medicaid Services).

A wide variety of healthcare institutions offer goods and services throughout the U.S., and all operate slightly differently in compliance with federal regulations and in response to local market dynamics. In 2014 the American Hospital Association (AHA) registered 5,627 U.S. hospitals, which include nongovernment not-for-profit community hospitals, investor-owned for-profit community hospitals, state and local government

community hospitals, federal government hospitals, nonfederal psychiatric hospitals, nonfederal long term care hospitals, and hospital units of institutions. In addition to these categorizations, hospitals are also indexed according to their location and affiliation with other healthcare entities. Approximately 54.6 percent and 33.0 percent of all registered hospitals are in urban and rural communities, respectively, and a majority of hospitals belong to a system (56.6 percent) compared to a network (28.8 percent); a system is either a multihospital or a diversified single hospital system, and a network involves a group of hospitals, physicians, other providers, insurers and/or community agencies that collectively coordinate and deliver a broad spectrum of services to their community. Altogether, annual expenses in 2014 for all AHA registered hospitals totaled to nearly $9 billion (American Hospital Association).

It is apparent that healthcare constitutes a considerable national expense in the U.S., and its projected growth will continue to outpace GDP growth and eventually make healthcare costs unsustainable. Even with the passage of federal policies aimed at healthcare reform, the constant goal of reducing medical expenditures while improving care access and quality remains elusive. Since hospitals are both service and business entities, they may choose to engage in transactions, such as consolidation deals, to increase their capacity to provide better care with more available resources and efficient processes.

CHAPTER THREE
A REVIEW OF HOSPITAL CONSOLIDATION AND ITS EFFECTS ON HEALTHCARE QUALITY AND COST

In light of growing strategic, economic, and regulatory pressures, one of the most prevalent trends in today's dynamic healthcare industry involves hospital consolidation to form larger systems capable of capitalizing on broader service reach and economics of scale (Yanci et al., 2013). Existing literature analyzes an array of merger predispositions and ramifications and discusses many factors that drive the business decision as well as resulting quality and cost outcomes.

3.A. Macro level of hospital consolidation and competition

Before considering the direct effects of mergers on the particular entities involved in the transaction, it is important to examine the consequences on the local healthcare markets as a whole. Hospital consolidation may seem favorable from a broader perspective of increased capital and resources, but its effect on industry competition and market power may significantly alter the quality of care delivery and cost to patients.

3.A.1. Arguments for hospital consolidation

Advocates for hospital consolidation argue that mergers provide the opportunity to share clinical services and resources, capitalize on economies of scale, eliminate duplication, and ultimately improve healthcare quality without increasing cost (Chang et al, 2016; Connor et al., 1997; Frakt, 2015; Xu et al., 2015). High-volume institutions are more likely to benefit from increased operational efficiency and cost savings associated with economies of scale; reducing unused capacity through pooled staffing and eliminating duplicative services place merged entities in a better financial position with

more streamlined and effective production processes (Connor et al., 1997; Hayford, 2012). The resulting efficient and standardized operations as well as more experienced healthcare providers, higher volumes of specialized procedures can yield better surgical outcomes (Connor et al., 1997). Merged facilities can also share high-performing infrastructure resources like electronic medical records (EMRs) and have better access to a greater range and amount of capital (Chang et al., 2016; Connor et al., 1997). Additionally, mergers may be accompanied by attainment of not only physical capital but also human capital as larger, more capable medical facilities attract increasingly skilled professionals and garner greater patient bases from broader geographic and network coverage (Alexander et al., 1996; Connor et al., 1997). Financial gains through merges strengthen the capacity to invest substantially in quality-improvement health technology and personnel (Alexander et al., 1996; Tsai and Jha, 2014). Even though greater resources may not be invested in quality improvements, they are unlikely to reduce quality; thus, the financial impact of a merger on quality should be, at worst, neutral (Hayford, 2012).

3.A.2. Effects of competition on the healthcare industry

While proponents of hospital consolidation contend that efficient integration of care and economies of scale drive quality improvement and cost reduction, a decrease in competition consequent mergers has been shown to have opposite effects (Chang et al., 2016; Frakt, 2015). Isolating the effect of reduced competition on quality of care has revealed an increase in the number of procedures but also an increase in inpatient mortality (Hayford, 2012).

In a competitive market, providers must always strive to outperform their rivals in order to attract patients. Therefore, the presence of competition provides a strong drive to improve quality of services. Furthermore, healthy competition among providers for inclusion in a network's patient base enables insurers to negotiate lower reimbursement rates, which translate to lower insurance costs for consumers and employers (Ramirez, 2014). There has also been evidence suggesting that hospitals in competitive markets tend to have better management, possibly because poor management is associated with more substantial costs (Tsai and Kha, 2014).

It is not to say that partnership between healthcare entities to any degree adversely affects; most of the leading quality and safety successes in medicine, such as the implementation of the World Health Organization (WHO) Surgical Safety Checklist and near elimination of bloodstream infections in hospitals, have resulted from hospital collaborations. However, these were collaboratives formed by competing hospitals rather than within one system under common ownership (Xu et al., 2015).

3.A.3. Local hospital market dynamics

In addition to analyzing the prevalence of competition, it is important to consider other dynamics of the healthcare markets in which mergers occur. The geographic and economic natures of merging entities are also relevant considerations because cross-market mergers have been shown to differ from within-market mergers, controlling for commonalities shared across both merger types like changes in bargaining skill, managerial practices, service mix, and cost structures (Dafny, 2016). Within a market, merged facilities appear to retain most of their market share several years after the merger, and zip codes with larger shares of patients who are discharged by merged

facilities are affected proportionally to their share (Hayford, 2012). The identities of the medical institutions present in the market also influence how these entities interact and how mergers affect healthcare costs.

Merger-related price reductions have been found to be considerably less in market areas with higher market concentration levels, and such reductions in areas with higher health maintenance organization (HMO) penetration were approximately twice those in areas with lower HMO penetration (Connor et al., 1997). Furthermore, consolidations may alter the competitive dynamics of local healthcare markets, pressuring rival hospitals to improve their quality of care to increase their competitive advantage against growing hospital systems and to retain bargaining power with insurance companies (Chang et al., 2016). Although surrounding hospitals may be compelled to reform their healthcare practices in attempt to remain competitive, the merged entity itself may adopt a degree of stagnating complacency. Larger, post-merger systems or hospitals may be less motivated to join health information exchanges, which allow for the meaningful data sharing, systems for effective patient handoffs, and streamlined care transitions, because they assume they already capture a large proportion of patients' clinical information internally; they may see information as a tool to retain patients, not to improve care (Tsai and Jha, 2014). Moreover, conglomerate hospitals created from mergers have the potential to wield considerable market power and to make decisions regarding the care offerings for a large patient population.

The absence of robust competition may incentivize such hospitals to focus on the most profitable services rather than to maintain the infrastructure for a fuller range of services or to pursue continuous quality improvement. These actions present risk to a

population if a monopoly hospital system within a market fails; population health would suffer, and greater threat endangers rural areas where one hospital system serves as the only source of medical care (Xu et al., 2015). Therefore, it is essential to consider not only the benefits of greater operational capacity consequent consolidation but also the potential harm that can follow if merged hospitals become powerful enough in their markets such that their priorities shift away from improving patient care to other, less altruistic goals.

3.B. Hospital characteristics

Hospital type and other general characteristics can affect the likelihood of a merge, structural and operational changes subsequent consolidation, and how mergers impact healthcare quality and cost. Furthermore, the number of patients, capable physicians, and overall volume of procedures in a hospital are important determinants of the ability to deliver appropriate care with improvements in patient outcomes paralleling decreases in costs.

3.B.1. Hospital size and ownership type

Connor, et al (1997) found that merging hospitals were less likely to have been government-owned and more likely to have been part of a system, were larger in terms of numbers of beds and admissions, had higher occupancy rates and case-mix indexes, and had higher expenses and revenues per adjusted admission. Despite the perception of mergers as an eventuality of one or two hospitals that do not have the resources to function optimally independently, little evidence suggests that smaller institutions cannot make the investments needed to improve care delivery. Small hospitals are comparable

with larger ones in adopting new health information technology, for example, and many quality improvement interventions, like checklists, are inexpensive and can be successfully implemented with strong leadership and commitment (Tsai and Jha, 2014). Size has been found to have post-merger ramifications, for mergers between hospitals of dissimilar size have resulted in a decrease in the number of beds in the new facility and an increase in both the nurses and total personnel per average daily census, changes that could possibly have helped ameliorate staffing shortages present in the pre-merged hospitals (Alexander et al., 1996).

Hospital ownership has been found to play a role in affecting quality and cost of care. Horwitz et al. (2005) found that the medical services hospitals provide vary markedly by ownership depending on their differing priorities; proprietary hospitals are more likely to offer relatively profitable services, government hospitals are most likely to offer relatively unprofitable services that are disproportionately needed by poor and underinsured patients, and nonprofit hospitals fall in between by balancing profit-seeking and serving the poor. An example of this phenomenon is the observation that among comparable hospitals, for-profits are the most likely to offer open-heart surgery above nonprofits and then public hospitals, sequentially (Horwitz, 2005).

Nonprofit and for-profit hospitals are privately owned and operated and thus may have greater access to resources than publicly-owned government hospitals. A phenomenon known as the “infrastructure inequality trap” represents when government funding is increasingly attracted towards private hospitals and away from public hospitals because private patients can afford to pay for greater infrastructure at private hospitals. As a result, private hospitals have a greater capacity to accept more government funds

and skilled healthcare personnel to promote healthcare quality improvement (Basu et al., 2012). Akinci et al. (2005) also underlines the importance of physical appearance and technological capabilities in patient perceptions of hospital competence.

Between for-profit and nonprofit hospitals, however, the majority of the studies that have analyzed healthcare data representative of U.S. hospitals have found that for-profit hospitals tend to have higher mortality or other adverse event rates than nonprofit hospitals. On average, for-profit hospitals have been found to have higher mortality among elderly patients with heart disease (McClellan and Staiger, 2000). On the other hand, it can be speculated that for-profit hospitals may provide higher quality care on easily monitored dimensions that are critical for determining reimbursement amounts but pay less attention to harder-to-monitor quality measures (Sloan et al., 2001). Amidst the various findings, it has also been concluded that hospital ownership does not make an apparent difference in quality outcomes, such as readmission rate to a hospital for the same diagnosis and mortality rates several months after discharge (McClellan and Staiger, 2000; Sloan and Taylor, 1999; Sloan et al., 2001).

When analyzing how ownership status impacts patient's perceived quality of hospital care, as opposed to examining the differences in actual patient health outcomes measures, hospital ownership does seem to have various effects different from those discussed previously on mortality and readmission rates. Since nonprofit and government hospitals do not place primary emphasis on earning a net profit, it is not uncommon for news of their high debt-to-asset ratios to shape consumer opinions in the media (Sloan et al., 2003). Consumers, therefore, form views that nonprofit and government hospitals have poor competence and that for-profit hospitals are better coordinated, have shorter

wait times, and more streamlined clinical pathways in order to minimize waste and maximize profit (Drevs et al., 2014). Proprietary hospitals, however, also suffer from perceptions of a conflict of interest because they provide healthcare goods and services while also aiming to make a profit. To address this discord between economic and altruistic strategic goals, for-profit hospitals sometimes affiliate with social causes or welfare initiatives (Lichtenstein et al., 2004).

Beyond competence, the level of comfort and perception of affectionate care afforded by a hospital to its patients are also crucial determinants of patient satisfaction that vary with ownership type. Nonprofit hospitals tend to score the highest in humane, fair, and personalized care (Schlesinger et al., 2004a; Schlesinger et al., 2004b). For-profit hospitals are not perceived well with regard to these considerations because consumers may feel as though they are not treated as individuals but as cases. Proprietary hospitals' principal focus on cost-reduction strategies, profit margins, and efficiency can convey a view of patient care as simply increasing volume and throughput (Comondore et al., 2009). Some for-profit hospitals have strived to eliminate this negative perception of lack of care for individualized patient needs by implementing customer relationship management programs (Akinci et al., 2005; Kim et al., 2008). Therefore, the different priorities and available resources of each of the three hospital types may have a more significant effect on shaping patient perceptions and satisfaction of care than on the actual outcomes measures themselves.

3.B.2. Hospital and surgeon volume of operative procedures

Consolidation almost invariably entails increases in hospital and surgeon volume for acquired hospitals due to a more expansive patient base, provider workforce, and

institutional capacity. As a result, healthcare quality is likely to be higher in medical facilities consequent a merger because high-volume hospitals may have more surgeons who specialize in specific procedures, more consistent processes for postoperative care, better-staffed intensive care units (ICUs), and greater resources, in general to handle postoperative complications (Birkmeyer et al., 2002). There is considerable evidence that patients undergoing various types of complex treatments or high-risk surgical procedures have lower mortality rates and otherwise better outcomes if care is provided in hospitals with a high caseload of patients with the same condition (Hayford, 2012; Kizer, 2003). For instance, hospital mergers are associated with increased utilization of intensive heart surgeries and greater treatment intensity, both in the type of treatment utilized and in the number of procedures received during a hospital stay (Hayford, 2012). For most conditions other than a small number of technically difficult surgeries like esophagectomy and pancreatectomy, however, the benefits of volume may be less pronounced; volume effects usually diminish past a critical threshold that most hospitals already reach for many procedures. Emerging evidence suggests that volume may simply be a proxy for other processes, such as having systems well-adept to recognize and effectively manage complications (Tsai and Kha, 2014).

In addition to increases in overall hospital volume for surgical procedures, surgeon volume and the average experience of operating surgeons also increase due to greater staffing capabilities and employment appeal following a merger. A larger surgeon team with more expertise is much more likely to improve patient surgical outcomes, and patients treated by high-volume surgeons have been shown to have lower operative mortality rates than those cared for by low-volume surgeons, regardless of the surgical

volume of the hospital in which they practiced (Birkmeyer et al., 2003; Kizer, 2003). Surgeon volume was found to be inversely related to operative mortality for eight cardiovascular or cancer resection procedures, and for certain types of such procedures, patients could significantly increase their chances of survival by selecting surgeons who perform the operations frequently (Kizer, 2003). The adjusted odds ratio for operative death varies widely according to the procedure, and surgeon volume accounts for a large proportion of the apparent effect of hospital volume (Birkmeyer et al., 2003).

3.C. Quality measures

One of the chief considerations in healthcare is patient quality outcomes and satisfaction scores, for medicine is ultimately a service for the good of the public. Therefore, there is pressure on merging entities to be able to justify the transaction with improving scores on various quality measures.

3.C.1. Mortality, complication, and readmission rates

Mortality and readmission rates represent two hallmarks of healthcare quality, and much research has focused on surgical outcomes measures. Although increases in volume that arise from consolidation have been seen to have positive effects on surgical mortality rates, the overall consequences of mergers on healthcare quality are mixed. Previous research on the effects of hospital mergers on certain procedures revealed inconsistent changes in risk-adjusted complication rate; lumbar and lumbosacral fusion of the posterior column and total hip replacement saw decreases in risk-adjusted complication rate; transurethral prostatectomy, cervical fusion of the anterior column, and total knee replacement experienced increased rates; and laparoscopic colectomy and lumbar and

lumbosacral fusion of the anterior column saw no change in complication rate. Furthermore, the comorbidity rate of obesity for patients of consolidated hospitals was found to be greater post-consolidation (Chang et al., 2016). Additionally, to contrast the decreased adjusted mortality rates found for selected cardiovascular and cancer procedures discussed previously, merger completion is also associated with increased utilization of bypass surgery and angioplasty as well as increased inpatient mortality (Hayford, 2012).

Previous studies have also researched the extent to which mortality and readmission rates are related. Some existing literature has found a modest association between 30-day mortality and readmission rates for heart failure (Krumholz et al., 2013; McIlvennan et al., 2015). Krumholz et al. (2013) found that risk-standardized mortality and readmission rates were not associated for patients admitted for heart attack or pneumonia and were only weakly, negatively associated for patients admitted with heart failure. Another study by Ho and Hamilton (2000) compared the quality of hospital care before and after mergers and acquisitions in California between 1992 and 1995 and found no measurable impact on inpatient AMI mortality and increased AMI 90-day readmission rates in some cases.

Finally, though mergers allow for financial savings due to infrastructure consolidation, some patients may be required to travel farther for care. Additional travel time, even in urban or hospital-dense areas, has been found to increase mortality from myocardial infarctions (Hayford et al., 2012). Therefore, hospital consolidation does not seem to uniformly impact postoperative mortality or readmission rates.

3.C.2. Patient satisfaction scores

Patient experience of care has also become an important consideration in evaluating healthcare quality. The Centers for Medicare & Medicaid Services' (CMS) Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) provides a national, standardized survey instrument and data collection methodology for measuring patients' perspectives on hospital care. This survey allows for valid comparisons to be made across all hospitals in the U.S. (HCAHPS Hospital Survey). One of the HCAHPS global measures, patients' overall ratings of their hospitals, has been positively associated with hospital performance on CMS clinical process of care measures for AMI, HF, PN, and surgical care (Isaac et al., 2010; Jha et al., 2008). Mortality and readmission rates conditions such as heart attack, heart failure, and pneumonia have shown improvement consequent the start of public reporting and inclusion of these measures in the CMS's pay-for-performance (P4P) programs (Griffey and Kosowsky, 2007; Price et al., 2014; Suter et al., 2014). Higher patient satisfaction has been found to be associated with improved guideline adherence and lower risk-adjusted inpatient mortality rates for heart attack patients (Glickman et al., 2010). Furthermore, hospitals with the highest patient satisfaction scores have lower 30-day mortality and readmission rates compared to hospitals with the lowest patient satisfaction scores (Tsai et al., 2015). Finally, it is not only outcomes metrics that play a role in determining patient experience but also process of care measures. Hospitals with consistently poor performance on cardiac process measures have also been found to possess lower patient satisfaction on average, an association suggesting that these hospitals have overall poor

quality of care (Girotra et al., 2012). Research on the effects of hospital mergers on HCAHPS scores is limited, and no conclusive evidence from multiple studies has suggested any significant impacts.

3.D. Healthcare cost

Medical expenditures comprise a relatively large proportion of the country's GDP, and containing its rapid growth is one of the nation's primary concerns. Whether M&A transactions result in increased or decreased costs is still a topic of contention, and assessing the effects of mergers on the operational performance of the involved entities is important to consider.

3.D.1. Costs

Similar to quality, healthcare costs have also experienced variable impacts as a result of hospital mergers. In instances in which lesser performing hospitals consolidate through a merger or acquisition, the act can allow for cost savings, increased market power, and economies of scale (Chang et al., 2016). Moreover, merger-related price reductions have been found to be greater for low-occupancy hospitals, nonteaching hospitals, non-system hospitals, similar-size hospitals, and hospitals with greater pre-merger service duplication (Connor et al., 1997).

Despite these findings, many studies have shown the opposite effect that hospital consolidation raises prices upwards of 45 percent with little to no corresponding improvements in quality (Dafny, 2014; Gaynor and Town, 2012; Ramirez, 2014; Xu et al., 2015). In considering the rival distance to merged entities, there has also been

evidence indicating substantial post-merger price increases by rivals of merging hospitals (Dafny, 2005). Price increases may arise through two mechanisms in settings in which a single payer negotiates with both providers. The common customer effect is generated when the insurer competes for customers who value both merging providers, and the common insurer effect exists even in the absence of common customers. Cross-market mergers in the same state resulted in price increases of roughly 6 to 10 percent, while those linking hospitals to out-of-state providers did not result in statistically meaningful changes in price; mergers of proximate hospitals may lead to the largest price effects (Dafny et al., 2016). The majority of existing literature seems to suggest higher healthcare costs as a result of hospital mergers.

3.D.2. Hospital operating efficiency

Incongruent with the substantial support for higher prices without compensating benefits consequent hospital consolidation, mergers may produce short-term improvements in operating efficiency on measures such as the number of duplicate tests and the regional variation in medical practice (Quality Forum). For all merger types, operational areas such as operating efficiency, occupancy rate, and expenses per adjusted admissions were all positively impacted, and trends toward inefficiency were arrested somewhat after merger (Alexander et al., 1996). Additionally, because mergers often create avenues whereby to consolidate two small clinical departments into one larger unit, they can reduce the relative variability of daily patient census as well as the associated costs of staffing adequately for random periods of high demand (Lynk, 1995).

3.E. Concerns regarding mergers

Since mergers continue to occur amidst the debates regarding its different costs and benefits depending on the constituents in question, third party institutions have some control over the outcome of consolidation propositions; these organizations strive to make objective decisions about merger deals after taking into account their possible effects on both the macro and micro scale.

3.E.1. Hazards of mergers

The main potential hazards of mergers to parties other than the consolidating hospitals or hospital systems are decreased competition, higher prices, and reduced geographic access because of consolidation (Connor et al., 1997). Even though there has been some evidence suggesting that mergers reduce costs, improve healthcare quality, and increase operational efficiency, many of these benefits can be achieved without consolidation. The volume-quality relation of better health outcomes with higher numbers of procedures as well as better triaging of patients to the best physician can be addressed through interoperability of EHRs and better transparency. Proliferation of large hospital systems in low-competition marketplaces may fail to improve outcomes and also could encourage greater health care utilization that may drive up costs and induce iatrogenic illness. Furthermore, infrastructure consolidation may require some patients to travel farther for care, resulting in more intensive procedures and higher mortality. Finally, hospitals that own expensive equipment, such as radiation machines, are more likely to refer patients for in-system treatment over other treatment options, leading to potentially more suboptimal care and overtreatment in large health systems (Xu et al., 2015).

3.E.2. Antitrust organizations

Considering the dangers associated with hospital consolidations, antitrust organizations can be justifiably concerned that mergers in concentrated markets will erode competition, increase prices, and reduce consumer welfare (Connor et al., 1997; Dafny, 2014). Antitrust laws play a crucial role in ensuring that consumers benefit from robust market competition. Such necessary competition leads to lower costs and higher-quality services and encourages investment and innovation. The Federal Trade Commission (FTC) intervenes when there is strong evidence that a merger between healthcare providers is likely to result in market power that will cause an increase in prices through higher insurance premiums and copayments without corresponding quality improvements. The FTC showed that there are different ways other than a merger for hospitals to achieve the benefits of clinical integration, such as the use of clinical practice protocols to ensure consistent treatment and financial incentives for meeting quality-of-care goals (Ramirez, 2014).

CHAPTER 4
STATISTICAL MODEL: DIFFERENCE-IN-DIFFERENCES ANALYSIS

Difference-in-differences (DID) analysis will be used to compare changes in risk-adjusted complication rate of certain elective operations performed nationally one year prior to consolidation (pre-consolidation) and the year after consolidation (post-consolidation) between the consolidated hospitals and the matched control group. Chang et al. (2016) conducted a similar study with patient-level data from the Health Care Cost and Utilization Project State Inpatient Database for California and Florida. They identified 19 hospitals that consolidated between 2007 and 2013 and propensity matched them with 19 independent hospitals, using patient and hospital characteristics. This study will compare a sample of 20 merged hospitals from 2011, 8 merged hospitals from 2012, and 16 merged hospitals from 2013 with a matching number of unmerged, control hospitals from each corresponding year. Hospitals were matched according to number of beds, and quality and cost data were obtained from 2010 to 2014.

CHAPTER 5
DATA AND RESULTS

The main purpose of this study is to test whether a hospital merger or acquisition has a significant impact on the target hospital's patient outcomes and Medicare reimbursements. Equation 1 was used for the basic DID analysis employing an ordinary least squares (OLS) regression in which quality outcomes were a function of three dummy variables: AFTER, whether the quality data was from the year before or after that of the merge; MERGED, the status of the hospital as merged or unmerged; and AFTER*MERGED, the interaction term. These three independent variables were included to analyze not only the individual effects of time and merger status on hospital quality scores but also, most importantly, the combined effect of participation in a merger deal on the quality of care provided over time.

$$OUTCOME = \beta_1 AFTER + \beta_2 MERGED + \beta_3 AFTER*MERGED + \varepsilon \quad (1)$$

This study uses data on hospital mergers and acquisitions (M&A) from Irving Levin Associates, a company that has been providing market intelligence for healthcare M&A markets for over 60 years (Irving Levin Associates). Irving Levin Associates is the leading publisher of business intelligence for investors in healthcare M&A and finance, and it is the most well-recognized and reliable source of catalogued hospital merger deals in the nation. Information on 2011, 2012, and 2013 hospital M&As was obtained from the comprehensive lists outlined in Irving Levin Associates's annual The Health Care Services Acquisition Reports. Data of interest comprised the target name, listing,

location, and units, as well as the acquirer name, listing, and location. Terms of the deals were also collected.

Analysis of healthcare quality metrics and costs involved panel data from CMS'S Hospital Compare, an online database with information on quality of care and median reimbursements provided by and to Medicare-certified hospitals throughout the U.S. Datasets were obtained from the Hospital Compare data archive for 2010 to 2014, using the most updated annual files available. Since this study aimed to analyze the changes in patient outcomes from one year prior to the merge event to one year after, this five-year span of quality data was necessary to encompass the three years of merger deals. Table 1 presents all of the variables utilized in the regression analyses along with their detailed descriptions.

Table 1. Variable descriptions.

Variables	Descriptions
MORT_AMI	30-day death rate for heart attack patients
READM_AMI	30-day rate of unplanned readmission for heart attack patients
MORT_HF	30-day death rate for heart failure patients
READM_HF	30-day rate of unplanned readmission for heart failure patients
MORT_PN	30-day death rate for pneumonia patients
READM_PN	30-day rate of unplanned readmission for pneumonia patients
HSP_9_10	Percentage of patients who gave their hospital a rating of 9 or 10 on a scale from 0 (lowest) to 10 (highest)
REC_Y	Percentage of patients who reported YES, they would definitely recommend the hospital
GOVT	Public hospital owned by a government and receives government funding
NONPROFIT	Private hospital owned by nonprofit corporations or religious organizations that invests all profits in the organization and is exempt from paying income and property taxes
FORPROFIT	Private hospital owned by corporates or individuals that distributes profits to investors, raises capital through investors, and pays income and property taxes
PAYM_AMI	Median Medicare payment for heart attack patients, discharged alive with MCC (MS-DRG 280)
PAYM_HF	Median Medicare payment for heart failure patients, discharged alive with MCC (MS-DRG 291)
PAYM_PN	Median Medicare payment for pneumonia patients, discharged alive with MCC (MS-DRG 193)

Note: The descriptions are taken from CMS Hospital Compare's data dictionaries and *cms.gov*.

Hospitals for the merged hospital sample were randomly selected by taking every fifth deal listed in the Irving Levin Associates annual reports. Then, the target hospitals were located in the Hospital Compare dataset for the corresponding year of the merge, the year before, and the year after to ensure data availability. If data were missing for any of the eight quality measures, the next deal in the list was taken until a sample with complete data was compiled. To create the control sample of comparable hospitals that did not undergo a merge or acquisition, the hospitals in the merged sample were matched according to number of beds (units) and state to control hospitals listed in the American Hospital Directory (American Hospital Directory). Meticulous care was taken in selecting comparable hospitals for the control group such that the mean number of units was only different by one – 236 beds in the merged hospitals and 237 in the unmerged hospitals. The full sample used contains 20 merged hospitals from 2011, 8 merged hospitals from 2012, and 16 merged hospitals from 2013, with a matching number of unmerged, control hospitals from each corresponding year. Data on all the variables in Table 1 were obtained for hospitals in both samples for the year prior to and after the merge date of the merged hospital in each merged-unmerged hospital matched pair.

Data for variables that could potentially have an impact on healthcare outcomes were collected from Hospital Compare's databases. The quality metrics selected were 30-day acute myocardial infarction (AMI, i.e. heart attack) mortality rate, AMI readmission rate, heart failure (HF) mortality rate, HF readmission rate, pneumonia (PN) mortality rate, and PN readmission rate. The mortality measures are estimates of deaths for any reason in the 30 days after either entering the hospital for a specific condition or having a coronary artery bypass graft surgery; the deaths can occur in the hospital or after

discharge. The readmission measures are estimates of unplanned readmission for any reason to an acute care hospital in the 30 days after discharge from a hospitalization. All-cause mortality and readmissions are considered because from a patient perspective, any death or readmission is an adverse event. Both death and readmission rates are measured within 30 days because deaths and readmissions after a longer time period may have less to do with the care received in the hospital and more to do with other complicating illnesses, patients' own behavior, or care provided to patients after hospital discharge. The death and readmission measures include hospitals for Medicare beneficiaries 65 years or older, and the readmission measures do not include patients who died during the index admission or who left the hospital against medical advice. Furthermore, to accurately compare hospital performance, the death and readmission rates are adjusted for patient characteristics that may make death or readmission more likely. These characteristics include the patient's age, past medical history, and comorbidities upon admission that are known to increase the patient's chance of dying or of having a readmission (Medicare.gov). The readmission and mortality rates for AMI, HF, and PN were each regressed on the three dummy variables using Equation 1.

The three conditions of AMI, HF, and PN were chosen because they were included in the Joint Commission's initial set of core performance measures in 2001. Hospitals seeking accreditation were required to submit data on these standardized measure sets. Moreover, CMS and the Joint Commission collaborated on the AMI, HF, and PN measures to align the specifications that were common to both and subsequently set out to make their measure sets identical with common data dictionaries, information forms, and algorithms (Joint Commission Specifications Manual). With increasing

emphasis on P4P and value-based purchasing (VBP), especially consequent the Patient Protection and Affordable Care Act (ACA), CMS requires hospitals to submit data on AMI, HF, and PN and provides financial incentives and bonuses for measurable improvements in overall score on these quality measures (Griffey and Kosowsky, 2007).

The next variable included as potentially affecting a hospital's quality of care was target hospital ownership. A hospital's characterization as public or private and profit-seeking or not-for-profit may drive different incentives that emphasize certain elements of the care process for various reasons, but existing literature provides incongruous results regarding the effects of hospital ownership on healthcare quality or whether the ownership type has any significant impact at all. It has been found that for-profit hospitals tend to have higher mortality rates than nonprofit hospitals, but for-profit hospitals could also provide higher quality care on principal measures for reimbursement (McClellan and Staiger, 2000; Sloan et al., 2001). Even though no significant differences in quality outcomes have been found pertaining to hospital ownership, previous studies have not considered 30-day mortality rates that are more observable than mortality rates after several months and 30-day readmission rates that represent unplanned readmissions for any reason (McClellan and Staiger, 2000; Sloan and Taylor, 1999; Sloan et al., 2001).

All of the hospitals in both the merged and unmerged samples belonged to one of three hospital listings: government, voluntary nonprofit, and for-profit. Only two of the three categories, government and for-profit, were given a dummy variable specification and included in the regression to avoid multicollinearity in Equation 2. The nonprofit listing was omitted from the OLS regression because it contained the majority of the hospitals in the study, 73 percent, as shown in Table 3. The constant term represents the

nonprofit hospitals, and the coefficients on the government and for-profit dummy variables would show differences between hospitals of these two types and the majority of hospitals in the market that identify as voluntary nonprofit.

$$OUTCOME = \beta_1 AFTER + \beta_2 MERGED + \beta_3 AFTER*MERGED + \beta_4 GOVT + \beta_5 FORPROFIT + \varepsilon \quad (2)$$

Previous literature has suggested associations between readmission and mortality rates; hospitals with lower mortality rates may have been discharging patients who had a greater severity of illness and thus a greater likelihood of being readmitted, or hospitals with higher mortality rates could have had patients die before they could be readmitted (Krumholz et al., 2013). Therefore, separate OLS tests were done with readmission rates for AMI, HF, and PN regressed on the corresponding, condition-specific mortality rates in addition to the five dummy variables, as seen in Equation 3. Again, the dummy variable for nonprofit hospitals was left out of the regression to prevent multicollinearity among the ownership variables.

$$READM\_RATE = \beta_1 AFTER + \beta_2 MERGED + \beta_3 AFTER*MERGED + \beta_4 GOVT + \beta_5 FORPROFIT + \beta_6 MORT\_RATE + \varepsilon \quad (3)$$

In addition to the six patient outcomes measures, two Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) measures were also included in the study. Research indicates that higher patient satisfaction with their care

experiences is associated with higher levels of adherence to recommended prevention and treatment processes and better clinical outcomes. Furthermore, HCAHPS measures are increasingly included in public reporting and P4P programs (Price et al., 2014). Patients' overall ratings of their hospitals have been positively associated with hospital performance on CMS clinical process of care measures for AMI, HF, PN, and surgical care (Isaac et al., 2010; Jha et al., 2008). Additionally, overall ratings and willingness to recommend the hospital were lower in hospitals that consistently performed poorly on cardiac process measures (Girotra et al., 2012). Therefore, the global HCAHPS measures of overall hospital rating and willingness to recommend hospital were included with outcome measures on AMI, HF, and PN to provide a more comprehensive picture of hospital quality of care.

Table 2 displays the descriptive statistics for the six mortality and readmission rates as well as the two global HCAHPS patient satisfaction measures. Not all 176 observations reported mortality and readmission rates for AMI. Average readmission rates were higher than average mortality rates for all three conditions, with the greatest difference between the two for HF, in which readmission rates were nearly twice mortality rates. The range of each rate was also fairly wide. Overall, AMI had the highest mean mortality rate and HF had the highest readmission rate. For the HCAHPS scores, a slightly greater proportion of patients tended to report that they would recommend their hospital than would rate the hospital a 9 or 10. Again, the range of values for both patient satisfaction measures varied widely, for the maximum percentage of patients answering affirmatively to these categories was twice or more than twice the minimum for hospital rating and likelihood to recommend, respectively.

Table 2. Descriptive statistics for Hospital Compare mortality, readmission, and global HCAHPS quality measures.

Variables	MORT_AMI	READM_AMI	MORT_HF	READM_HF	MORT_PN	READM_PN	HSP_9_10	REC_Y
Mean	15.6	18.6	12.0	23.1	13.0	17.8	68.2	70.7
Median	15.2	19.0	11.3	23.6	11.9	17.8	68.0	71.0
Maximum	29.0	24.0	28.3	31.6	26.4	26.7	92.0	94.0
Minimum	10.4	8.6	6.7	9.0	8.3	8.5	46.0	43.0
Std. Dev.	2.8	2.7	3.5	3.7	3.4	2.3	8.0	9.3
Number of Observations	175	171	176	176	176	176	176	176

Note: Data taken from CMS Hospital Compare's databases from 2010 to 2014.

With changes in healthcare cost also an important potential consequence of hospital mergers, Hospital Compare data on median Medicare payment for three of the top seventy utilized Medicare Severity-Diagnosis Related Groups (MS-DRGs) was collected. One MS-DRG is assigned to each inpatient stay using the principal diagnosis and additional diagnoses, the principal procedure and additional procedures, sex, and discharge status. The three DRGs chosen belong to the three conditions under study and comprise acute myocardial infarction patients discharged alive with major complication or comorbidity (MCC) (MS-DRG 280); heart failure & shock patients with MCC (MS-DRG 291); and simple pneumonia & pleurisy patients with MCC (MS-DRG 193). As part of the hospital inpatient prospective payment system (IPPS), each of these MS-DRGs has a payment weight assigned to it based on the average resources used to treat Medicare patients in that MS-DRG. CMS uses MS-DRGs to better account for severity of illness and resource consumption for Medical patients, and MCC represents the highest level of severity. The IPPS per-discharge payment is based on two national base payment rates, one that provides for operating expenses and the other for capital expenses. These standardized payment rates are adjusted to account for the MS-DRG relative weight, or the costs associated with the patient's clinical condition and related treatment relative to the costs of the average Medicare case, as well as the wage index, representing market conditions in the hospitals' location relative to national conditions. The same MS-DRG weights are used for operating and capital payment rates and are recalibrated annually, without affecting overall payments, based on standardized charges and costs for all IPPS cases in each MS-DRG. Base operating and capital rates are adjusted by an area wage index to reflect the expected differences in local market prices for labor, which is

intended to measure difference in hospital wage rates among labor markets by comparing the average hourly wage for hospital workers in each urban or statewide rural area to the nationwide average. The wage index is revised each year based on wage data reported by IPPS hospitals (Centers for Medicare & Medicaid Services).

Beginning with discharges occurring on and after October 1, 2012, IPPS payments also reflect any applicable adjustments under the Hospital Value-Based Purchasing (VBP) Program and Hospital Readmissions Reduction Program (HRRP). Under the Hospital VBP Program, a portion of operating IPPS payments to acute inpatient hospitals eligible for the program are reduced to fund value-based incentive payments based on hospital overall performance on a set of quality measures. Under the HRRP, a portion of eligible hospitals' IPPS payments are reduced for those hospitals with excess 30-day readmissions for conditions including AMI, HF, and PN. Finally, IPPS payment has undergone another adjustment starting in fiscal year 2015 consequent the Hospital-Acquired Conditions (HACs) Reduction Program, in which overall payments are reduce by 1 percent for applicable hospitals in the worst-performing quartile of risk-adjusted quality measures for reasonable preventable HACs (Centers for Medicare & Medicaid Services).

Median Medicare payment was regressed on the three dummy variables in Equation 4 to assess the effects of hospital merger events on healthcare costs over time. These payment IDs were chosen because MS-DRG 193 was the only reimbursement measure for PN in the 2010 Hospital Compare database, so it was carried through the remaining years with the same measures for the other two conditions.

$$MEDICAREPAY = \beta_1 AFTER + \beta_2 MERGED + \beta_3 AFTER*MERGED + \varepsilon \quad (4)$$

Table 3 shows the descriptive statistics for the three hospital ownership types and the three Medicare payment measures. Fifteen percent of the total hospitals were public, government-owned; 73 percent were private, voluntary nonprofit; and 11 percent were for profit. Not all hospitals reported their median Medicare payments for the three MS-DRGs under study. Of the individual samples that had data, the mean Medicare reimbursements were highest for AMI patients discharged alive with MCC and lowest for PN patients discharged alive with MCC. Each MS-DRG had a large range of payment variation, with the maximum reimbursement nearly three times the minimum for AMI, two times the minimum for HF, and over two times the minimum for PN.

Table 3. Descriptive statistics for target hospital ownership and median Medicare payment measures.

Variables	GOVT	NONPROFIT	FORPROFIT	PAYM_AMI	PAYM_HF	PAYM_PN
Mean	0.15	0.73	0.11	11,529.54	9,399.35	9,154.47
Median	0.00	1.00	0.00	11,104.50	9,032.00	8,822.00
Maximum	1.00	1.00	1.00	19,142.00	14,404.00	14,595.00
Minimum	0.00	0.00	0.00	6,941.00	7,160.07	6,763.58
Std. Dev.	0.36	0.44	0.32	2,107.41	1,465.84	1,486.83
Number of Observations	176	176	176	168	175	175

Note: Data taken from CMS Hospital Compare's databases from 2010 to 2014.

All hospitals must make a profit somehow in order to continue operations, but the method whereby hospitals increase their revenue differs based on their ownership type. Medical services hospitals provide vary markedly by ownership depending on their differing priorities; proprietary hospitals are more likely to offer relatively profitable services, government hospitals are most likely to offer relatively unprofitable services that are disproportionately needed by poor and underinsured patients, and nonprofit hospitals fall in between by balancing profit-seeking and serving the poor (Horwitz,

2005). Therefore, differences in healthcare services offered may result in different Medicare reimbursement amounts, so dummy variables for hospital ownership were added to produce Equation 5.

$$MEDICAREPAY = \beta_1 AFTER + \beta_2 MERGED + \beta_3 AFTER*MERGED + \beta_4 GOVT + \beta_5 FORPROFIT + \varepsilon \quad (5)$$

As the healthcare industry has increasingly evolved to value quality of care, initiatives such as CMS's inpatient prospective payment system (IPPS) and Hospital Value-Based Purchasing (VBP) Program reflect the significant role hospital performance has on Medicare payments. Incentive payments are awarded under the VBP Program to participating hospitals that meet or exceed performance standards and/or improve performance during the applicable performance period (Centers for Medicare & Medicaid Services). Therefore, it was appropriate to test the effect of quality outcomes on healthcare costs as well, as shown in Equation 6. The outcomes variable represents the six mortality and readmission rates as well as the overall hospital rating. The likelihood that a patient would definitely recommend a hospital was omitted from the OLS regression because of the high correlation between both global HCAHPS measures of 0.92, as shown in Table 4. It was more appropriate to include only one of these measures to avoid multicollinearity. Furthermore, overall hospital rating is the only HCAHPS global measure included in Hospital VBP (HCAHPS Fact Sheet).

$$MEDICAREPAY = \beta_1 AFTER + \beta_2 MERGED + \beta_3 AFTER*MERGED\ \beta_4 GOVT + \beta_6 FORPROFIT + \beta_7 OUTCOME + \varepsilon \quad (6)$$

Table 4 shows the correlation values between every possible pair of variables in this study. AMI mortality is the only mortality rate that decreased over time without taking into account the presence of a merger event. Average readmission rates and median Medicare reimbursements for patients discharged alive with MCC also decreased for all three conditions over time. The two global HCAHPS measures, furthermore, showed an overall increase across each three-year period spanning a merger year. The primary variable of interest, the interaction term AFTER*MERGED, shows a negative relationship with readmission rates for all three conditions, median Medicare payment for AMI, MS-DRG 280, and now patient likelihood to definitely recommend the hospital after considering the effect of a merger over time. All three mortality rates are positively associated with each other, and all three readmission rates are positively correlated with each other as well. Moreover, the each mortality rate has a negative relationship with readmission rate for all three conditions. AMI mortality rate is negatively associated with overall hospital rating; likelihood to definitely recommend a hospital; and nonprofit and for-profit hospitals. Government hospitals are negatively associated with AMI, HF, and PN readmission rates as well as both HCAHPS measures. Nonprofit hospitals are negatively associated with all three mortality rates and both patient satisfaction measures. Finally, proprietary hospitals are positively correlated with HF mortality rates, PN mortality and readmission rates, and both HCAHPS measures. Medicare payments for AMI are negatively associated with the interaction term, while payments for HF and PN

are positively associated with the interaction term. Medicare reimbursements for all three conditions are positively correlated with government and nonprofit hospital types but negatively correlated with for-profit hospitals.

Table 4. Correlation values between all study variables.

	AFTER	MERGED	AFTER*MERGED	MORT_AMI	READM_AMI	MORT_HF	READM_HF	MORT_PN	READM_PN
AFTER	1.00	-0.10	0.58	-0.02	-0.52	0.30	-0.39	0.48	-0.32
MERGED	-0.10	1.00	0.53	0.18	-0.23	0.20	-0.26	0.15	-0.21
AFTER*MERGED	0.58	0.53	1.00	0.20	-0.59	0.42	-0.57	0.49	-0.41
MORT_AMI	-0.02	0.18	0.20	1.00	-0.38	0.30	-0.26	0.16	-0.39
READM_AMI	-0.52	-0.23	-0.59	-0.38	1.00	-0.58	0.71	-0.59	0.57
MORT_HF	0.30	0.20	0.42	0.30	-0.58	1.00	-0.77	0.68	-0.42
READM_HF	-0.39	-0.26	-0.57	-0.26	0.71	-0.77	1.00	-0.68	0.61
MORT_PN	0.48	0.15	0.49	0.16	-0.59	0.68	-0.68	1.00	-0.39
READM_PN	-0.32	-0.21	-0.41	-0.39	0.57	-0.42	0.61	-0.39	1.00
HSP_9_10	0.17	-0.06	0.08	-0.14	-0.21	0.07	-0.23	0.02	-0.22
REC_Y	0.03	-0.10	-0.04	-0.13	-0.11	0.01	-0.15	-0.09	-0.15
GOVT	0.00	0.04	0.04	0.27	-0.07	0.08	-0.09	0.08	-0.13
NONPROFIT	-0.04	-0.02	-0.03	-0.17	0.10	-0.09	0.09	-0.12	0.05
FORPROFIT	0.05	-0.02	0.00	-0.08	-0.06	0.04	-0.03	0.09	0.08
PAYM_AMI	-0.21	0.07	-0.09	0.05	0.22	0.01	0.13	-0.13	0.27
PAYM_HF	-0.02	0.05	0.02	-0.03	0.11	0.07	0.06	0.03	0.24
PAYM_PN	-0.07	0.06	0.00	0.01	0.15	0.05	0.08	-0.04	0.25
UNITS	0.04	-0.05	-0.01	0.03	-0.02	0.08	-0.16	0.04	-0.08
YEAR	0.11	0.15	0.06	-0.36	-0.10	-0.10	0.01	0.18	-0.05

	HSP_9_10	REC_Y	GOVT	NONPROFIT	FORPROFIT	PAYM_AMI	PAYM_HF	PAYM_PN	UNITS	YEAR
AFTER	0.17	0.03	0.00	-0.04	0.05	-0.21	-0.02	-0.07	0.04	0.11
MERGED	-0.06	-0.10	0.04	-0.02	-0.02	0.07	0.05	0.06	-0.05	0.15
AFTER*MERGED	0.08	-0.04	0.04	-0.03	0.00	-0.09	0.02	0.00	-0.01	0.06
MORT_AMI	-0.14	-0.13	0.27	-0.17	-0.08	0.05	-0.03	0.01	0.03	-0.36
READM_AMI	-0.21	-0.11	-0.07	0.10	-0.06	0.22	0.11	0.15	-0.02	-0.10
MORT_HF	0.07	0.01	0.08	-0.09	0.04	0.01	0.07	0.05	0.08	-0.10
READM_HF	-0.23	-0.15	-0.09	0.09	-0.03	0.13	0.06	0.08	-0.16	0.01
MORT_PN	0.02	-0.09	0.08	-0.12	0.09	-0.13	0.03	-0.04	0.04	0.18
READM_PN	-0.22	-0.15	-0.13	0.05	0.08	0.27	0.24	0.25	-0.08	-0.05
HSP_9_10	1.00	0.92	-0.17	-0.07	0.30	-0.39	-0.39	-0.41	-0.13	0.03
REC_Y	0.92	1.00	-0.10	-0.07	0.22	-0.25	-0.28	-0.29	-0.03	-0.07
GOVT	-0.17	-0.10	1.00	-0.73	-0.14	0.08	0.04	0.06	0.17	-0.29
NONPROFIT	-0.07	-0.07	-0.73	1.00	-0.57	0.03	0.03	0.03	-0.06	0.20
FORPROFIT	0.30	0.22	-0.14	-0.57	1.00	-0.14	-0.10	-0.12	-0.12	0.06
PAYM_AMI	-0.39	-0.25	0.08	0.03	-0.14	1.00	0.88	0.90	0.32	-0.23
PAYM_HF	-0.39	-0.28	0.04	0.03	-0.10	0.88	1.00	0.98	0.29	-0.08
PAYM_PN	-0.41	-0.29	0.06	0.03	-0.12	0.90	0.98	1.00	0.29	-0.12
UNITS	-0.13	-0.03	0.17	-0.06	-0.12	0.32	0.29	0.29	1.00	-0.12
YEAR	0.03	-0.07	-0.29	0.20	0.06	-0.23	-0.08	-0.12	-0.12	1.00

All OLS regressions were run using EViews. Table 5 presents the estimates of the effects of the DID variables on patient quality outcomes as outlined in Equation 1. Only AMI mortality rate, AMI readmission rate, and PN readmission rate significantly decreased from the year before the merge to the year after the merge. All three conditions, however, had mortality and readmission rates that were significantly impacted by the combined effect of the presence of a merger on an acquired hospital over the three-year period centered on the year of the merge. All mortality rates increased while all readmission rates decreased as a result of a hospital merger over time, on average, ceteris paribus. The coefficient of 2.67 on the interaction term in regression (5), for example, indicates that the increase in PN mortality rate over the three-year time period centered on the year of a hospital merger was 1.96 percentage points greater, on average, than the increase in PN mortality rate over three years for hospitals that did not merge. A graphical representation of this significant difference is illustrated in Figure 1. HF readmission rates experienced the largest absolute change of all six measures, with merged hospitals possessing an average 4.20 percent lower HF readmission rate the year after the merge compared to the matched unmerged hospitals, ceteris paribus. HF also had the greatest magnitude change in mortality rate of the three conditions, with merged hospitals possessing an average 2.97 percent higher HF mortality rate the year after the merge compared to the matched unmerged hospitals, ceteris paribus.

Table 5. Mortality and readmission rates as a function of DID variables.

	Dependent Variables					
	(1)	(2)	(3)	(4)	(5)	(6)
Independent Variables	**MORT_AMI**	**READM_AMI**	**MORT_HF**	**READM_HF**	**MORT_PN**	**READM_PN**
AFTER	-1.13*	-1.63***	0.51	-0.84	1.77***	-0.76*
	(0.59)	(0.47)	(0.69)	(0.66)	(0.63)	(0.44)
MERGED	0.01	-0.22	-0.06	0.04	-0.35	-0.28
	(0.59)	(0.45)	(0.69)	(0.66)	(0.63)	(0.44)
AFTER*MERGED	1.96**	-2.36***	2.97***	-4.20***	2.67***	-1.33**
	(0.84)	(0.65)	(0.98)	(0.93)	(0.89)	(0.63)
R-squared	0.06	0.40	0.17	0.32	0.27	0.17
Adjusted R-squared	0.04	0.39	0.15	0.30	0.25	0.15
Number of observations	175	171	176	176	176	176

Note: The standard errors are presented in parentheses. For OLS regressions, the values in the table represent the coefficients for each independent variable.
*Statistically significant at the 0.10 level.
**Statistically significant at the 0.05 level.
***Statistically significant at the 0.01 level.

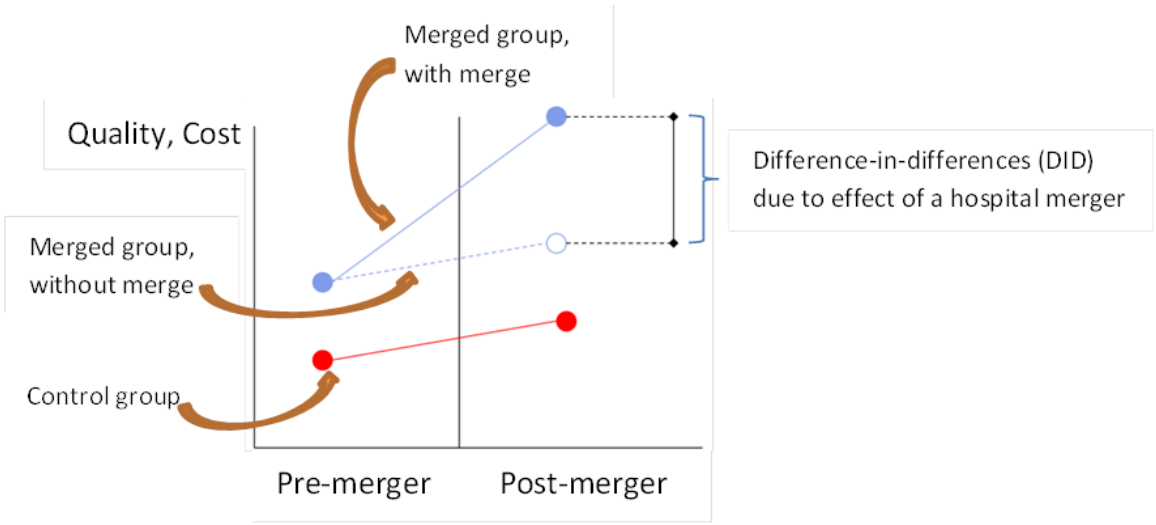


Figure 1. Graphical representation of difference-in-differences due to the effect of a hospital M&A on various quality and cost metrics.

Table 6 shows the inclusion of the two hospital ownership dummy variables, the constant term that represents the nonprofit hospital category, and the three condition-specific mortality rates as independent variables. Regression specifications (1), (2), (3),

(4), (5), and (6) followed Equation 2; and specifications (2a), (4a), and (6a) followed Equation 3. Even with the addition of these variables, all regressions except specification (6a) yielded statistically significant coefficients for the interaction term, a result indicating that a merge did have a notable effect on 30-day patient outcome rates for AMI, HF, and PN. Again, all mortality rates have a positive coefficient on the interaction term, with HF mortality having the largest value, and all readmission rates have a negative coefficient on the interaction term, with the greatest negative value for HF readmission when controlling only for the DID variables and ownership in column (4). Even though the magnitudes of the coefficients on each condition-specific readmission rate decrease when controlling for more factors, the fact that they still retain a negative sign and the same level of significance, except for column (6a), suggests a prominent effect of hospital mergers on hospital quality of care.

Hospital ownership largely did not seem to have a significant effect on performance on the selected mortality and readmission quality measures except for AMI and PN mortality. Government-owned hospitals had a 1.90 percent and 1.39 percent higher AMI mortality rate and PN mortality rate, respectively, than nonprofit hospitals. For-profit hospitals, on the other hand, revealed no significant differences in quality outcomes from nonprofit hospitals. Furthermore, increases in each mortality rate are shown to result in decreases in the corresponding readmission rates for AMI, HF, and PN, holding other variables constant. The decrease in HF readmission rate consequent a 1 percentage point increase in the condition-specific mortality rate is more than twice the decrease for AMI readmission rate and more than five times that for PN.

Table 6. Mortality and readmission rates as a function of all independent variables.

	Dependent Variables								
	(1)	(2)	(2a)	(3)	(4)	(4a)	(5)	(6)	(6a)
Independent Variables	MORT_AMI	READM_AMI	READM_AMI	MORT_HF	READM_HF	READM_HF	MORT_PN	READM_PN	READM_PN
AFTER	-1.09*	-1.62***	-1.98***	0.52	-0.85	-0.51	1.78***	-0.77*	-0.56
	(0.58)	(0.47)	(0.44)	(0.70)	(0.66)	(0.48)	(0.62)	(0.44)	(0.45)
MERGED	0.01	-0.23	-0.22	-0.05	0.03	-0.01	-0.32	-0.28	-0.32
	(0.57)	(0.45)	(0.42)	(0.70)	(0.66)	(0.48)	(0.62)	(0.44)	(0.44)
AFTER*MERGED	1.92**	-2.35***	-1.75***	2.95***	-4.18***	-2.25***	2.67***	-1.32**	-1.01
	(0.81)	(0.65)	(0.61)	(0.98)	(0.93)	(0.69)	(0.88)	(0.63)	(0.64)
C	15.42***	20.21***	24.88***	10.89***	24.79***	31.92***	11.29***	18.70***	20.02***
	(0.42)	(0.33)	(0.92)	(0.52)	(0.49)	(0.67)	(0.46)	(0.33)	(0.69)
GOVT	1.90***	-0.57	0.01	0.69	-0.89	-0.43	1.39**	-0.47	-0.31
	(0.57)	(0.45)	(0.43)	(0.69)	(0.65)	(0.48)	(0.62)	(0.44)	(0.44)
FORPROFIT	-0.33	-0.47	-0.57	0.32	-0.55	-0.34	1.05	0.13	0.26
	(0.65)	(0.52)	(0.48)	(0.79)	(0.74)	(0.54)	(0.70)	(0.50)	(0.50)
MORT_AMI	-	-	-0.30***	-	-	-	-	-	-
			(0.06)						
MORT_HF	-	-	-	-	-	-0.65***	-	-	-
						(0.05)			
MORT_PN	-	-	-	-	-	-	-	-	-0.12**
									(0.05)
R-squared	0.12	0.40	0.49	0.17	0.33	0.65	0.29	0.17	0.20
Adjusted R-squared	0.10	0.39	0.48	0.15	0.31	0.63	0.27	0.15	0.17
Number of observations	175	171	171	176	176	176	176	176	176

Note: The standard errors are presented in parentheses. For OLS regressions, the values in the table represent the coefficients for each independent variable.
*Statistically significant at the 0.10 level.
**Statistically significant at the 0.05 level.
***Statistically significant at the 0.01 level.

Following analysis of mergers on AMI, HF, and PN mortality and readmission rates, the specifications in Table 7 did not yield significant effects of hospital mergers on the two global HCAHPS scores. Regressions (1) and (2) followed Equation 1, and regressions (1a) and (2a) followed Equation 2. Contrary to the results in Table 6 comparing the quality outcomes for the different hospital ownership types, significant differences in patient satisfaction scores are seen between for-profit and nonprofit hospitals but not between government-owned and nonprofit hospitals. For-profit hospitals showed a greater patient likelihood to rate the hospital a 9 or a 10 and to definitely recommend the hospital than did nonprofit hospitals.

Table 7. Global patient satisfaction measures as a function of DID and hospital ownership variables.

	Dependent Variables			
	(1)	(1a)	(2)	(2a)
Independent Variables	HSP_9_10	HSP_9_10	REC_Y	REC_Y
AFTER	1.02	0.89	-0.73	-0.82
	(1.72)	(1.69)	(1.99)	(1.98)
MERGED	-1.66	-1.54	-2.14	-2.04
	(1.72)	(1.69)	(1.99)	(1.98)
AFTER*MERGED	1.36	1.38	0.80	0.80
	(2.43)	(2.39)	(2.81)	(2.80)
C	-	67.68***	-	71.48***
		(1.25)		(1.47)
GOVT	-	-0.78	-	-0.01
		(1.67)		(1.97)
FORPROFIT	-	5.08***	-	4.19*
		(1.90)		(2.24)
R-squared	0.02	0.06	0.01	0.03
Adjusted R-squared	-0.0003	0.03	-0.01	0.002
Number of observations	176	176	176	176

Note: The standard errors are presented in parentheses. For OLS regressions, the values in the table represent the coefficients for each independent variable.
*Statistically significant at the 0.10 level.
**Statistically significant at the 0.05 level.
***Statistically significant at the 0.01 level.

Table 8 presents the regression coefficients on the three DID variables, the three hospital ownership types modeled by two dummy variables and the constant term, and the six mortality and readmission rates and hospital overall rating quality measures when analyzing their effects on median Medicare payments for AMI, HF, and PN patients discharged alive with MCC. Regression specifications (1), (2), and (3) were modelled by Equation 4; (1a), (2a), and (3a) were modelled by Equation 5; and (1b), (2b), and (3b) followed Equation 6. AMI was the only condition that showed significant decreases in Medicare payment over time in columns (1) and (1a). None of the Medicare reimbursement rates were significantly different over time consequent a hospital merger and also saw largely insignificant effects from the corresponding condition mortality and readmission rates; PN readmission rate was the only patient outcome measure that possessed a significant coefficient. Government-owned and for-profit hospitals did not show significant differences from nonprofit hospitals for all three MS-DRG payments. Interestingly, the hospital rating coefficient for each condition's MS-DRG reimbursement amount was significantly negative.

Table 8. Median Medicare payments as a function of all variables.

	Dependent Variables								
	(1)	(1a)	(1b)	(2)	(2a)	(2b)	(3)	(3a)	(3b)
Independent Variables	PAYM_AMI	PAYM_AMI	PAYM_AMI	PAYM_HF	PAYM_HF	PAYM_HF	PAYM_PN	PAYM_PN	PAYM_PN
AFTER	-1,028.42**	-1,015.10**	-546.06	-90.43	-87.77	-24.32	-202.66	-194.80	-25.00
	(451.49)	(452.41)	(455.59)	(316.88)	(318.68)	(293.75)	(320.71)	(321.99)	(300.14)
MERGED	222.00	209.36	92.99	53.23	49.46	-65.03	99.84	92.40	12.88
	(440.60)	(441.41)	(411.63)	(315.06)	(316.78)	(291.25)	(318.86)	(320.07)	(292.13)
AFTER*MERGED	178.84	167.30	354.84	26.92	28.03	39.83	16.59	16.18	282.24
	(638.50)	(639.81)	(627.86)	(446.85)	(449.19)	(435.84)	(452.25)	(453.86)	(426.07)
C	-	11,896.22***	15,763.51***	-	9,442.96***	13,505.46***	-	9,243.12***	11,974.75***
		(327.37)	(2,875.71)		(234.35)	(1,982.06)		(236.78)	(1,623.56)
GOVT	-	205.47	51.09	-	-83.91	-167.34	-	-31.89	-23.20
		(446.88)	(430.27)		(314.61)	(290.57)		(317.88)	(293.44)
FORPROFIT	-	-556.36	20.86	-	-165.75	208.04	-	-327.37	22.63
		(522.39)	(502.31)		(357.61)	(334.75)		(361.33)	(338.36)
MORT_AMI	-	-	17.47	-	-	-	-	-	-
			(61.57)						
READM_AMI	-	-	100.56	-	-	-	-	-	-
			(79.90)						
MORT_HF	-	-	-	-	-	55.06	-	-	-
						(44.75)			
READM_HF	-	-	-	-	-	18.71	-	-	-
						(47.98)			
MORT_PN	-	-	-	-	-	-	-	-	-8.10
									(36.56)
READM_PN	-	-	-	-	-	-	-	-	114.55**
									(52.28)
HSP_9_10	-	-	-90.99***	-	-	-75.73***	-	-	-70.65***
			(20.51)			(13.56)			(13.58)
R-squared	0.06	0.06	0.18	0.001	0.003	0.18	0.01	0.01	0.20
Adjusted R-squared	0.04	0.04	0.14	-0.02	-0.03	0.14	-0.01	-0.02	0.16
Number of observations	168	168	166	175	175	175	175	175	175

Note: The standard errors are presented in parentheses. For OLS regressions, the values in the table represent the coefficients for each independent variable.
*Statistically significant at the 0.10 level.
**Statistically significant at the 0.05 level.
***Statistically significant at the 0.01 level.

CHAPTER 6
DISCUSSION

Hospital M&As generate large-scale, institutional changes that have not been found to be uniform across all target hospitals. This chapter will analyze the results presented previously and discuss how this study either adds to existing literature or sheds new light on the effects of hospital M&As on healthcare quality and cost.

When analyzing AMI, HF, and PN mortality and readmission rates as a function of the three DID variables in Table 5, both measures for each condition showed significant changes as a result of a merger or acquisition beyond what would have occurred simply over time, without the presence of a merger. All mortality rates increased while all readmission rates decreased, and these results align with Hayford et al.'s (2012) findings of increased mortality rates and Suter et al.'s (2014) findings of decreased readmission rates after a merger. Congruent with all mortality rates changing in one direction and all readmission rates changing in the other, Table 4 reveals a positive relationship among all three mortality rates as well as among all readmission rates for AMI, HF, and PN. This observation may be due to hospitals with poor performance on one quality metric exhibiting suboptimal performance on other similar quality metrics as well, and the same concept can be applied for high-performing hospitals.

There was some variation in the magnitude of the effects of hospital mergers on mortality and readmission rates. HF possessed the greatest positive coefficients on the interaction term with mortality as the dependent variable in column (3) of both Tables 5 and 6; HF also possessed the largest negative coefficients on the interaction term with readmission as the dependent variable in column (4) of Table 5 and in columns (4) and (4a) of Table 6. The fact that HF mortality and readmission rates were affected most

prominently may support why previous studies have found only this condition, not AMI nor PN, to show an overall increase in mortality and an association between mortality and readmission, and why McIlvennan et al. (2015) analyzed the inverse relationship between mortality and readmission rate only for HF (Krumholtz et al., 2013; Suter et al., 2014). It is unclear why much of the compelling evidence concerning these two quality outcomes pertains to HF. There may be elements to the disease and specific courses of treatment themselves that cause HF to show different patterns and relationships between mortality and readmission rates than AMI and PN. These previous studies all questioned the strength of the correlation between mortality and readmission rates due to their finding of HF to be the only condition yielding moderate results at best. If higher mortality rates did lead to healthier patients being discharged with a lower risk of readmission, this inverse relationship should have been observed across AMI, HF, and PN.

Despite these findings, the results of this study illustrate statistically significant, negative associations between all three condition-specific mortality and readmission rates, regardless of the fact that AMI's and PN's quality outcomes did not show changes as large as those for HF. Table 4 shows this negative relationship as do the regression results in specifications (2a), (4a), and (6a) of Table 6, holding other variables constant. There are some potential reasons for observing this correlation between mortality and readmission. First, readmissions could be inversely affected by the competing risk of death, such that a patient who dies during an index episode of care can never be readmitted. Therefore, if a hospital has a higher mortality rate, then a smaller proportion of its discharged patients are eligible for readmission. On the other hand, if a hospital has a lower mortality rate due to improved quality of care, the greater possible readmission

rate may be a consequence of this successful care (Gorodeski et al., 2010). Furthermore, some hospitals may have a lower threshold for admission and readmission that would cause them to hospitalize lower-acuity patients. As a result, readmission rates would be inflated and mortality rates reduced (McIlvennan et al., 2015).

The opposite signs of the significant coefficients on the interaction term, positive for mortality and negative for readmission, in Table 6 corroborate the inverse relationship between condition-specific mortality and readmission rates found in columns (2a), (4a), and (6a) because following a hospital merger, mortality and readmission are seen to be affected in opposing directions. Table 6 controls for additional variables than those presented in Table 5, and the fact that the coefficients on the interaction terms are still significant supports the robustness of the effect of hospital mergers on healthcare quality outcomes. Hospital merger events often occur to relieve a hospital from bankruptcy or another reason for unsustainability, and the acquiring entity usually reallocates resources to the target hospital to keep it operational. This increase in available resources in turn may lead to infrastructure expansion and, consequently, increased treatment intensity. An increased provision of surgeries for AMI, HF, and PN may improve the length or quality of life for some patients, and hospitals that perform higher volumes of procedures tend to have better outcomes (Hayford, 2012). Therefore, a smaller group of discharged patients eligible for readmission due to higher mortality rates coupled with the increase in patient outcomes from merger-induced procedural volume increases could very well lead to lower readmission rates across the board (Birkmeyer et al., 2002; Hayford, 2012; Kizer, 2003).

The significant decreases in AMI, HF, and PN readmission rates found in this study may also be explained by policymakers' emphasis on reducing 30-day readmission rates. The widening adoption of the HCAHPS Survey and public reporting of hospital scores on Hospital Compare has incentivized hospitals to dedicate more attention and resources to improving patient experiences and outcomes. Especially with the growth of publicly accessible healthcare information and the consumer tendency to research this information to guide their health-related decision-making, a respectable public image is essential if a hospital wants to remain competitive in the market for prospective patients. The major driver behind this increased pressure to perform well on publicly accountable measures is the Patient Protection and Affordable Care Act (ACA) of 2010, which established the Hospital VBP Program in 2011 and the Hospital Readmission Reduction Program (HRRP) in 2012. The VBP program marked the first time hospitals began being paid based on their care quality, not quantity, and applies to payments beginning in Fiscal Year (FY) 2013 for hospitals under the IPPS. Under VBP, CMS withholds a small percentage – approximately 1 to 2 percentage points – of the base DRG reimbursement paid to hospitals that can be earned back based on either how well they perform on each measure or how much they improve their performance on each measure compared to their performance during a baseline period. If hospitals perform well enough to be reimbursed beyond the initial withhold, they effectively earn a net bonus. HCAHPS scores have comprised a consistent domain in every year's VBP program, along with clinical process of care measures, and outcome measures including mortality and readmission rates were added to the program starting FY 2014 (OPPS VBP Final Rule 11.1.11). While VBP allows hospitals to receive a payment bonus, the HRRP is strictly a

penalty program that reduces payments to hospitals with excess all-cause readmissions within 30 days of discharge. Since its implementation, the HRRP included only AMI, HF, and PN as applicable conditions during the five years relevant to this study until chronic obstructive pulmonary disease (COPD) and elective total hip or total knee replacement were added in 2015 and coronary artery bypass grafts (CABG) in 2017 (Centers for Medicare & Medicaid Services). In response to these federal regulations and pay-for-performance programs that financially incentivize hospitals to enhance their quality of care, it is not surprising that readmission rates have improved as a result (Suter et al., 2014).

Considering that one of the main reasons hospitals merge is to avoid financial insolvency and to recover the capacity to operate effectively, engaging in a merger would allow underperforming hospitals or those at risk of closure to regain footing in being able to adhere to the policies mandated in the ACA. Mergers may place a target hospital under a large healthcare system that can provide necessary infrastructure and staffing or even introduce new operations and informatics that will help streamline healthcare delivery. Therefore, the ACA and associated pressures from federal performance-based programs like the VBP and HRRP strongly encourage M&As as a means to consolidate healthcare goods and services for quality improvement on outcomes measures crucial for CMS reimbursement.

This heavy focus on readmissions for AMI, HF, and PN, however, may be misguided because only a small proportion of 30-day readmissions are preventable; only 12 percent were found preventable in studies that used clinical data. Hospital readmission rates are affected predominantly by the composition of a hospital's patient population and

community resources, and hospitals have little control over factors such as the incidence of mental illness and poverty as well as potentially poor social support for patients. As a result, the immense efforts hospitals are dedicating towards reducing readmissions may be detracting from the attention and resources that could be spent improving inpatient safety and mortality rates (Joynt and Jha, 2012). Thus, the decreased readmission rates over time as a consequence of a hospital merger, shown in Tables 5 and 6, can be explained in part by intense pressures from federal healthcare reform programs to earn reimbursements through fewer 30-day unplanned readmissions. The increased mortality rates, subsequently, may be a byproduct of potentially misappropriated resource and time allocation that strives to reduce readmissions that are largely unavoidable rather than to emphasize inpatient safety and death prevention.

Although the data in Table 4 show that the two global HCAHPS measures are positively associated with time, the regression results in Table 7 do not support the same conclusion. The lack of significant evidence of improved patient satisfaction scores over time is surprising because of the revolutionary federal policies and programs of healthcare reform that have placed considerable focus on increasing access to and quality of care while reducing medical expenditures. Since hospitals are increasingly held accountable for their performance on patient outcomes and satisfaction scores through public reporting and value-based reimbursement, it would have been expected for hospitals to prioritize improving patient experience. Moreover, a merged hospital can receive additional resources and staff from its acquirer to facilitate increased and more efficient operations. However, Table 7 shows no significant changes in hospital overall rating or patient likelihood to definitely recommend a hospital as a function of time or a

merger. It could be that one year post-merger is not an adequate amount of time for all operational adjustments to a target hospital to be fully implemented and integrated. Since traditional methods of care delivery and operation may undergo considerable changes during this transition period, existing and potentially new staff alike may be spending their time and effort trying to accustom themselves to a shifting environment rather than focusing on performing at their highest capacity for direct patient care. Delays due to tedious administrative protocols and staff confusion regarding new procedures or medical technology would adversely affect patient care and as a result, patient satisfaction.

The significant increases in mortality rate and decreases in readmission rates, as shown in Tables 5 and 6, may also contribute to negligible changes in global HCAHPS scores. Since readmissions do not necessarily entail death, patients may derive greater satisfaction from a higher chance of surviving their hospitalization without being injured than from a lower probability of being readmitted to the hospital (Joynt and Jha, 2012). The quality of care and interaction with the staff a patient experiences while in the hospital play extremely important roles in shaping the patient's perception of care, and an injury-free inpatient stay is much preferred to one in which patient safety is compromised. Therefore, the fact that mortality rates were found to increase for AMI, HF, and PN after a merger could be an explanatory factor for the lack of significant increases in patient satisfaction scores over time consequent a hospital merger deal.

Similar to previous studies that found no marked differences in quality outcomes based on hospital ownership type, nonprofit and for-profit hospitals did not show any significant differences in mortality or readmission rates for any of the three conditions (McClellan and Staiger, 2000; Sloan and Taylor, 1999; Sloan et al., 2001). Table 6 does

reveal, however, that nonprofit hospitals perform significantly better than government-owned hospitals, though only on AMI and PN mortality rates. Table 4 also shows that these two outcome measures have a positive correlation with public, government hospitals and a negative correlation with private, nonprofit hospitals. This result provides additional insight into how public and private hospitals compare and supports existing literature that concluded that private hospitals deliver greater quality of care. Many causes may factor into why this maybe so. Private institutions usually have a greater proportion of their patient population possessing medical insurance, whether it be private or through their employers. Therefore, these patients are better able to pay for the cost of their healthcare goods and services, and their hospitals in turn have a greater capacity to invest in adequate infrastructure and staff needed to improve care and patient outcomes (Basu et al., 2012).

Public hospitals are also commonly referred to as safety net hospitals because they accept patients regardless of insurance status (Werner et al., 2008). Thus, public hospitals are usually very impacted with patients who cannot pay for emergency and acute care and, as a result, often have long queues and patient wait times. This suboptimal access to care can cause a substantial amount of stress for both patients and healthcare staff, especially when hospital personnel are overworked due to a seemingly unending patient flow. As a consequence, overwhelmed and overextended staff are more prone to medical errors, and patients under a higher level of stress are more likely to experience adverse health effects. These characteristic burdens of public, government-owned hospitals, in turn, may result in higher 30-day mortality rates.

Despite the findings of government hospitals performing more poorly than nonprofit hospitals on two of the three condition-specific mortality measures, this relationship does not translate for patient perception and satisfaction scores. Table 7 illustrates significant differences in global HCAHPS scores between nonprofit hospitals and for-profit hospitals, but not between nonprofit and government hospitals. Columns (1a) and (2a) show that for-profit hospitals score higher than nonprofit hospitals for overall rating and for likelihood of definitely recommending the hospital. Even though this result does not reflect previous findings that on average, for-profit hospitals tend to have higher mortality or other adverse event rates than nonprofit hospitals (McClellan and Staiger, 2000), it does align with existing literature on consumer perceptions of hospitals based on ownership-related dimensions. Since nonprofit hospitals are sometimes portrayed in the media as desperately needing capital due to high debt-to-asset ratios, consumers are likely to view for-profit hospitals as more capable, coordinated, and efficient in their care delivery due to adequate resources and infrastructure (Drevs et al., 2014; Sloan et al., 2003). Furthermore, for-profit hospitals are more likely to offer profitable services that are often complex and not available everywhere, such as open-heart surgeries (Horwitz, 2005). Access to tertiary care such as complicated but life-saving surgeries may contribute to higher global ratings because these proprietary hospitals offer necessary services that patients cannot find in other medical facilities. Additionally, some for-profit hospitals employ customer relationship management programs and affiliation with social causes or welfare initiatives to improve patient satisfaction, especially to address potential public perception of the hospital's conflict of interest between making a profit and providing philanthropic healthcare to patients

(Akinci et al., 2005; Kim et al., 2008; Lichtenstein et al., 2004). Thus, hospital ownership status has differing effects depending on the quality measure under consideration. Nonprofit hospitals seem to have significantly lower AMI and PN mortality rates than government hospitals, but they also appear to possess lower global HCAHPS scores than for-profit hospitals.

Analysis of the effect of the DID variables, hospital ownership, and quality outcomes on Medicare payments showed the least amount of significant evidence. All three Medicare reimbursement amounts were not significantly affected by a hospital merger over time or by hospital ownership status, as reported in Table 8. It may be that one year post-consolidation is not sufficient in markedly changing the surrounding market and thus the wage index that contributes to each FY's base payment rate calculation.

It is worth noting the fact that the hospital overall rating coefficients in columns (1b), (2b), and (3b) of Table 8 for each condition's MS-DRG reimbursement amount is significantly negative. This result conflicts with intuitive reasoning because it would be expected that hospitals with higher overall ratings would have higher reimbursements. However, since the payment variables in this study concern predetermined MS-DRG reimbursements, payment amounts comprise all services associated with an inpatient stay for a particular condition. Though each DRG is given a weight reflecting the average relative costliness of cases in that group compared with the average Medicare case, high cost outliers would increase the reimbursement amount for patients who are sicker and require more complex care. On the other hand, these outlier cases could also entail patients who potentially acquire iatrogenic illnesses or are subject to extraordinarily

severe overdiagnosis and overtreatment. These latter two instances would place the patient at risk, unnecessarily elevate healthcare costs, and be cause for lower patient satisfaction and overall hospital ratings. Physicians are pressured from financial, legal, and professional standpoints to overutilize medical services and technology; their reimbursements rely on all the tests and procedures they order, and the constant threat of malpractice lawsuits and patients' desires for what they deem to be thorough care drive physicians to overtreat and cover all bases. Much of the care that is provided is unnecessary and wasteful, and may even pose harm to patients. Overutilization of services is only growing consequent the continual advancement of medical technology, and the increases in MS-DRG base payments every year may reflect this trend in increasing cost of care at little to no benefit to patients. Therefore, it is the reverse causality of higher median Medicare payments for the three MS-DRGs on lower patient satisfaction scores that may be significant and worthy of further investigation.

A behavioral economics approach may also shed light on this phenomenon of higher payments being associated with lower overall hospital ratings. A growing body of evidence indicates that tangible rewards, especially monetary ones, undermine motivation and worsen performance on complex cognitive tasks, especially when intrinsic motivation is high (Himmelstein et al., 2014). For example, Medicare payments could cause physicians to focus more on how they will be reimbursed for their services rather than on how they can optimize these services to best care for their patients. This reasoning is supported by the lack of robust associations between the mortality and readmission rates and Medicare reimbursement amounts shown in Table 8; other studies have similarly found no evidence that financial incentives improve patient outcomes

(Flodgren et al., 2011; Scott et al., 2011). These findings may suggest necessary reform in the way physicians are compensated for their services so that the inherent desire to care for the ill and to enhance the patient experience is not overtaken by the preoccupation with maximizing reimbursements.

CHAPTER 7
CONCLUSIONS AND RECOMMENDATIONS

This paper examines the effects of hospital mergers and acquisitions on healthcare quality and cost. Analyses utilized data on inpatient mortality and readmission rates for AMI, HF, and PN, two global HCAHPS measures of overall hospital rating and likelihood to recommend the hospital, hospital ownership status, and median Medicare reimbursements for MS-DRGs 193, 280, and 291 from hospitals that merged in 2011, 2012, or 2013 and their matched, unmerged hospitals.

AMI, HF, and PN mortality and readmission rates show significant changes as a result of a merger or acquisition beyond what would have occurred simply over time, without the presence of a merger. All mortality rates increased while all readmission rates decreased, and a positive relationship was found among all three mortality rates as well as among all readmission rates for the three conditions. HF mortality and readmission rates were affected most prominently, and it may be due to particularities with the disease and associated treatment that cause HF to show different patterns and relationships between mortality and readmission rates than AMI and PN.

This study's findings of statistically significant, negative associations between all three condition-specific mortality and readmission rates further support the inverse relationship between the two outcomes rates following a hospital merger. The significant decreases in AMI, HF, and PN readmission rates found in this study may be explained in part by policymakers' emphasis on reducing 30-day readmission rates. Federal policies like the ACA and associated programs such as Hospital VBP and HRRP incentivize hospitals to dedicate more attention and resources to improving patient experiences and outcomes. Mergers may facilitate increased performance according to these federal

measures because underperforming hospitals or those at severe financial risk would be able to obtain necessary infrastructure and staffing from their acquiring entities to reinvigorate operations. Therefore, reduced readmission rates consequent a merger is not surprising considering the immense federal pressure and emphasis on quality improvement. This heavy focus on decreasing readmission rates, however, may cause hospitals to forego equally robust efforts in enhancing other important measures like mortality rate. As a result, the increased mortality rates found in this study may be a byproduct of potentially misappropriated resource and time allocation that strives to reduce readmissions that are largely unavoidable rather than to emphasize inpatient safety and death prevention.

The lack of significant evidence of improved patient satisfaction scores over time due to a merger is surprising because hospitals are increasingly held accountable for their performance on patient outcomes and satisfaction scores through public reporting and value-based reimbursement. It could be that one year post-merger is not an adequate amount of time for the newly acquired hospitals to smooth out all the operational adjustments or to fully utilize new capital gained through the merger. Delays due to tedious administrative protocols and staff confusion regarding new procedures or medical technology would adversely affect patient care and as a result, patient satisfaction. Additionally, the fact that mortality rates were found to increase for AMI, HF, and PN after a merger could be an explanatory factor for the lack of significant increases in patient satisfaction scores over time consequent a hospital merger deal because patients may prefer an injury-free inpatient stay to one in which their safety is compromised.

Nonprofit and for-profit hospitals did not show any significant differences in mortality or readmission rates for any of the three conditions, but nonprofit hospitals were found to perform significantly better than government-owned hospitals on AMI and PN mortality rates. Private institutions usually have a greater proportion of their patient population who are able to pay for their care through private insurance. As a result, hospitals would have a greater capacity to invest in adequate infrastructure and staff needed to improve care and patient outcomes. Another reason that government hospitals may have poorer performance than nonprofit hospitals is that public hospitals must care for all patients who present there, regardless of their ability to pay. This high volume of uninsured patients would stress and overwork staff who are then more prone to making potentially harmful mistakes that could contribute to higher 30-day mortality rates.

When analyzing the two global HCAHPS scores of overall hospital rating of a 9 or 10 and the likelihood of definitely recommending the hospital, significant differences were found between nonprofit hospitals and for-profit hospitals; for-profit hospitals scored higher than nonprofit hospitals on both measures. Proprietary hospitals are more likely to offer complex services that patients may not be able to feasibly find elsewhere, and these hospitals also probably have the necessary funds and resources to implement customer relations programs and patient satisfaction-oriented institutional initiatives.

Finally, Medicare payments were not significantly affected by hospital M&As over time. This result may reflect the need for a longer time period of analysis such that the indices involved in the base payment rate calculation are sufficiently different from past years. One result of importance, however, is the fact that hospital overall rating was negatively associated with mean Medicare reimbursement for all three MS-DRGs. This

relationship could be explained by an above normal prevalence of high cost outliers that would increase the reimbursement amount for patients who are sicker and require more complex care. Unusually high costs may also be a factor of overdiagnosis and overtreatment due to financial, legal, and professional pressures on physicians to overutilize medical services and technology. A major unintended shortcoming of monetary rewards for the quantity and quality of care physicians provide is the possibility that doctors begin to focus more on how they will be paid rather than how they can better and more altruistically serve their patients. Additionally, unnecessary care could adversely affect patient health, and higher MS-DRG payments from a greater number of medical services done could lead to poorer patient outcomes and satisfaction of care.

Greater efforts should be directed toward improving mortality rates in addition to readmission rates. The federal programs currently in place consequent the passage of the ACA put a tremendous focus on preventing patient readmissions, but improving inpatient safety and mortality metrics should not be any less stressed. Furthermore, all hospitals, regardless of ownership status, should constantly strive to provide patient-centered, integrated, and coordinated care so patient experiences continue to improve. To address the potentially misguided physician reimbursement schedules currently in place, it may be valuable to consider other, non-financial incentives to enhance quality of care so that physicians maintain their altruistic motivations for providing healthcare.

This study has some limitations that should be addressed. First, all systematic differences between hospitals that merge and those that do not merge, such as competition, patient case mix, market shares, and hospital location, were not controlled for. Second, the research may not have captured all the hospital mergers that occurred in

the U.S. Only publicly announced transactions are included in Irving Levin Associates's annual reports. Third, three years may not have been a sufficient time period for hospital performance to change significantly; it probably takes longer than one year for the merger to have any notable effects. Fourth, health industry changes consequent federal healthcare reform policies were not comprehensively incorporated. Beyond what was discussed in this paper regarding the ACA, VBP, and HRRP, many other healthcare legislations were passed that could possibly have had an effect on the variables in this study. Fifth, though there were only a few cases at most with which this is pertinent, the analyses did not take into account the new sizes of target hospitals after they were acquired. Finally, regressions were not conducted that analyzed the differences between government and for-profit hospitals in quality and cost measures; both ownership types were only assessed for significant difference in reference to the nonprofit group.

There are many avenues this study provides whereby to conduct more thorough research to better understand the longer-term implications of hospital mergers. It would be interesting to study the impacts of a hospital's state, status as rural or urban, and Herfindahl-Hirschman index (HHI), which measures market concentration, on propensity to merge and how a merger would affect efficiency metrics and staffing composition. Additionally, using Medicare spending per beneficiary would allow for broader analysis of healthcare costs, and future studies could also look into how M&As affect hospital profitability. Since this study used only outcomes measures, the mortality and readmissions rates, future studies could investigate how process of care measures are impacted by a merger. Lastly, it would be valuable to analyze potential organizational culture components associated with successful quality improvements and cost reductions

post-merger and whether cultural resistance in any way hinders these goals after hospital M&As.

REFERENCES

"30-day unplanned readmission and death measures." Medicare.gov - the Official U.S. Government Site for Medicare. Accessed March 10, 2017. https://www.medicare.gov/hospitalcompare/Data/30-day-measures.html.

"About Irving Levin Associates." Levin Associates Products. Accessed March 10, 2017. https://products.levinassociates.com/aboutus/.

"Acute Care Hospital Inpatient Prospective Payment System." *Health Care Policy and Politics A to Z* (n.d.): n. pag. *Centers for Medicare & Medicaid Services*. Dec. 2016 Accessed Feb 8, 2017. https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/AcutePaymtSysfctsht.pdf.

Akinci, Fevzi, A. Ezel Esatoglu, Dilaver Tengilimoglu, and Amy Parsons. 2005. Hospital choice factors: A case study in turkey. *Health Marketing Quarterly* 22 (1): 3-19.

Alexander, J. A., M. T. Halpern, and S. Y. Lee. 1996. The short-term effects of merger on hospital operations. *Health Services Research* 30 (6) (Feb): 827-47.

"American Hospital Directory - Hospital Statistics by State." American Hospital Directory - Hospital Statistics by State. Accessed March 10, 2017. https://www.ahd.com/state_statistics.html.

Barnet, Shannon, Molly Gamble, Heather Punke, Emily Rappleye, Ellie Rizzo, and Tamara Rosin. "10 challenges and opportunities for hospitals in 2015." Becker's Hospital Review. December 30, 2014. Accessed March 10, 2017. http://www.beckershospitalreview.com/hospital-management-administration/10-challenges-and-opportunities-for-hospitals-in-2015.html.

Basu, S., J. Andrews, S. Kishore, R. Panjabi, and D. Stuckler. 2012. Comparative performance of private and public healthcare systems in low- and middle-income countries: A systematic review. *PLoS Medicine* 9 (6): e1001244.

Bernheim, S. M., J. N. Grady, Z. Lin, Y. Wang, Y. Wang, S. V. Savage, K. R. Bhat, et al. 2010. National patterns of risk-standardized mortality and readmission for acute myocardial infarction and heart failure. update on publicly reported outcomes measures based on the 2010 release. *Circulation.Cardiovascular Quality and Outcomes* 3 (5) (Sep): 459-67.

Birkmeyer, John D., Andrea E. Siewers, Emily VA Finlayson, Therese A. Stukel, F. Lee Lucas, Ida Batista, H. Gilbert Welch, and David E. Wennberg. 2002. Hospital

volume and surgical mortality in the united states. *New England Journal of Medicine* 346 (15): 1128-37.

Birkmeyer, John D., Therese A. Stukel, Andrea E. Siewers, Philip P. Goodney, David E. Wennberg, and F. Lee Lucas. 2003. Surgeon volume and operative mortality in the united states. *New England Journal of Medicine* 349 (22): 2117-27.

Bloom, Nicholas, Carol Propper, Stephan Seiler, and John Van Reenen. 2015. The impact of competition on management quality: Evidence from public hospitals. *The Review of Economic Studies* 82 (2): 457-89.

Brekke, Kurt Richard, Luigi Siciliani, and Odd Rune Straume. 2014. Can competition reduce quality? .

Chang, Victor, Robert H. Blackwell, Ryan M. Yau, Stephanie Besser, Joslyn M. Albright, Gopal N. Gupta, Paul C. Kuo, and Anai N. Kothari. 2016. Variable surgical outcomes after hospital consolidation: Implications for local health care delivery. *Surgery*.

Comondore, V. R., P. J. Devereaux, Q. Zhou, S. B. Stone, J. W. Busse, N. C. Ravindran, K. E. Burns, et al. 2009. Quality of care in for-profit and not-for-profit nursing homes: Systematic review and meta-analysis. *BMJ (Clinical Research Ed.)* 339 (Aug 4): b2732.

"Congressional Budget Office." Congressional Budget Office. March 09, 2017. Accessed March 10, 2017. https://www.cbo.gov/.

Connor, R. A., R. D. Feldman, B. E. Dowd, and T. A. Radcliff. 1997. Which types of hospital mergers save consumers money? *Health Affairs (Project Hope)* 16 (6) (Nov-Dec): 62-74.

Cookson, Richard, Mauro Laudicella, and Paolo Li Donni. 2013. Does hospital competition harm equity? evidence from the english national health service. *Journal of Health Economics* 32 (2): 410-22.

Cubanski Juliette, Christina Swoope, Cristina Boccuti, Gretchen Jacobson, Giselle Casillas, Shannon Griffin, and Tricia Neuman. "A Primer on Medicare: Key Facts About the Medicare Program and the People it Covers - How much does Medicare spend, and how does current spending compare to past trends and the future outlook?" Kff.org. March 20, 2015. Accessed March 10, 2017. http://kff.org/report-section/a-primer-on-medicare-how-much-does-medicare-spend/.

Curfman, Gregory, MD. "Everywhere, hospitals are merging - but why should you care?" Harvard Health Blog. April 01, 2015. Accessed March 10, 2017. http://www.health.harvard.edu/blog/everywhere-hospitals-are-merging-but-why-should-you-care-201504017844.

Dafny, Leemore. 2014. Hospital industry consolidation—still more to come? *New England Journal of Medicine* 370 (3): 198-9.

Dafny, Leemore S. 2005. *Estimation and Identification of Merger Effects: An Application to Hospital Mergers*.

Dafny, Leemore, Kate Ho, and Robin S. Lee. 2016. *The Price Effects of Cross-Market Hospital Mergers*.

Dranove, David, and Richard Lindrooth. 2003. Hospital consolidation and costs: Another look at the evidence. *Journal of Health Economics* 22 (6): 983-97.

Drevs, Florian, Dieter K. Tscheulin, and Jörg Lindenmeier. 2014. Do patient perceptions vary with ownership status? A study of nonprofit, for-profit, and public hospital patients. *Nonprofit and Voluntary Sector Quarterly* 43 (1): 164-84.

Ferrier, Gary D., and Vivian G. Valdmanis. 2004. Do mergers improve hospital productivity? *Journal of the Operational Research Society* 55 (10): 1071-80.

"FINAL 2012 POLICY, PAYMENT CHANGES FOR HOSPITAL OUTPATIENT DEPARTMENTS." Centers for Medicare & Medicaid Services. May 17, 2013. Accessed March 10, 2017. https://www.cms.gov/Newsroom/MediaReleaseDatabase/Fact-Sheets/2011-Fact-Sheets-Items/2011-11-01.html.

Flodgren, Gerd, Martin P. Eccles, Sasha Shepperd, Anthony Scott, Elena Parmelli, and Fiona R. Beyer. 2011. An overview of reviews evaluating the effectiveness of financial incentives in changing healthcare professional behaviours and patient outcomes. *Cochrane Database Syst Rev* 7 (7).

Frakt, Austin B. 2015. Hospital consolidation isn't the key to lowering costs and raising quality. *Jama* 313 (4): 345-.

Gai, Yunwei. 2016. Evaluation of willingness-to-pay methods for pre-merger investigation and certificate of need licensing in local hospital markets.

Gaynor, Martin, Mauro Laudicella, and Carol Propper. 2012. Can governments do it better? merger mania and hospital outcomes in the english NHS. *Journal of Health Economics* 31 (3): 528-43.

Gaynor, Martin, and Robert Town. 2012. The impact of hospital consolidation– update. *The Synthesis Project. Robert Wood Johnson Foundation. http://www.Rwjf.org/content/dam/farm/reports/issue_briefs/2012/rwjf73261*.

Gaynor, M., R. Moreno-Serra, and C. Propper. 2012. Can competition improve outcomes in UK health care? lessons from the past two decades. *Journal of Health Services Research & Policy* 17 Suppl 1 (Jan): 49-54.

Girotra, S., P. Cram, and I. Popescu. 2012. Patient satisfaction at america's lowest performing hospitals. *Circulation.Cardiovascular Quality and Outcomes* 5 (3) (May): 365-72.

Glickman, S. W., W. Boulding, M. Manary, R. Staelin, M. T. Roe, R. J. Wolosin, E. M. Ohman, E. D. Peterson, and K. A. Schulman. 2010. Patient satisfaction and its relationship with clinical quality and inpatient mortality in acute myocardial infarction. *Circulation.Cardiovascular Quality and Outcomes* 3 (2) (Mar): 188-95.

Gorodeski, Eiran Z., Randall C. Starling, and Eugene H. Blackstone. 2010. Are all readmissions bad readmissions? *New England Journal of Medicine* 363 (3): 297-8.

Gowrisankaran, Gautam, Aviv Nevo, and Robert Town. 2013. Mergers when prices are negotiated: Evidence from the hospital industry.

Griffey, Richard T., and Joshua M. Kosowsky. "Cms/joint Commission Hospital Quality Measures—is It the Federal Grade for Quality?." *Emergency Medicine Reports* 28, no. 19 (2007): 225-235.

Guerin-Calvert, Margaret E., Jen Maki, and Bruce C. Vladeck. 2015. Re-aligning prospective hospital merger guidance: Moving beyond concentration to more meaningful approaches. *Available at SSRN 2593165*.

Harris II, J., H. Ozgen, and Y. Ozcan. 2000. Do mergers enhance the performance of hospital efficiency? *Journal of the Operational Research Society* 51 (7): 801-11.

Hayford, Tamara B. 2012. The impact of hospital mergers on treatment intensity and health outcomes. *Health Services Research* 47 (3pt1): 1008-29.

"HCAHPS Fact Sheet." HCAHPS Hospital Survey. June 2015. Accessed March 10, 2017. http://www.hcahpsonline.org/Facts.aspx.

"HCAHPS Hospital Survey." HCAHPS Hospital Survey. Accessed March 10, 2017. http://www.hcahpsonline.org/.

"Health Care Spending as a Percentage of GDP." The Commonwealth Fund. Accessed March 10, 2017. http://www.commonwealthfund.org/interactives-and-data/chart-cart/chartbook/multinational-comparisons-data-2014/health-care-spending-as-a-percentage-of-gdp.

Heidenreich, Paul A., Anju Sahay, John R. Kapoor, Michael X. Pham, and Barry Massie. 2010. Divergent trends in survival and readmission following a hospitalization for heart failure in the veterans affairs health care system 2002 to 2006. *Journal of the American College of Cardiology* 56 (5): 362-8.

Himmelstein, David U., Dan Ariely, and Steffie Woolhandler. 2014. Pay-for-performance: Toxic to quality? insights from behavioral economics. *International Journal of Health Services* 44 (2): 203-14.

Ho, Vivian, and Barton H. Hamilton. 2000. Hospital mergers and acquisitions: Does market consolidation harm patients? *Journal of Health Economics* 19 (5): 767-91.

Horwitz, J. R. 2005. Making profits and providing care: Comparing nonprofit, for-profit, and government hospitals. *Health Affairs (Project Hope)* 24 (3) (May-Jun): 790-801.

Isaac, Thomas, Alan M. Zaslavsky, Paul D. Cleary, and Bruce E. Landon. 2010. The relationship between patients' perception of care and measures of hospital quality and safety. *Health Services Research* 45 (4): 1024-40.

"JCAHO Specifications Manual for National Hospital Quality Measures." QualityNet - Specifications Manual. Accessed March 10, 2017. http://qualitynet.org/dcs/ContentServer?cid=1141662756099&pagename=QnetPublic%2FPage%2FQnetTier2&c=Page. Accessed 2%2F16%2F217.

Jha, Ashish K., E. John Orav, Jie Zheng, and Arnold M. Epstein. 2008. Patients' perception of hospital care in the united states. *New England Journal of Medicine* 359 (18): 1921-31.

Johar, Meliyanni, and Elizabeth Savage. 2014. Do mergers benefit patients in underperforming administrations? lessons from area health service amalgamation. *Economic Record* 90 (291): 526-35.

Joynt, Karen E., and Ashish K. Jha. 2012. Thirty-day readmissions—truth and consequences. *New England Journal of Medicine* 366 (15): 1366-9.

"Key Features of the Affordable Care Act ." HHS.gov. January 30, 2017. Accessed March 10, 2017. http://www.hhs.gov/healthcare/facts-and-features/key-features-of-aca/index.html.

Kim, Kyung Hoon, Kang Sik Kim, Dong Yul Kim, Jong Ho Kim, and Suk Hou Kang. 2008. Brand equity in hospital marketing. *Journal of Business Research* 61 (1): 75-82.

Kizer, Kenneth W. 2003. The volume–outcome conundrum. *New England Journal of Medicine* 349 (22): 2159-61.

Krabbe-Alkemade, YJFM, TLCM Groot, and M. Lindeboom. 2016. Competition in the dutch hospital sector: An analysis of health care volume and cost. *The European Journal of Health Economics*: 1-15.

Krumholz, Harlan M., Zhenqiu Lin, Patricia S. Keenan, Jersey Chen, Joseph S. Ross, Elizabeth E. Drye, Susannah M. Bernheim, Yun Wang, Elizabeth H. Bradley, and Lein F. Han. 2013. Relationship between hospital readmission and mortality rates for patients hospitalized with acute myocardial infarction, heart failure, or pneumonia. *Jama* 309 (6): 587-93.

Krumholz, H. M., S. L. Normand, and Y. Wang. 2014. Trends in hospitalizations and outcomes for acute cardiovascular disease and stroke, 1999-2011. *Circulation* 130 (12) (Sep 16): 966-75.

Lichtenstein, Donald R., Minette E. Drumwright, and Bridgette M. Braig. 2004. The effect of corporate social responsibility on customer donations to corporate-supported nonprofits. *Journal of Marketing* 68 (4): 16-32.

Lynk, William J. 1995. The creation of economic efficiencies in hospital mergers. *Journal of Health Economics* 14 (5): 507-30.

Martin, A., MD Makary, and Johns Hopkins. 2015. The potential hazards of hospital consolidation implications for quality, access, and price.

McClellan, Mark B., and Douglas O. Staiger. 2000. Comparing hospital quality at for-profit and not-for-profit hospitals. In *The changing hospital industry: Comparing for-profit and not-for-profit institutions.*, 93-112University of Chicago Press.

McIlvennan, C. K., Z. J. Eapen, and L. A. Allen. 2015. Hospital readmissions reduction program. *Circulation* 131 (20) (May 19): 1796-803.

"Measurement Framework: Evaluating Efficiency Across Patient-Focused Episodes of Care ." NQF. Accessed March 10, 2017. http://www.qualityforum.org/Publications/2010/01/Measurement_Framework__Evaluating_Efficiency_Across_Patient-Focused_Episodes_of_Care.aspx.

Narcı, Hacer Özgen, Yasar A. Ozcan, İsmet Şahin, Menderes Tarcan, and Mustafa Narcı. 2015. An examination of competition and efficiency for hospital industry in turkey. *Health Care Management Science* 18 (4): 407-18.

"NHE Fact Sheet." Centers for Medicare & Medicaid Services. December 02, 2016. Accessed March 10, 2017. http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NHE-Fact-Sheet.html.

Pan, Jay, Xuezheng Qin, Qian Li, Joseph P. Messina, and Paul L. Delamater. 2015. Does hospital competition improve health care delivery in china? *China Economic Review* 33 : 179-99.

Ramirez, Edith. 2014. Antitrust enforcement in health Care—Controlling costs, improving quality. *New England Journal of Medicine* 371 (24): 2245-7.

"Readmissions Reduction Program." Centers for Medicare & Medicaid Services. April 18, 2016. Accessed March 10, 2017. https://www.cms.gov/medicare/medicare-fee-for-service-payment/acuteinpatientpps/readmissions-reduction-program.html.

Schlesinger, Mark, Shannon Mitchell, and Bradford H. Gray. 2004. Restoring public legitimacy to the nonprofit sector: A survey experiment using descriptions of nonprofit ownership. *Nonprofit and Voluntary Sector Quarterly* 33 (4): 673-710.

Schlesinger, M., S. Mitchell, and B. H. Gray. 2004. Public expectations of nonprofit and for-profit ownership in american medicine: Clarifications and implications. *Health Affairs (Project Hope)* 23 (6) (Nov-Dec): 181-91.

Scott, Anthony, Peter Sivey, Driss Ait Ouakrim, Lisa Willenberg, Lucio Naccarella, John Furler, and Doris Young. 2011. The effect of financial incentives on the quality of health care provided by primary care physicians. *The Cochrane Library*.

Sloan, Frank A., Gabriel A. Picone, Donald H. Taylor, and Shin-Yi Chou. 2001. Hospital ownership and cost and quality of care: Is there a dime's worth of difference? *Journal of Health Economics* 20 (1): 1-21.

Sloan, F. A., J. Ostermann, and C. J. Conover. 2003. Antecedents of hospital ownership conversions, mergers, and closures. *Inquiry : A Journal of Medical Care Organization, Provision and Financing* 40 (1) (Spring): 39-56.

Squires, David, and Chloe Anderson. "U.S. Health Care from a Global Perspective." The Commonwealth Fund. October 08, 2015. Accessed March 10, 2017. http://www.commonwealthfund.org/publications/issue-briefs/2015/oct/us-health-care-from-a-global-perspective.

Suter, Lisa G., Shu-Xia Li, Jacqueline N. Grady, Zhenqiu Lin, Yongfei Wang, Kanchana R. Bhat, Dima Turkmani, Steven B. Spivack, Peter K. Lindenauer, and Angela R. Merrill. 2014. National patterns of risk-standardized mortality and readmission after hospitalization for acute myocardial infarction, heart failure, and pneumonia: Update on publicly reported outcomes measures based on the 2013 release. *Journal of General Internal Medicine* 29 (10): 1333-40.

Taylor, Zachary. "Health Care Spending Hits Record 17.5% Of GDP." David Stockman's Contra Corner. December 03, 2015. Accessed February 10, 2017. http://davidstockmanscontracorner.com/thanks-obamacare-health-care-spending-hits-record-17-5-of-gdp/.

Tsai, Thomas C., and Ashish K. Jha. 2014. Hospital consolidation, competition, and quality: Is bigger necessarily better? *Jama* 312 (1): 29-30.

Tsai, T. C., E. J. Orav, and A. K. Jha. 2015. Patient satisfaction and quality of surgical care in US hospitals. *Annals of Surgery* 261 (1) (Jan): 2-8.

Weil, T. 2010. Hospital mergers: A panacea? *Journal of Health Services Research & Policy* 15 (4) (Oct): 251-3.

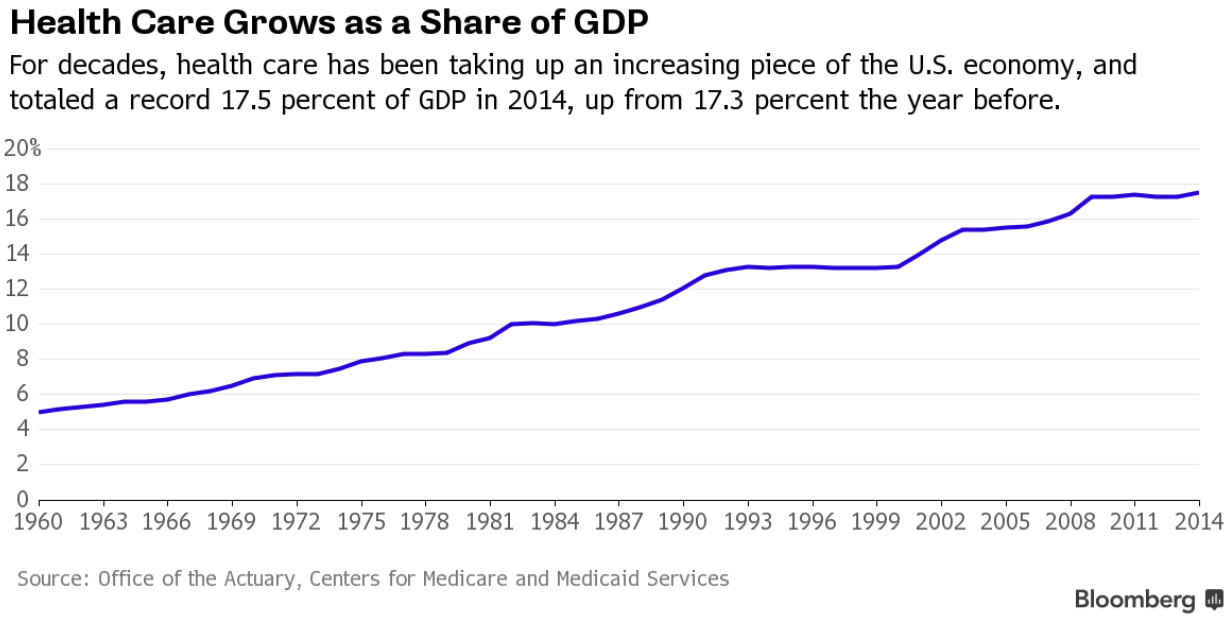
Werner, Rachel M., L. Elizabeth Goldman, and R. Adams Dudley. 2008. Comparison of change in quality of care between safety-net and non–safety-net hospitals. *Jama* 299 (18): 2180-7.

Xu, Tim, Albert W. Wu, and Martin A. Makary. 2015. The potential hazards of hospital consolidation: Implications for quality, access, and price. *Jama* 314 (13): 1337-8.

Yanci, J., M. Wolford, and P. Young. "What hospital executives should be considering in hospital mergers and acquisitions." *Charlotte, NC: Dixon Hughes Goodman LLP* (2013): 3.

APPENDICES

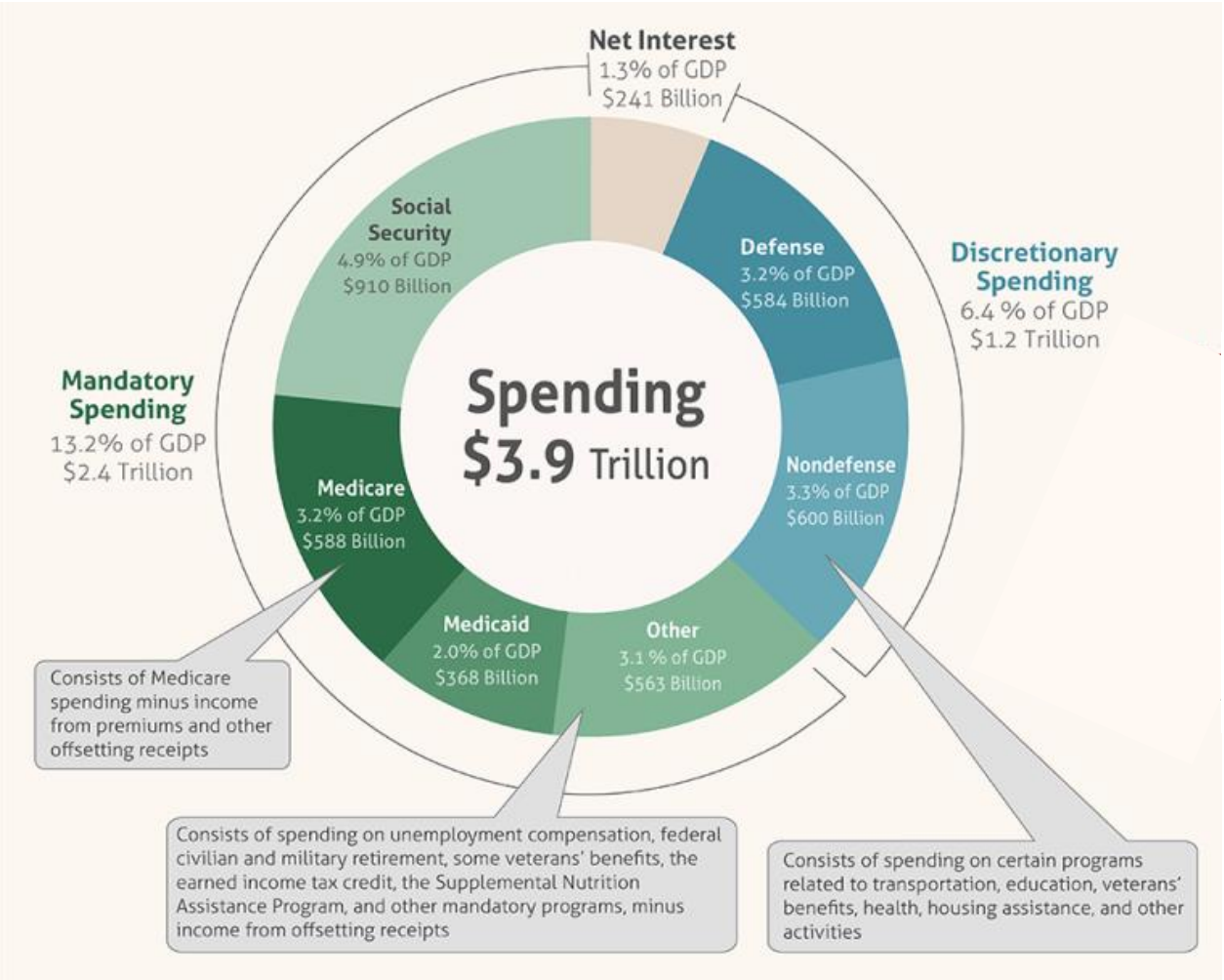
APPENDIX A
HEALTHCARE GROWS AS A SHARE OF GDP



(Taylor, 2015)

APPENDIX B

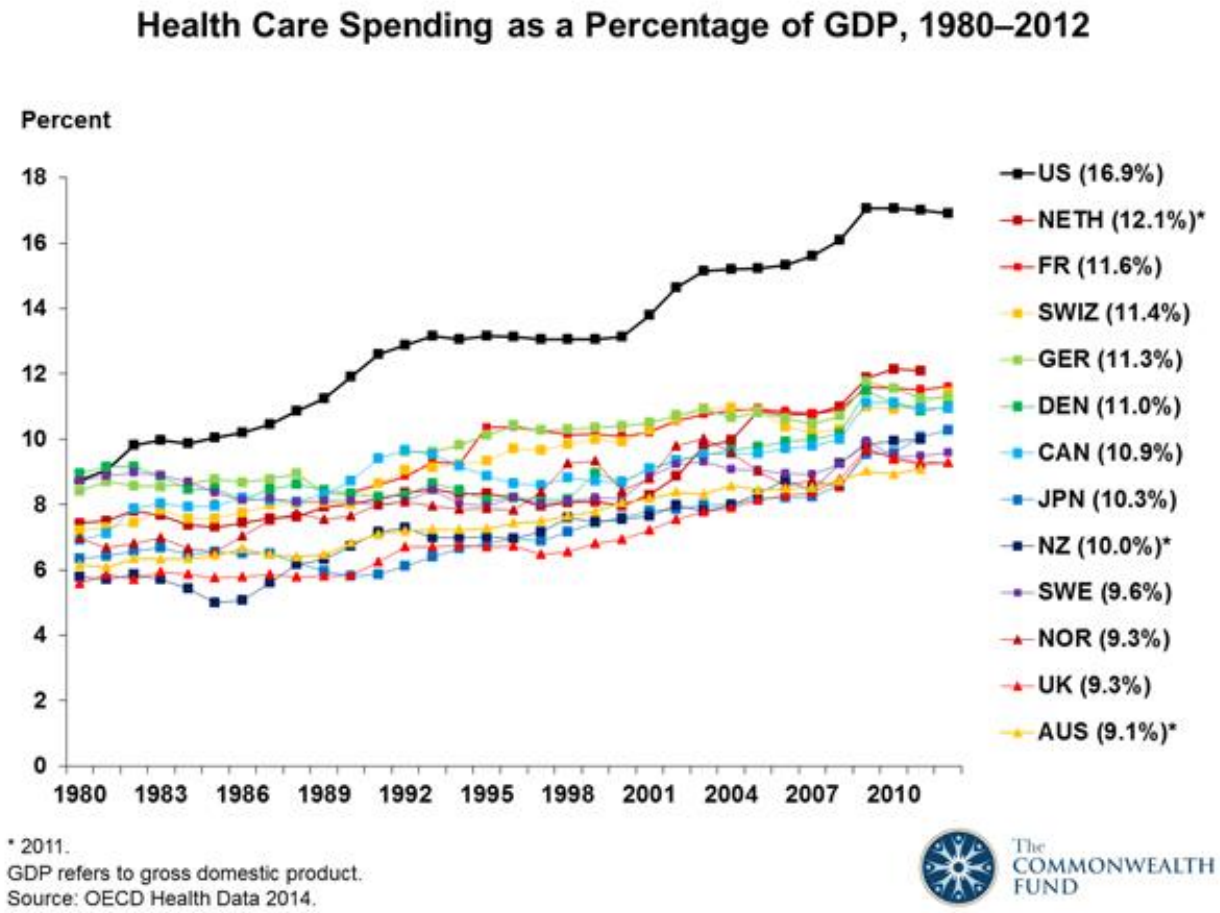
HEALTHCARE EXPENDITURES AS A PERCENTAGE OF FEDERAL SPENDING IN 2016



www.cbo.gov

APPENDIX C

HEALTHCARE SPENDING AS A PERCENTAGE OF GDP, 1980-2012



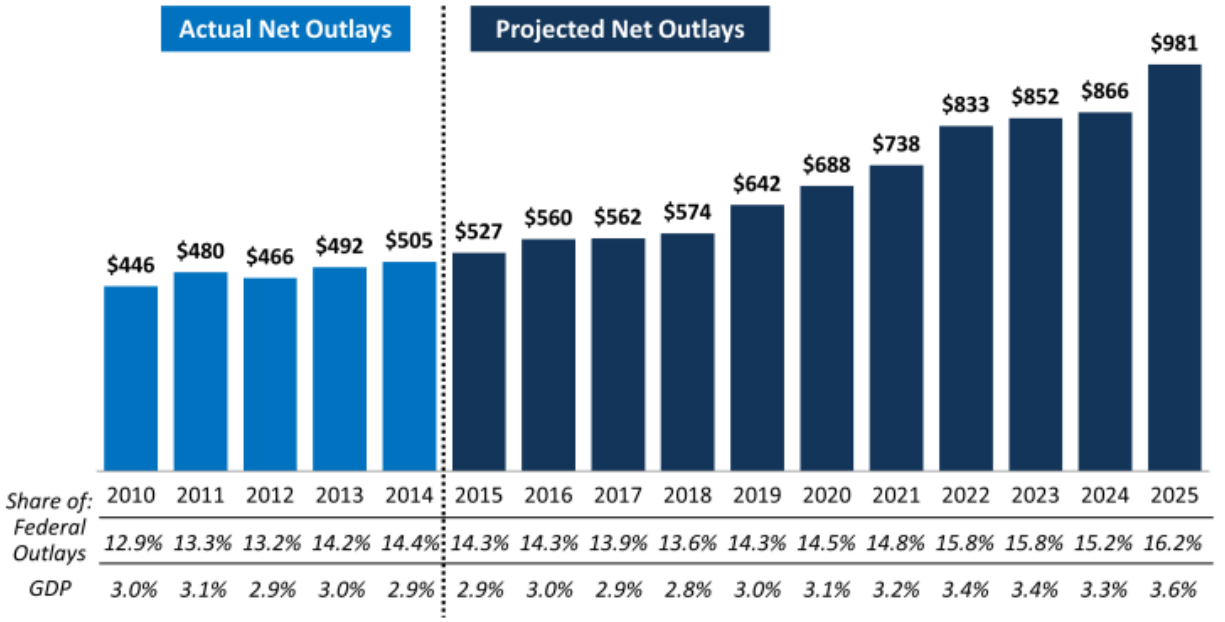
www.commonwealthfund.org

APPENDIX D

MEDICARE SPENDING AND PERCENT OF FEDERAL OUTLAYS AND GDP, 2010-2025

Figure 27

Medicare Spending and Percent of Federal Outlays and GDP, 2010-2025



NOTE: All amounts are for federal fiscal years; amounts are in billions and consist of Medicare spending minus income from premiums and other offsetting receipts.
SOURCE: Kaiser Family Foundation based on data from Congressional Budget Office, Updated Budget Projections: 2015 to 2025 (March 2015); The 2014 Long-Term Budget Outlook (July 2014).

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(Cubanski et al., 2015)