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FINANCIAL DISTRESS – CAUSES AND CONSEQUENCES: AN EXAMINATION OF THE NURSING HOME INDUSTRY

by

JUSTIN CALEB LORD

ROBERT WEECH-MALDONADO, COMMITTEE CHAIR
JUSTIN BLACKBURN
NATHANIEL CARROLL
AMY LANDRY
GRANT T. SAVAGE

A DISSERTATION

Submitted to the graduate faculty of The University of Alabama at Birmingham,
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy

BIRMINGHAM, ALABAMA

2018

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JUSTIN CALEB LORD

ADMINISTRATION-HEALTH SERVICES

ABSTRACT

Nursing homes operate in a tumultuous and changing environment and are under increasing financial pressure, risk of closure, and financial distress. The issue of financial distress has been explored tangentially within the nursing home industry. This study is the first to validate the Altman Z-Score, a financial distress prediction model, within the nursing home context. The Altman Z-Score model uses multiple discriminate analysis (MDA) to examine multiple financial ratios (liquidity, efficiency, profitability and net worth) simultaneously to predict the likelihood of a firm's financial distress. After calculating the Z-Score, clustering was used to classify the observations into three groups, distressed, risk-of-distress and financially healthy nursing homes. After the nursing home observations were classified according to risk of financial distress, the organizational and environmental factors that facilitate financial distress were explored. Resource Dependency Theory and Porter's Five Forces of Competition framework where used to conceptualize the organizational and environmental factors associated with financial distress. It was found that the organizational level variables, such as, occupancy, payer-mix, size and chain-affiliation had a significant impact on nursing home financial distress. The effects of external market forces on nursing home financial distress were limited, as only county-level Medicaid concentration; prevalence of home

health agencies, and number of hospital-based SNF beds were found to have a significant impact on nursing home financial distress. Lastly, this study explored the relationship between financially distressed nursing homes and resident's quality of care. The Resource-Based View of the Firm theory and Donabedian's structure-process-outcomes framework were used to explore the relationship between nursing home financial distress and quality of care. Nursing homes in risk-of-distress had higher RN, LPN, CNA staffing intensity and RN staffing mix but lower prevalence of catheters as compared to distressed nursing homes. Healthy nursing homes had higher LPN and CNA staffing but lower use of restraints and prevalence of contractures as compared to distressed nursing homes. These findings will help policy makers and practitioners be able to identify financially distressed nursing homes, understand what organizational and environmental factors facilitate distress, and the impact that nursing home financial distress can have on resident's health outcomes.

Keywords: Financial Distress, Altman Z-Score, Nursing Homes, Porter's Five Forces of Competition, Donabedian's structure-process-outcome framework

DEDICATION

To

My loving and supportive husband

Patrick Lord-Stephens

ACKNOWLEDGMENTS

There are so many people who I have to thank and acknowledge. I would not be here today, without the support of so many. First and foremost, I would like to thank Dr. Robert Weech-Maldonado for being my mentor, committee chair, and friend. Nothing that I have accomplished would have been possible without you. You have been a role-model for the type of professor and person that I hope to be one day. Thank you for taking a chance on me. Thank you to Dr. Amy Landry who encouraged me to enroll in this program. I would not have embarked on a journey of a life-time without your support and guidance. I would also like to thank all my other committee members for their feedback, guidance, and support. I am eternally grateful to all of you. I could not have asked for a better group of people to guide me. Also, to all my teachers who have helped and encouraged me throughout the way, there are too many to name but you know who you are.

I would be remiss if I did not thank my best friend, cheerleader, therapist, loving husband - Patrick. You have put up with more than you should. I know that I am not the easiest to be around with my craziness, mood-swings and everything-else but thank you for never leaving my side. Thank you for always being there to support me and bring me back to reality. I would not have been able to get through these past four years without you. As this part of our journey, comes to a close, I am excited about the new chapters that are about to open.

To my family who has provided me the encouragement and support that I take for granted and who have always been there throughout. To my mom, my first teacher (*Tiger was a Scaredy Cat*) and who has sacrificed more for me than I will ever realize (i.e. Birmingham every Monday night), I thank you. To my dad, who has and continuous to be a constant role model of how to be a better man. To my brother, who listens to my constant complaining and who is always willing to be there when I need it.

To all my UAB colleagues and friends, Gani Davlytov, Claudia Guerrazzi, Scott Young, Katherine Meese, William Opoku-Agyeman, Pam Paustian – who have been there to deal with my inane questions about stats, corny jokes, or temporary meltdowns.

Lastly, and most importantly, I am thankful to God who has poured his blessings on me and my loved ones during this journey. I believe he has a plan for all of us and this is part of it. I have experienced more than my fair share of God's grace and provisions during this process. I am thankful for this journey - it has been a learning experience for us all!

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INTRODUCTION

Nursing homes operate in a tumultuous and changing environment (Castle, 2003). These long-term care facilities face multiple challenges of providing high quality care to an aging, ailing population in a highly competitive and heavily regulated environment (Zinn, Mor, Feng & Intrator, 2006). Nursing homes are struggling to survive. From 2000 to 2014, there were over 1,223 nursing home closures in the US (Harris-Kojetin *et al*., 2016). This represents an 8% decrease in the number of nursing home facilities or a reduction of 101,445 beds (National Center for Health Statistics, 2015). This is representative of a larger trend of nursing home closures and consolidations. In the 1980s, there were approximately 17,773 nursing homes (Hawes & Phillips, 1986). In 2014, the number of nursing homes decreased to around 15,600 (Harris-Kojetin *et al.*, 2016). The decline of nursing homes far surpasses the closure rate of 1.5% for hospitals during the same period (National Center for Health Statistics, 2015). The reduction of nursing homes and available beds comes at a time when the number of older adults demanding long-term care will be approaching historical highs. It is estimated that the number of older adults seeking long-term care assistance will almost double from 15 million in 2000 to over 27 million in 2050 (Harris-Kojetin, Sengupta, Park-Lee, & Valverde, 2013). These closures will have implications for individuals seeking quality access to care and to the community at large (Castle, 2005a).

BACKGROUND

Nursing homes offer long-term and sub/post-acute care that provides health, personal and supportive services to meet the needs of frail older individuals; adults with disabilities, or individuals seeking rehabilitative care (Boccuti, Casillas, & Neurman, 2015; Harris-Kojetin *et al.*, 2013; HHS, 2013). Not all nursing homes are the same. Within the nursing home industry there is variation and specialization, with some nursing homes focusing their efforts on providing rehabilitation or other specialty services while others concentrate on providing long-term care services (Banaszak-Holl, Zinn, & Mor, 1996). Most sub-acute, post-acute and nursing home rehabilitative services are reimbursed by Medicare; however, long-term care services are usually reimbursed through Medicaid (Harris-Kojetin *et al.*, 2013). Even though nursing homes can provide a mix of services to target a specific payer-mix, on average, the majority of nursing home services are focused on providing long-term care (Harris-Kojetin *et al.*, 2013).

As individuals age, complications from complex chronic conditions and/or general declines in overall health may require institutional care at a skilled nursing facility/nursing home (Houser, Fox-Grage, & Ujvari, 2012). Residents of nursing homes typically have limited capacity for self-care because of a chronic illness; injury; physical, cognitive, or mental disability; or other health-related conditions (HHS, 2013). As such, the residents are a particularly vulnerable population. Exacerbating this potential vulnerability is the lack of financial and social support that must nursing home residents experience. Approximately, two-thirds of all nursing home residents are reliant on Medicaid and often report limited family or social support (CBO, 2013; HHS, 2013). In this context, nursing homes are often considered safety-net institutions for older adults

and individuals with disabilities, thus providing an important role in the health care system (Bowblis & Vasallo, 2014).

As of 2014, there were 1,693,943 certified nursing home beds available but only 1.4 million residents utilizing these facilities (CMS, 2015; National Center for Health Statistics, 2015). There is an estimated excess capacity of 331,440 nursing home beds; however, this has been estimated to be insufficient to accommodate the estimated increase of older adults in the coming years (Boccuti, Casillas, & Neurman, 2015; National Center for Health Statistics, 2015). The need for long-term care will only grow. The number of older individuals (over the age of 65) is anticipated to double from 40.2 million in 2010 to 88.5 million in 2050 (Vincent & Velkoff, 2010), while the number of older adults needing assistance is estimated to increase at a similar rate, to over 27 million in 2050 (Harris-Kojetin *et al.*, 2013). This will have a direct impact on nursing home demand. Nursing home utilization is estimated to increase from its current level of 1.4 million to over 2.3 million in 2030 (Mather, Jacobsen, & Pollard, 2015).

Despite the potential demand for nursing home care, there has been a trend of nursing home closures from 2000 to 2013 (National Center for Health Statistics, 2015). As the "graying of America" accelerates, this may pose a potential problem as it relates to nursing homes access (Sade, 2012). New nursing home facilities' construction has not rebounded since its precipitous decline of 33% during the Great Recession (Yoder, 2012; McGrath, 2015). Currently, the nursing home industry is ill-equipped to handle the aging baby boomer generation, due to aged facilities, nursing shortages, and decreased supply (Siberski & Siberski, 2015). The pace of current nursing home closures; current capacity

constraints, and the aging population will pose a challenge for the entire nursing home industry.

History of Nursing Homes

To comprehend the current nursing home industry and the environment, it is important to understand its history. The federal government initially became involved in the nursing home industry with the passage of the Social Security Act of 1935 (Vladeck, 1980). This legislation created a federal-state public assistance program for the elderly titled, Old Age Assistance (OAA). By 1954, there were over 9,000 nursing home facilities in operation. In the 1950s, an amendment to the Social Security Act required medical care funding to be made directly to nursing homes rather than the beneficiaries of care (KFF, 2015a). In 1954, the Hill-Burton Act provided federal money for nursing homes that were built in conjunction with hospitals (KFF, 2015a). The nursing home industry experienced tremendous growth in 1965 with the passage of Medicare and Medicaid (IOM, 1986). From 1960 to 1975, the number of nursing home beds increased by 302% (Young, 2016). As a result of the Medicare and Medicaid programs, the federal and state governments become the largest payers for long-term health care. This increased the utilization of nursing homes dramatically. However, in the 1970s, there was a propagation of abuse and neglect stories in the nursing home industry, resulting in increased regulation of nursing homes. Congress enacted the Nursing Home Reform Act as a part of the Omnibus Budget Reconciliation Act of 1987, which added additional regulations for nursing homes. In order for nursing homes to be able to participate in

Medicare, the Nursing Home Reform Act, stipulated that nursing homes had to have a sufficient level of nursing home staff; take a comprehensive assessment of each resident's functional capacity, and develop individualized comprehensive care plans (H.R. 3545, 1987). The 1997 Balanced Budget Act introduced prospective payments for skilled nursing care. This change in Medicare reimbursement has been generally credited with an increase of nursing home closures, financial distress, and bankruptcy (Knox, Blankmeyer, Trinidad, & Stutzman, 2009; Qaseem, Weech-Maldonado, & Mkanta, 2007). In 2005, the Deficit Reduction Act allowed states to expand community-based care demonstration models with federal funding (KFF, 2015a). The diversion of federal funds to home and community-based services, expanded in 2010 with the passage of the Patient Protection and Affordable Care Act (KFF, 2015a). The Protecting Access to Medicare Act of 2014, established a value-based purchasing program for skilled nursing facilities (SNFs). The value-based purchasing program will introduce financial penalties for potentially avoidable readmissions in SNFs (H.R. 4302, 2014). In 2015, the minimal performance standards were raised with the revision of the Five-Star Quality rating system as introduced by the Centers for Medicare and Medicaid (CMS) (KFF, 2015a). While the environment, regulation, and financing of nursing home care has changed drastically throughout the years (Harris-Kojetin *et al.*, 2013), the delivery of care in a nursing home has not.

As of 2014, there were 15,640 nursing homes with an average capacity of 106 beds. The average occupancy of these nursing home facilities is 82% (CMS, 2015). More than 70% of all the nursing homes are classified as for-profit; 56% of all nursing homes are chain affiliated and 92 % of all nursing homes are dual certified to accept

Medicare and Medicaid (CMS, 2015; Harris-Kojetin *et al.*, 2016). Most nursing homes are distributed in the South (35%) and in the Midwest (33%) (Harris-Kojetin *et al.*, 2013). From 2004 to 2014, the number of nursing homes has gradually declined but this decline has essentially halted over the past five years (CMS, 2015). From 2009 to 2014, there have actually been nineteen states have had an increase in the number of nursing homes, primarily in Alaska (20.0%), Nevada (8.2%), Arizona (5.8%), Indiana (+5%), and Texas (3.8%) (CMS, 2015); however, this trend has not been seen in all states.

Competitive Landscape

The long-term care industry is undergoing a transformative change. This is partially due to the impending elder baby boom, as well as, a shift in consumer preferences for long-term care alternatives (Grabowski, Stevenson, & Cornell, 2012). Since the 1970s, there has been a bias against institutional or nursing home care (Grabowski, Stevenson, & Cornell, 2012). The disability rights movement of that era challenged the institutional delivery of long-term health care. The disability rights movement argued that nursing homes were limiting personal autonomy and increasing segregation from the community (Grabowski, Stevenson, & Cornell, 2012). Correspondingly, there was a change in consumer preferences as it related to long-term care, especially nursing home care (Mollica & Houser, 2012). This change in consumer preferences for long-term care was also driven by a concern over nursing home quality. A survey by the Kaiser Family Foundation (2007) found that 51% of individuals were very concerned regarding the quality of nursing home care. The high cost of nursing

homes; institutional bias; negative beliefs of nursing home quality have increased the risk of substitutes in the nursing home industry.

In the past two decades, there has been a major shift away from institutional care (i.e., nursing homes) and an increase for independent long-term care services, such as, assisted living, home and community-based services (HCBS), adult day care, and/or personal skilled nursing care (Feng, Fennell, Tyler, Clark, & Mor, 2011; Kemper, Komisar, & Alecxih, 2005; Vincent & Velkoff, 2010). In 2012, there were an estimated 3,700 hospices; 4,800 adult day services centers; 12,200 home health agencies, and 22,200 residential care communities – all of which are indirect competitors/substitutes of nursing homes (Harris-Kojetin, *et al.,* 2013). These providers of long-term care all vary from nursing homes by expense, capacity and level of care, yet they share a degree of overlap. The shift in consumer demand, away from nursing homes and toward alternative providers of long-term care may have attributed to decreases in nursing home occupancy rates over the past several decades (Castle *et al.,* 2009). From 1991 to 2014, the average nursing home occupancy rate has fallen from 91% to 82% (Bishop, 1999; CMS, 2015).

Home and community-based services

Home and community-based services (HCBSs) is defined as long-term support that assists older adults to remain in their homes (Kassner, 2011). These services can include items such as personal care, chore assistance, transportation, meals or adult day services. HCBSs are provided by home health care agencies who then send nurses, therapists, and aides into an individual's home to assist the patient's activities of daily living (ADL) (Benjamin, 2001; Mollica, Simms-Kastelein, & Kassner, 2009).

Individuals who are eligible for HCBS must be assessed 'at risk' for nursing home placement. HCBSs grew rapidly after the Olmstead v. L.C. case in 1999. The ruling was an attempt to reintegrate adults with disabilities into their community, thus removing them from institutional care (Hornbostel, 2005). As a result, CMS began to shift money away from institution-based organizations and towards community-based services (Hornbostel, 2005). HCBS services are traditionally provided in the consumer's home and can be reimbursed through Medicaid. HCBSs have an average cost per patient of $17,151, which is much lower than the average cost for a nursing home (Ng, Harrington, Musumeci, & Reaves, 2015).

Medicaid spending on HCBS has more than tripled nationally from 15% ($22 billion) in 1992 to 51% ($75 billion) in 2013 (Eiken, Sredl, Burwell, & Saucier, 2015). HCBS services currently serve 3.2 million individuals but there remain over 582,000 people on waiting lists to get coverage (Ng *et al.*, 2015). As of 2014, the wait time for HCBS exceeds two years (Kassner, 2011; Ng *et al.*, 2015). HCBS programs have exploded in popularity over the past two decades and are available in every state to a varying degree (Benjamin, 2001; Kassner, 2011).

Assisted Living Communities

Assisted living communities are an alternative long-term care provider. Residents in an assisted living community are often provided support with activities of daily living, such as, bathing, eating, and dressing in a home/community setting. The Assisted-Living Quality Coalition (1998) defines assisted living as "a congregate residential setting that provides or coordinates personal services, 24-hour supervision and assistance (scheduled

and unscheduled), activities, and health related services." Assisted living communities can provide limited care to older adults with mild health issues; however, once the individual's level of health deteriorates past a certain point those individuals will need the full support of a nursing home (Mollica, Sims-Kastelein, & O'Keefe, 2008).

Assisted living communities tend to attract healthier, wealthier, and more educated individuals (Reinhard, 2010; Stevenson & Grabowski, 2010). Assisted living communities have opened up in more affluent, suburban neighborhoods that have lower proportion of minorities (Feng *et al.*, 2011; Stevenson & Grabokwsi, 2010). The average cost of assisted living care was $42,000 in 2014, compared to $82,125 per year for a semiprivate room in a nursing home (Genworth, 2017). Because assisted living communities are almost all private pay, so generally they do not have to comply with the same rules and regulations (i.e., certificate-of-need, minimum staffing ratios) that govern nursing homes (Grabowski, Stevenson, & Cornell, 2012; Longwell & Steele, 2011; Stevenson & Grabowski, 2010). While assisted living communities are not subject to federal oversight, they are subject to state regulation. The level of regulation varies state-to-state and can be impacted by the type of services that an assisted living community offers. For example, Alabama has more stringent oversight/regulations for Specialty Care Assisted Living communities as compared to other states (Carder, O'Keeffe & O'Keefe, 2015).

As the nursing home industry has seen a decline, the assisted living industry has seen tremendous growth (Mollica & Houser, 2012). There is a misnomer that assisted living communities and nursing homes are 'true' substitutes for each other (Bowblis,

2014). Assisted living communities are an indirect competitor to nursing homes. It has been found that the presence of assisted living bed in a market can negatively impact a nursing home's financial performance (Lord, Davlyatov, Thomas, Hyer, & Weech-Maldonado, 2018).

Impact on Nursing Homes

Over the past several years, nursing homes have seen a decline in their payer-mix and occupancy. Private-pay residents are now choosing to age in assisted living care or other long-term care options as opposed to nursing homes (Bowblis, 2012). This has resulted in a transfer of resources from the nursing home. The total portion of 'out-of-pocket' spending on nursing home care has fallen from 32% in 2000 to 26% in 2015. As the percentage of private-pay has fallen, nursing homes have attempted to increase the percentage of Medicare reimbursed services, such as, skilled nursing care services. From 2000 to 2015, the spending for skilled-nursing care has increased by $26.8 billion and gone from 13% of the revenue mix to 24% (CMS, 2017). However, as previously notated, not all nursing homes are created equal nor do they offer the same levels of skilled nursing care. Nursing homes that are unsuccessful in being able to reposition themselves as providers of quality post-acute care are often required to care for the more resource intensive residents (Bowblis, 2012).

Medicaid is still the biggest payer in nursing home care. Even with the changing payer-mix, nursing homes still have to fund a majority of their operations utilizing a Medicaid, a historically low and unattractive payer (Bowblis, 2012). In 2015, 32% of all nursing home revenue was funded through Medicaid. This is lower than the 37% level

that Medicaid funded in 2000 (CMS, 2017). Even though Medicaid (as a total percentage of revenue) has fallen, in absolute dollar terms, spending on Medicaid for nursing home care has increased by $17.8 billion (CMS, 2017).

Prior to assisted living and HCBS, nursing homes had a relatively balanced payer-mix, in which private pay and Medicare services helped cover the Medicaid residents. However, as the private pay (out-of-pocket) nursing home payer-mix has deteriorated this has placed increased financial constraints on nursing homes. Nursing homes are now having to care for more resource intensive patients in a resource-constrained environment.

Nursing Home Resident Demographics

While there has been a consumer shift in preferences for long-term care, there has also been a demographic shift within nursing homes. Between 1999 and 2008, the number of older Hispanics residents in nursing homes grew by 55%; the number of Black residents increased 11%, while the number of White nursing home residents declined 10% (Feng *et al.*, 2011). The total number of minorities in nursing homes has increased more rapidly than the minority population. As Whites sought long-term care outside of the nursing home, Hispanics and Blacks increased their utilization of nursing homes. This has implications for health inequity.

Inequity in Quality

Racial disparities have consequential consequences on health care access and outcomes. Minorities on average receive care from relatively lower quality providers and

have worse health outcomes (Chisholm, Weech-Maldonado, Laberge, Lin, & Hyer, 2013). Some of these variations may be attributed to differences as it relates to access to care, financial resources or social support (Chisholm *et al,* 2013; Rahman & Foster, 2015). Minority populations, such as, Blacks and Hispanics, tend to have fewer alternatives for high quality nursing home care relative to Whites (Fennell, Feng, Clark, & Mor, 2010; Mor, Zinn, Angelelli, Teno, & Miller, 2004; Reed & Andes, 2001; Reed, Andes, & Tobias, 2001). Low quality nursing homes are often located in geographic areas that have a disproportionate number of minority, Medicaid, and less educated individuals (Angelelli, Grabowski, & Mor, 2006; Grabowski, 2004; Konetzka *et al.,* 2015; Smith, Feng, Fennell, Zinn, & Mor, 2007). Nursing home care is often geographically constrained to a certain community or concentrated group of individuals (Konetzka *et al.,* 2015). This has potentially negative implications for minorities.

The delivery of high-quality nursing home care is not equitable. Nursing homes remain relatively segregated, roughly mirroring the residential segregation within a community (David *et al.,* 2007). The issue of de facto racial segregation of health care facilities has been notated by researchers and advocates (IOM, 2002; Smedley, Stith, & Nelson, 2002; U.S. Civil Rights Commission, 1971). Minority populations, such as, Blacks and Hispanics, tend to have fewer alternatives for high quality nursing home care as compared to Whites (Fennell *et al.,* 2010; Mor *et al.*, 2004; Reed & Andes, 2001; Reed, Andes, & Tobias, 2001). Mor and colleagues found that across the United States 40% of Black residents, but only 9% of Whites, resided in low-tiered nursing home facilities (Li *et al.* 2011; Mor *et al.,* 2004). The number of minorities seeking nursing home care, relative to Whites, is also increasing. Concerns have been

raised that nursing homes will become more segregated as a disproportionate percentage of minority residents seem to be relegated to low performing nursing homes (Konetzka *et al.,* 2015). With the changing socio-economic and demographic trends of nursing home residents – these issues will only become more prevalent (Feng *et al.,* 2011).

Racial segregation in nursing homes can have a negative impact on resident's care. Health outcomes have been found to vary due to differences in incomes (Qasim & Andrews, 2013). Nursing homes in poorer communities have been found to have lower levels of staffing (Kane, Shamliyan, Mueller, Duval, & Wilt, 2007); training (Kendall-Gallagher, Aiken, Sloane, & Cimiotti, 2011), and facilities/equipment (Qasim & Andrews, 2013). Mor and colleagues (2004) addressed the fact that there are socioeconomic and racial disparities within the nursing home industry. Blacks are more likely to be placed in nursing homes that have greater financial vulnerability, lower levels of staffing, and worse quality, as compared to Whites (David *et al.,* 2007). If the demographics of nursing homes are shifting more to minority residents this may exasperate existing health care disparities in the delivery of long-term care (Feng *et al.,* 2011).

The issue of segregation extends further than resident quality of care but as it relates to access. Feng and associates (2011) found that nursing home closures were higher in markets characterized by high rates of poverty and higher proportions of racial and ethnic minority residents. Nursing home closures do not impact all communities equally. In economically depressed communities, often there is a lack of long-term care alternatives (Feng, Lepore, Clark, Tyler, Smith, Mor, & Fennell, 2011b). In these

communities, if the nursing home closes and it is the only provider, it can lead to an access-to-care issue. Minority and poorer residents may be limited in their ability to travel outside of their community to seek long-term care due to financial or social constraints (Konetzka *et al.,* 2015). This inability to seek alternative nursing home care outside of their communities may exasperate existing health care disparities (Mor *et al.,* 2004).

The persistent and imbedded socio-economic and racial disparities in the nursing home industry have many negative implications. Many nursing home closures are concentrated in minority and poor communities (Feng *et al*., 2011). This may be explained by the differences in the amount of resources available in these different communities. Wealthy communities often have greater access to resources (Konetzka *et al.,* 2015); however, low income individuals will lack those resources (Qasim & Andrews, 2013). As a result, nursing homes whose primary clientele is low-income lack the necessary financial resources to provide adequate resident care.

Nursing Home Staffing

Nursing homes are an example of a service intensive industry, as such, there is great deal of personal interaction between the service personnel and the nursing home resident (Huda, 1995). Nursing home staff is comprised of registered nurses (RNs), licensed practical nurses (LPNs), certified nurse assistants (CNAs) and health care aides. Within this hierarchy of staffing, typically RNs hold the highest nursing position in a nursing home (ANA, 2016). The scope of practice varies between RNs and LPNs. RNs

have supervisory duties that include, but are not limited to, assessing the medical history; coordinating with physicians; starting intravenous infusions; administering oxygen, and supervising the LPNs (ANA, 2016). LPNs provide basic but necessary care to patients. Some of the LPN roles and responsibilities include monitoring the respiration; blood pressure; inserting catheters; treating bedsores; giving injections; administering medications, and changing bandages (ANA, 2016). CNAs primarily provide residents with assistance regarding their activities of daily living (ADLs); observe resident's responses to care; monitor vital signs, and document food/fluid intake (Torpey, 2011). Some of these ADLs may include but are not limited to feeding, bathing, dressing, and helping residents with their mobility. Even though these activities and roles are labor intensive, the compensation varies based on nurse skill set. RNs average salary is around $68,450, as compared to LPNs at $44,090 and CNAs whose average salary is around $26,590 (Bureau of Labor Statistics, 2016).

Nurses play a crucial role in the delivery of care in a nursing home, yet there has been a systemic shortage of nurses since the 1990s with shortages projected to get worse in the coming years (DeFriese, 2009). In 2010, there were an estimated 2,824,641 RNs and 690,038 LPNs in the workforce (HRSA, 2013); however, only 7% of RNs and 31% of LPNs work in nursing home facilities (HRSA, 2013). The majority (63%) of RNs work in hospitals. RNs and LPNs are less likely to work in nursing home facilities because of the perceived low pay, prestige and workload. Instead RNs and LPNs typically accept employment in hospitals, outpatient care centers, administration positions, and other health care services (HRSA, 2013; Terry, 2008).

Nurses are not immune to the "greying" of America. As of 2010, more than half the RN workforce was over 50 or older (Budden, Zhong, Moulton, & Cimiotti, 2013). Research suggests there will be a shortage of 285,000 RNs between 2015 and 2020. This is nearly three times the size of the current shortage (Buerhaus, Staiger, & Auerbach, 2009). Even with small increases in the number of RNs (increase of 14% per 100,000 individuals) and LPNs (increase of 6% per 100,000 individuals), these increases will not be enough to satisfy the growing demand for nurses and replace retiring nurses (HRSA, 2013).

The shortage of medical personnel is not limited to nurses but also includes physicians. Medicare regulations require a physician to serve as the medical director and to be responsible for the medical care provided in skilled nursing facilities (AMDA, 2011; Nanda, 2015). While the specific functions and tasks of the medical director can vary by state, patient populations or facility requirements, the primary role of the medical director is to provide physician leadership to ensure appropriate and quality resident care is delivered (AMDA, 2011). The Association of Academic Medical Colleges estimates a shortage of 124,000 to 159,000 physicians by 2025 (Moote, Krsek, Kleinpell, & Todd, 2011). This shortage is expected to hit primary and geriatric care especially hard because there has been waning physician interest in these fields (Iglehart, 2008; Katz, Karuza, Intrator, & Mor, 2009). In 2008, the Institute of Medicine reported on the downward trend of board-certified geriatricians and physicians entering geriatric fellowships (Katz *et al*, 2009). Nursing homes are struggling to provide adequate levels of care as they are faced with the challenge of retaining qualified staff to provide high quality care to resource intensive patients (Gaugler, 2014; Shulman *et al.*, 2009; Wiener, Freiman, &

Brown, 2007). The Institute of Medicine called for the expanded role of physician extenders (midlevel providers), such as, nurse practitioners (NPs) and physician assistants (PAs) to bridge this gap (IOM, 2008; Katz *et al.*, 2009).

NPs and PAs are mid-level providers/practitioners who are more highly trained as compared to a registered nurse (Caprio, 2006; Henry, Hooker, & Yates, 2011). Physician assistants and nurse practitioners emerged in the 1960s as an effort to relieve a nationwide shortage of primary care providers (Henry, Hooker, & Yates, 2011). These physician extenders are less expensive to employ as compared to a traditional physician yet more expensive as compared to a registered nurse (Gadbois, Miller, Tyler, & Intrator, 2015; Hooker & Muchow, 2015). All physician extenders must graduate from an accredited program and pass a national exam. Then licensure must be acquired from the appropriate state regulatory board and care supervised by a doctor. Although NPs and PAs are certified nationally, differing state scope-of-practice laws determine the extent to which they may practice independently (Atwater, Bednar, Hassman, & Khouri, 2008; Gadbois, Miller, Tyler, & Intrator, 2015).

The utilization of physician extenders (NPs and PAs) has been cited as a possible way to increase the level of care provided within nursing homes (Buchan & Poz, 2002; Poghosyan, Lucero, Rauch, & Berkowitz, 2012). Research has found that NPs and PAs, in addition to increasing access to care, also provide quality care that is comparable in quality to that provided by physician, resulting in fewer avoidable hospitalizations and other favorable outcomes (Halter *et al.*, 2013; Hooker & Everett, 2012; Intrator, Feng, Mor, Gifford, Bourbonniere, & Zinn, 2005; Naylor & Kurtzman, 2010; Xing, Mukamel, & Temkin-Greener, 2013). The utilization and adjustment of the staffing mix to include

NPs and PAs offers a potential solution to the structural problem(s) facing nursing homes. However, the considerable cross-state variation in NP and PA authority makes understanding their potential impact in reducing the primary care shortage difficult (Gadbois, Miller, Tyler, & Intrator, 2015; Poghosyan *et al.*, 2012).

One factor that has a major influence on nurse staffing mix decisions is the minimum staffing regulations that arose from *The Nursing Home Reform Act (NHRA*) *of 1987* (Zhang, Unruh, Liu, & Wan, 2006; Wiener, Freiman, & Brown, 2007). With nursing homes, there are federal and state requirements dictating the staffing levels for RNs and LPNs (Hirdes, Mitchell, Maxwell, & White, 2011). While state regulations may vary, the federal statute establishes a baseline requiring nursing homes to have, at minimum one RN for eight continuous hours a day, seven days a week, and either an RN or LPN/LVN on duty twenty-four hours per day (Medicare, 2016). Some states have regulations that exceed the federal statute (Zhang *et al.*,2006). A study by Harrington and Millman (2001) found that 15 states had higher RN standards as compared to the federal guidelines and 25 states had higher LPN standards (Harrington & Millman, 2001).

Nursing homes seek optimal nurse staffing levels because of its relationship to cost and quality. Nurse staffing mix has been found to have significant impact on resident outcomes and processes of care (Bostick, Rantz, Flesner, & Riggs, 2006; Konetzka, Stearns, & Park, 2008). Studies have found a positive association between nurse staffing levels (especially for registered nurses) and the processes and outcomes of care in nursing homes (Institute of Medicine, 1986, 2001; Weech-Maldonado *et al.*, 2004). Nurse staffing levels can also impact financial performance. Nursing homes with a higher ratio of RNs to other nurses may have a marginal financial return (Weech-

Maldonado, Neff, & Mor, 2003a, 2003b). Yet, when the nurse staffing mix is too high, it can have a determinantal impact of financial performance, due to increased costs (Castle, Engberg, & Men, 2007). It has been found that nursing homes with low staffing levels, marginal increases in staffing may lead to increasingly large improvements in quality; however, high levels of nurse staffing will result in higher costs with diminishing improvements in quality or improvements at a decreasing rate (Zhang *et al.*, 2006). Strategic increases in nurse staffing hours have been associated with fewer nursing home deficiencies (Harrington *et al*., 2000), yet changes in staffing mix can impact costs and thus financial performance. In this case, nursing homes (acting rationally) will try to optimize their staffing-mix to get the most value with minimal staffing.

Nursing homes, in an effort to control costs, may want to cut their staff (largest variable expense); however, these decisions have to be balanced with minimum staffing requirements and concerns regarding quality. If the expenses for nursing homes continue to rise (i.e., shortage of nurses) and the revenue continues to decline (falling occupancy and shifting payer-mix) then this combination may help explain some of the poor financial performance seen in nursing homes.

Nursing Home Reimbursements

All nursing homes now offer skilled nursing or other types of nursing services (Harris-Kojetin *et al.*, 2016). In 1983, the Medicare prospective payment system (PPS) was introduced which incentivized hospitals to reduce the patient's length of stay. Following the introduction of this new payment system, patient discharges from hospitals to nursing homes that provided skilled nursing care increased (White, 2006). Medicare played a significant role in expanding skilled nursing care from the late 1980s through the

mid-1990s (Gabrel & Jones, 2000). Medicare reimbursements are more attractive to providers as compared to Medicaid because Medicare pays more. Nursing homes that provided skilled nursing and post-acute care could get additional revenue through Medicare. Even with the introduction prospective payments for skilled nursing care (due to the 1997 Balanced Budget Act) post-acute care still remains an important revenue stream for most nursing homes (Qaseem, Weech-Maldonado, & Mkanta, 2007). Medicaid remains the largest payer for long-term nursing home care, yet, Medicare reimbursements is an increasingly important proportion of the revenue mix. According to the National Health Expenditures survey, Medicare reimbursements for short-stay post-acute care, now accounts for 24% of all nursing home revenue in 2015 (CMS, 2017).

In 2019, the federal government will implement value-based payments for Medicare skilled nursing care based on quality measures and rates of hospital readmissions as outlined in *The Protecting Access to Medicare Act of 2014 (*Public Law 113-93, 2014). This act will financially penalize skilled nursing facilities and long-term care providers who have poor quality and certain avoidable health events, such as, avoidable re-hospitalizations (Public Law 113-93, 2014). When skilled nursing home reimbursements get tied to quality, this has the potential to financially shock the industry. The value-based purchasing system will force nursing homes and other long-term care providers to improve the delivery of patient care to avoid financial penalties. The increased emphasis on quality comes at a time when some long-term care facilities (i.e., nursing homes) are facing significant financial challenges.

Long-term care facilities (i.e., nursing homes, home based and community services and adult day care) are facing financial pressures as states struggle to fund their Medicaid programs (McNichol & Lav, 2008). While revenues for nursing homes are declining, the costs of care are increasing. The increased cost of care is a result of the intensive nature of delivering patient care, as well as, higher nurse staffing mandates and liability insurance costs (Bowblis & Lucas, 2012). Long-term care providers have to balance limited resources with more increased demands for staffing, care and resource intensive patients (Stone & Wiener, 2001; Wiener, Freiman, & Brown, 2007).

Nursing Home Quality

Health care quality is a pervasive issue in all aspects of the health care system. This issue has been addressed in hospitals (Keeler *et al.* 1992), dental practices (Baldwin & Sohal, 2003), elective out-patient centers (Derrett, Paul, & Morris, 1999), and nursing homes. The quality of care within a nursing home is of essential importance because nursing home residents are typically older individuals who have limited physical and cognitive abilities who can no longer care for themselves (Sasson *et al.,* 2012). Over the years, multiple reports have expressed concern over poor quality of care in nursing homes (Institute of Medicine, 1986; 2001; GAO, 2003, 2015). While there has been evidence of quality improvement within nursing homes with the decrease of serious deficiencies from 2005 to 2014, the Government Accountability Office continues to express concerns regarding resident quality-of-care (GAO, 2007, 2015). Quality of care remains a salient issue, not only because the U.S. government is the principal payer of long term care but also because nursing homes provide care to some of our most vulnerable populations

(Werner & Konetzka, 2010). As a result, nursing homes are under constant pressure to improve the quality of care.

In an attempt to address quality concerns, the federal and state government has attempted to improve and strengthen nursing home regulation; provide greater consumer transparency (Li *et al.*, 2011); institute more stringent penalties for deficiencies, and adopt market-based models to incentivize quality improvement. Forty-one states have attempted to improve nursing home quality by passing regulation that requires higher nurse staffing standards as compared to the federal standards (Harrington, Schnelle, McGregor, & Simmons, 2016; Lin, 2014). The federal nurse staffing requirements established by the Nursing Home Reform Act of 1987 required nursing homes to have "sufficient" staff to meet the needs of nursing home residents. The federal regulations required one RN (the Director of Nursing) to be on duty for eight hours a day, seven days a week, and for one licensed nurse to be present during the evening and night shifts; however, many states have made these staffing requirements more strenuous (Harrington, Schnelle, McGregor, & Simmons, 2016; Public Law 100-203, 1987).

Greater nursing home transparency has been provided through CMS's Nursing Home Compare. This is a publicly available resource that allows individuals to see how nursing homes compare to each other as it relates to certain quality indicators (CMS, 2016b). Nursing Home Compare has information on a nursing home's organizational, staffing and quality characteristics. Most notably Nursing Home Compare provides each facility with a star rating, which is the result of health inspection scores, staffing levels, and quality of resident care measures (CMS, 2016b). Quality measures, include but are not limited to, the percent of individuals who were re-hospitalized; percent of residents in

moderate to severe pain; percent of residents with new or worsening pressure ulcers; percent of urinary tract infections, and much more (CMS, 2016b). The intent of this transparent, public-reporting is that the individuals seeking out long-term care will choose high quality providers. The second intent, which is driven by theories in economics and behavior change, is that organizations will compete to improve their own quality when their information is publicly available (AHRQ, 2014).

The government is also adopting market-based models to incentivize quality improvement. *The Protecting Access to Medicare Act of 2014*, will use value-based purchasing payments to incentive better quality within skilled nursing facilities starting in 2019. This is an example of a market-based reform that rewards high quality while penalizing poor quality. Given the impending demand for nursing homes, it is anticipated that these will be the first of many market-based regulations and reimbursement models to improve quality.

Changing Nursing Home Environment

Nursing homes are currently operating in a challenging environment. One of the more important issues facing nursing homes is financial performance and the ability to remain solvent. Financial performance is a major operational concern, as nursing home failure and closure is an ever-present reality in the nursing home industry (Bowblis, 2011a; Feng *et al.*, 2011). Nursing homes have to focus on financial performance because as the health care adage goes "no margin, no mission" (Blackwell, 1994). A study by Weech-Maldonado and colleagues (2012) found that even though the total margin varied for not-for-profit and for-profit nursing homes, it was still relatively low

from 1.3% (for-profit) to -1.1% (not-for-profit). There are multiple challenges that can affect the financial performance of a nursing home, such as, changes in state and federal reimbursement policies (Carter, Garrett, & Wissoker, 2012; Gage, 1999); growth in managed care contracts (Pratt, 1999; Zinn *et al.*, 1998); declining occupancy rates (KFF, 2015b), and changing payer-mix (Chisholm *et al.*, 2013). At the same time that revenues are declining, the costs of delivering resident care are mounting, due to minimum nurse staffing mandates, liability insurance costs and residents having greater disabilities / post-acute care needs (Bishop, 1999; Bowblis & Lucas, 2012). While the previous sections may have highlighted some of these issues, there are some impending concerns that need to be addressed.

DISSERTATION PLAN

This dissertation will utilize the 'three-paper' model to explore nursing home financial distress. The first paper will propose and validate a statistical methodology to identify nursing homes that are in financial distress. The second paper will build on the results presented in the first paper and explore the organizational and market factors associated with financially distressed nursing homes. The third paper will examine resident quality in financially distressed nursing homes. These three papers will examine the issue of nursing home financial distress from three unique but important viewpoints. Each paper will be able to stand alone and be of publishable quality. A visualization of the proposed relationships can be seen on Figure 1. The following is a detailed summary of each of the following three papers.

Paper 1: Predicting Nursing Home Financial Distress Using the Altman Z-Score

Nursing homes are under tremendous financial pressure. The "Distress Indices Special Report: Causes of Healthcare Distress in 2014" found that bankruptcies in the health care industry were up by 38% between 2010 and 2014 with nursing homes following a similar trend (Guy, Dempsey, Johnson, & Katona, 2014). Nursing homes are described as 'safety net' institutions or 'care-takers of last resort,' it is for these reasons it is critical to identify nursing homes that are at a higher risk of closure (Bowblis, 2012). There are multiple factors that attribute to a nursing home closure; however, financial performance plays a significant role. Given the rate of nursing home closures and the changing environment, it is important to identify nursing homes that are in financial distress (Kaiser Family Foundation, 2013).

Understanding the financial indicators that may result in financial distress is important in targeting organizations that may be at a higher likelihood of closure. The first paper proposes to validate the Altman Z-Score within the nursing home industry to examine the attributes associated with nursing homes that are at risk for closure. The relationship between financial performance of nursing homes and the likelihood of nursing home closures is an important area to understand in the field of long-term care (Weech-Maldonado, Laberge, Pradhan, Johnson, & Hyer, 2012).

Paper 2: Let's Ask Porter: A Reconceptualization of the Resource Dependency Theory to Explore Financial Distress

The long-term health care industry is comprised of assisted living communities, skilled nursing facilities, home health, nursing homes, hospitals and uncompensated family care. The environment for long-term health care is changing and this has had financial implications for the nursing home industry. The availability of resources seems to be one of the underlying drivers of performance differences in nursing homes (Konetzka, Grabowski, Perraillon, & Werner, 2015). Nursing homes, like all organizations, are greatly impacted by the market factors of the environment in which they operate (Nyhan, Ferrando, & Clare, 2002). The munificence of the environment and the availability of resources are key issues for organizational survival. Identifying nursing homes that are in financial distress may provide valuable insight into the organizational or environmental factors that differentiate these facilities from others. Some of the organizational and environmental factors that have been found to impact financial performance are, payer mix, bed size, chain affiliation, average resident acuity, staffing mix, and level of competition (Castle, Engberg, Lave, & Fisher, 2009). The second paper will examine how external and internal forces have influenced the financial performance of nursing homes and the factors that may facilitate financial distress.

Paper 3: From the CFO to the Bed Side: An Examination of Nursing Home Financial Distress on Quality

Nursing homes provide residents with long-term health, personal and supportive services to meet the needs of frail older individuals and disabled adults (Harris-Kojetin *et al.,* 2013; HHS, 2013). Residents of nursing homes typically have limited capacity for self-care because of a chronic illness; injury; physical, cognitive, or mental disability; or other health-related conditions (HHS, 2013). On average, nursing home residents have poorer health, increased comorbidities and more complex chronic conditions as compared to other demographic groups (HHS, 2013). Since nursing home residents are at higher risk due to health complications and limited independence, the issue of delivering high quality care is a critical issue (Sasson *et al.*, 2012).

The lack of quality care in nursing homes has been a public policy concern for quite some time. One of the first cited instances was in 1956 when the Commission on Chronic Illness addressed the issues of quality within nursing homes (IOM, 1986). Since that time federal and state government agencies, committees and independent reports have called constant attention to the persistent low levels of nursing home quality (GAO, 2003, 2007, 2008, 2015; IOM, 1986, 2014). The issue of quality has improved over the past decade as the number of number of serious deficiencies have decreased by 41% from 2005 to 2014 (GAO, 2015). Nonetheless, serious quality concerns continue to persist in nursing homes that have inadequate staffing and limited financial resources (Harrington, Olney, Carrillo, & Kang, 2012; GAO, 2015). Nursing homes with limited resources have not improved in quality as consistently as other nursing homes (GAO, 2015). Nursing

homes that are in financial distress are at a higher likelihood of closing. These closures can have a negative impact on the resident's quality and continuity of care, as well as, the community's access to nursing home services (Castle, 2005b). As such, concerns over nursing home financial distress is important as it relates to resident's quality-of-care.

The study of nursing home financial distress as it relates to the nursing home industry is important because it may highlight some of the reasons why there are disparities in access and quality care. Nursing home financial distress has the potential to disproportionately affect some of the sickest, frailest, financially and socially vulnerable individuals in long-term care (Castle, 2005). This examination of nursing home financial distress may provide insight into some of the quality deficiencies found in nursing homes.

RESEARCH IMPORTANCE

There is evidence of stratification of nursing home care as it relates to race/ethnicity and socioeconomic status**.** Mor and colleagues (2004) published a seminal piece "Driven to Tiers: Socioeconomic and Racial Disparities in the Quality of Nursing Homes," that addressed some of the systemic differences in the nursing home industry. The findings from this paper identified a two-tiered system of nursing home care. Low-tiered nursing home facilities were characterized as having worse quality; more serious deficiencies; sicker residents; lower levels of staffing; high Medicaid payer-mix; more minorities, and greater financial vulnerability/distress as compared to the high performing organizations (Angelelli, Grabowski, & Mor, 2006; David, Feng, Fennel, Zinn, & Mor, 2007; Grabowski, 2004; Mor *et al.*, 2004; Smith *et al.*, 2007). The low-

tiered nursing homes were primarily located in markets that had high rates of poverty, low levels of education, and a high percentage of minorities (Konetzka *et al.,* 2015). Mor and colleagues found that across the United States 40% of Black residents, but only 9% of Whites, resided in these low-tiered facilities (Li *et al.* 2011; Mor *et al.,* 2004). The issue of de facto racial segregation of health care has been notated by researchers and advocates (IOM, 2002; Smedley, Stith, & Nelson, 2002; U.S. Civil Rights Commission, 1971). Minority populations, such as, Blacks and Hispanics, tend to have fewer alternatives for high quality nursing home care as compared to Whites (Fennell *et al.,* 2010; Mor *et al.,* 2004; Reed & Andes, 2001; Reed, Andes, & Tobias, 2001).

Nursing homes, like all organizations, are greatly impacted by the munificence of the environment in which they operate (Nyhan, Ferrando, & Clare, 2002). Low-tiered nursing homes are more likely to be in financial distress and are at higher risk of closure (Mor *et al.,* 2004). These facilities often have worse financial performance as compared to the high-tiered nursing homes (Mor *et al.,* 2004). This stratification of care (due to race and income) is a contributing factor to the high levels of health inequity (Konetzka *et al.,* 2015). Low-tiered nursing homes are saddled with poorer and sicker residents (Chisholm *et al.,* 2013). Low-tiered nursing homes are having to balance resource-intensive residents in a resource-constrained environment.

Differences in the environment and resources are factors that may cause nursing homes to go into financial distress and close (Mor *et al.,* 2004). Organizational failure in an efficient, competitive market can be viewed as socially desirable because those organizations were not satisfying the market or were inefficient in their operations

(Lynch & Ozcan, 1994). However, closure of a low-tiered nursing home, due to financial distress, may not have a socially desirable outcome. Communities with low-tiered nursing homes were found to have limited alternatives for long-term care (Feng, Lepore, Clark, Tyler, Smith, Mor, & Fennell, 2011b). Minority and low-income residents may be limited in their ability to find alternative care options because they lack the financial and social support to move outside of their community (Konetzka *et al.*, 2015). The inability for poorer residents to seek care outside of their community may increase existing health care disparities (Mor *et al.*, 2004). The issue of financial performance, quality, and environment are all interconnected.

The study of nursing home financial distress as it relates to the environment and resources is important because it highlights reasons why there are disparities in access and quality care. Nursing home closures have the potential to disproportionately affect some of the sickest, frailest, financially and socially vulnerable individuals in long-term care (Castle, 2005b). If nursing homes are 'safety net' institutions or 'care-takers of last resort' – then what happens when these facilities close (Bowblis, 2012). The goal of these three collective papers is to identify financially distressed nursing homes, explain why they may be distressed and how that distress can impact residents.

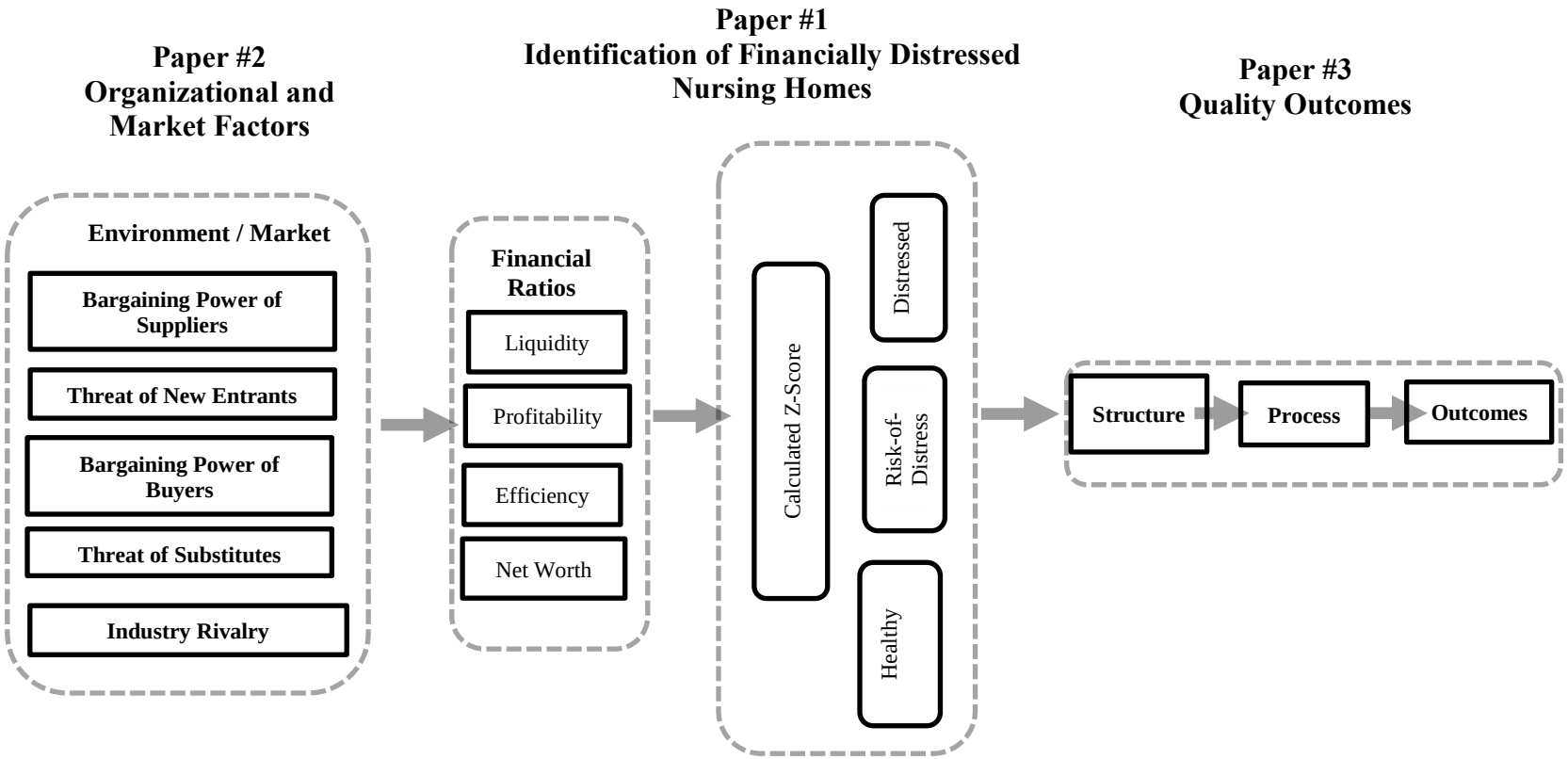
Executive Summary

The three proposed papers will attempt to provide a framework that nursing home financial distress can be examined. Financial distress is an outcome of poor financial performance, which in turn is a result of organizational and market factors as explored using Porter's Five Forces of Competition and Resource Dependency Theory. Financial

distress is also predicted to impact resident quality, as explored through Donabedian's structure-process-outcome framework. In order to examine the impact that the organizational and market factors have on nursing home financial distress and the consequences of this distress, it is essentially to first identify financially distressed nursing homes. The identification of financially distressed nursing homes is the premise of the first paper "Predicting Nursing Home Financial Distress Using the Altman Z-Score." The examination of the internal and external factors associated with financially distressed nursing homes will be explored in the second paper "Let's Ask Porter: A Reconceptualization of Resource Dependency Theory to Explore Financial Distress." It is important to understand that these organizational and market factors contribute and precede financial distress. The third paper "From the CFO to the Bed Side: An Examination of Nursing Home Financial Distress" will explore the relationship between financially distressed nursing homes and resident quality outcomes. The figure below will show the relationships of these three papers better.

FIGURES

Figure 1: Proposed Three Paper Framework to Explore Nursing Home Financial Distress



PREDICTING NURSING HOME FINANCIAL DISTRESS USING THE ALTMAN-Z SCORE

by

JUSTIN CALEB LORD

In Preparation for *Journal of Health Care Finance*

Format adapted for dissertation

PAPER 1

PREDICTING NURSING HOME FINANCIAL DISTRESS USING THE ALTMAN-Z SCORE

ABSTRACT

Objective: The purpose of this paper is to apply the Altman Z-Score within the nursing home industry to predict nursing home financial distress. The identification of these financially distressed nursing homes is important as it relates to closure, access, and resident quality of care. The Altman Z-Score model uses multiple discriminate analysis (MDA) to examine multiple financial ratios (liquidity, efficiency, profitability and net worth) simultaneously to predict the likelihood of a firm's financial distress.

Data Source/Study Setting: This study utilized data from three different sources: Medicare Cost Reports, Brown University's LTCFocus data and the Area Resource File from 2000 to 2015. This sample consisted of all Medicare participating nursing homes in the United States from 2000 through 2015, resulting in a final analytical sample of 167,268 nursing home observations.

Study Design: The independent financial variables, liquidity, profitability, efficiency and net worth, were entered stepwise into the multiple discriminant analysis model. After running the discriminant analysis, we found that the discriminant function was highly significant ($p < 0.001$) with a canonical correlation of only 0.048 with an eigenvalue of 0.0023. K-means clustering, a form of vector quantization, was used to

classify the latent variable into three categorical three groups, distressed, risk-of-financial distress and healthy.

Principal Findings: Three of the four financial variable hypotheses, liquidity, profitability, and efficiency, significantly contributed to the discriminating power of the model but net worth did not. The cutoff scores to group firms "at risk-of-financial distress" are as follows: financially distressed firms have a score of Z less than -0.1082; firms that have the possibility of financial distress have a Z score of -0.1081 and 0.7767 and healthy firms have a Z score greater than 0.7768. After the cut-points were established, these cut-points were used to assess how well they reflected actual nursing home closure. At the time of event (closure), the distressed groupings accurately classified 56% of the closures. Given that financial distress does not immediately result in closure, this seems like a reasonable estimation.

Conclusions: The findings of this paper will provide policy makers and practitioners another tool to identify nursing homes that are at risk of financial distress.

Keywords: Altman Z-Score, nursing homes, financial distress, multiple discriminant analysis

INTRODUCTION

There have been over 1,223 nursing home closures from 2000 to 2014 (Harris-Kojetin *et al.*, 2016). Depending on the theoretical outlook, organizational failure can be viewed as inconsequential (deterministic view); positive (industrial organization) or natural (organizational ecology) (Mellahi & Wilkinson, 2004). However, nursing homes have a critical role in the health care system, as they have been described as the safety net' institutions or 'care-takers of last resort' (Bowblis, 2012). Nursing homes face many external and internal operating challenges and pressures, such as, competition (Mollica & Houser, 2012); changing demographics (Feng *et al.*, 2011); staffing requirements (Hirdes *et al.*, 2011); changing reimbursement models (Public Law 113-93, 2014); increased regulation (GAO, 2008, 2011a; Zinn *et al.*, 2006), and many more. With all of these internal and external challenges nursing homes are under tremendous financial pressure and some are struggling to survive.

Not all nursing home closures are due to financial difficulties; however, given the increased number of bankruptcies in the health care industry from 2010 through 2014, this is a growing area of concern (Guy *et al.*, 2014). Organizational failure and financial distress in this context can have real and impactful consequences for a vulnerable population as it relates to access and health (Castle, 2005a). Given the rate of nursing home closures and the changing environment, it is important to identify nursing homes that are in financial distress (KFF, 2013).

Nursing homes that are facing failure and/or financial distress may have worse financial performance as compared to their peers. The identification of these financially distressed nursing homes is important as it relates to access and resident care. The Altman-Z Score, a financial distress prediction model, has been used to identify financially distressed organizations in other industries (Altman, 1968; Mossman, Bell, Swartz & Turtle, 1998). A review of the literature indicated a limited number of national studies that use the Altman's Z-Score within the health care industry (Knox *et al.*, 2009). This study would be the first to apply the Altman Z-Score within the nursing home context. Practitioners and state policy makers could use these findings to intervene in nursing homes that are at risk of closure. This would have important health implications for communities that lack alternative long-term care providers.

CONCEPTUAL MODEL

Financial distress prediction models are used to predict the likelihood of a firm experiencing financial difficulties and possible closure due to bankruptcy (Hughes, 1993). Over the past seventy years, many different financial distress models have emerged (Kuruppu, Laswad & Oyeler, 2003). Most of the financial distress prediction models that have been developed are quantitative in nature (Jones, 1987). Some financial distress models focus on ratios (Altman, 1968), others focus on cash flows (Aziz, Emanuel & Lawson, 1988), and/or market return (Clark & Weinstein, 1983). A study by Mossman, Bell, Swartz and Turtle (1998) tested different approaches (ratio, cash flow and market return) as they relate to financial distress prediction modeling and found that

no single approach was entirely accurate in its predictive capability. It was found that the cash flow model remained consistent two to three years prior to bankruptcy; however, the ratio model (Altman, 1968) was the most accurate in predicating the likelihood of bankruptcy in the year prior (Mossman *et al.,* 1998). It is for this reason that a financial ratio model will be used for this analysis.

Ratio models are often used to measure the financial status or health of an organization. Financial ratios are derived from the firm's financial statements, and simply try to capture a snapshot of the organization's financial health. These financial ratios are useful for their comparative purposes. When interpreting financial ratios, it is important to recognize that there may be unique, underlying industry characteristics. Some industries may have different cost, debt or financing structures as compared to others, so financial ratios should be interpreted carefully.

Moreover, several financial distress prediction models use the financial ratio approach. A few of these approaches are as follows: univariate (Fitzpatrick, 1932; Beaver, 1968), logit and probit analysis (Martin, 1977; Platt & Platt, 1990), recursive partitioning algorithm (McKee & Greenstein, 2000), neural networks (Shah & Murtza, 2000), and multiple discriminate analysis (Altman, 1968, 1993; Booth, 1983). Univariate analysis is the use of ratios to determine financial solvency, but only examines one ratio at a time (Beaver, 1968). One issue with this approach is that not all financial ratios have the same strength in successfully predicting organizational failure. In contrast, the logit and probit methods analyze the variables so the probability of failure is computed as the likelihood of classification into one or more separate groups. Neural networks are comprised of three layers that examines one layer (financial ratios) against a second

hidden layer that has no interaction with the environment in order to project the outcome of the third layer. Multiple discriminant method (MDA) uses financial ratios but examines them all simultaneously. MDA assigns specific weights to different coefficients depending on their interaction effect on the dependent variable (Altman, 1970). MDA provides a linear relationship in which the solution is provided as the difference between two possible alternatives (Hair, Black, Babin, Anderson, & Tatham, 2006).

In 1968, Altman utilized the MDA approach to create a model to predict industry financial distress. This model is now called the Altman Z-Score. Altman's approach to identifying financially distressed organizations is still widely accepted and generally considered a landmark model (Kuruppu, Laswad & Oyelere, 2003). This paper will use the Altman Z-Score approach to examine nursing home closures.

Altman Z-Score

The Altman Z-score approach examines multiple financial ratios simultaneously to predict the likelihood of a firm's bankruptcy or financial distress. At the time, this was an advance from the previous method of univariate analysis because it reduced the possibility of misclassifications. Altman examined several key financial ratios that addressed items such as liquidity, profitability, efficiency, and productivity (Altman, 1993). Altman's Z Score is the output of different financial ratios or variables in determining the likelihood of financial distress or bankruptcy. The first iteration of the Altman Z-Score model utilized five ratios to examine financial distress in the

manufacturing industry (Altman, 1968). In 1993, Altman adjusted the model to examine general service organizations. A four-variable model was developed to examine the service industry but not specifically health care. The revised four-variable "Z-score" model to predict financial distress in the service industry is:

Z= 6.56(XI) + 3.26(X2) + 6.72(X3) + 1.05(X4) (Altman, 1993)

In this model *Xl = working capital / total assets*; *X2 = retained earnings / total assets*; *X3 = earnings before interest and taxes / total assets*; *X4 = equity (book value) / total liabilities* and Z = overall index (Altman, 1993). The cutoff scores to group firms "at risk for financial distress" are as follows: financially distressed firms have a score of Z less than 1.10; firms that have the possibility of financial distress have a Z score of 1.10 and 2.60 and healthy firms have a Z score greater than 2.60.

Altman (1968) concluded that if the multiple discriminant analysis model is used correctly and periodically, it can successfully predict organizational failure. This model should still be appropriate in the nursing home context. The financial ratios in one service industry should still be relevant in another; therefore, it is hypothesized that:

H1: The Altman Z-Score model will be able to significantly predict nursing home financial distress.

Each of these variables in the Altman Z-Score model will have to be evaluated in the nursing home context and tested to determine if they are significant predictors of financial distress. Table 1 list each variable used in this study and notes the definition

and source of each. Each of these four variables of the model will be explored further in the following section.

Liquidity ratio is working capital divided by total assets. Altman (1968) found the liquidity ratio to be more informative as compared to the current ratio and quick ratio. Working capital, current assets less current liabilities, is a measure of both an organization's efficiency and its short-term financial health (Investopedia, 2016a). Total assets refer to the total amount of assets (or items of economic value) owned by the organization that are reported on the balance sheet. The liquidity ratio, as its name indicates, measures net liquid assets or liquidity.

Liquidity is important to an organization because it is a measure of an organization's access to cash and other unrestricted current assets (Zeller, Stanko, & Cleverley, 1997). This measure represents the organization's ability to meet its obligations without having to get external funding or by liquidating long-term assets. The ratio is useful in determining the organization's ability to generate sufficient cash to satisfy current liabilities (Bragg & Saphir, 2002). This is an important financial ratio to consider in the nursing home context. Liquidity indicates how the nursing home will be able to fund its current operations. The financial liquidity of a nursing home is an important measure in the organization's success or failure; therefore, it is hypothesized that:

H2: The liquidity ratio, will significantly contribute to the discriminant equation predicting nursing home financial distress.

Profitability ratio is retained earnings divided by total assets. This financial ratio is an indicator of the organization's ability to accumulate earnings based on its assets. For-profit organizations try to maximize profitability for shareholders. Not-for-profit organizations are usually not driven by profit maximization; however, they still need to be profitable to ensure operations (Gapenski & Reiter, 2016). Retained earnings, net assets or fund balance "represents the cumulative amount of the difference between revenues and expenses for business from the date the organization came into existence" (Herzlinger & Nitterhouse, 1994).

An organization can fund its operations or growth of assets through retained earnings, equity or debt. When this financial ratio is low, it may indicate that the organization has funded its assets through borrowing. The low ratio may signal increased risk of financial distress because the organization may have higher levels of debt. The increase in leverage may escalate the risk of distress and distress if the organization cannot meet its debt obligations. Retained earnings should increase as the organization ages. However, all organizations (for-profit or not-for-profit) have to remain profitable in order to continue their operations; therefore, it is hypothesized that:

H3: The profitability ratio, will significantly contribute to the discriminant equation predicting nursing home financial distress.

Efficiency ratio is earnings before interest and taxes divided by total assets. This ratio is also known as the operational or activity ratio. Finkler and Kovner (2000) define efficiency as "a measure of how close an organization comes to minimizing the amount

of resources used to accomplish a result." This ratio is an indicator of how effectively an organization is using its assets to generate earnings before obligations such as interest and taxes (Investopedia, 2016b). Altman (1968) determined this activity ratio captured the true productivity of the firm's assets separate from any leverage factors, such as debt or taxes. It is proposed that this ratio is the most significant in determining the discriminating power of the financial distress model (Altman, 1968). An organization's success is based off the earning power of its assets. This ratio represents the earnings that a company has generated for each dollar of assets on its book. Insolvency occurs when the total liabilities exceed the fair valuation of the earning power of the firm's assets (Altman, 1968).

Efficient services occur when there is minimal input and maximized output. The activity ratio is used in evaluating the utilization of assets. It discounts issues like tax status or non-profit versus for-profit. This ratio makes the comparison of for-profit and not-for-profit organizations equivalent. This is important with nursing homes since as of 2014, 30% of all nursing homes were not-for-profit (CMS, 2015; Harris-Kojetin *et al.*, 2016). These organizations do not have to pay taxes so it makes them appear more profitable as compared to for-profit organizations. In order for organizations to remain profitable in a changing and turbulent environment, they have to remain efficient. This measure captures the true productivity of an organization; therefore, it is hypothesized that:

H4: The efficiency ratio, will significantly contribute to the discriminant equation predicting nursing home financial distress.

Net worth is the book value of equity divided by total liabilities. This ratio is an equity measure because it measures a company's net worth against its accumulated debt (Altman, 1993). This ratio shows how much the firm's assets can decline in relation to total liabilities before the firm becomes insolvent (Altman, 1993). The book value of equity or net-worth is derived by examining the difference in the organization's total assets and total liabilities (Altman, 1993). If the organization sold off all its assets to pay for all its liabilities, the remaining amount would be the book value of equity. The book value reflects historical costs of assets and is traditionally more predictable and less volatile in the long term than market value. The book value of a firm provides a snapshot of the organization's financial health by examining its net assets in relation to total liabilities. Organizations who have a higher percentage of net assets in relation to total liabilities may be able to weather financial difficulties better as compared to organizations with lower net assets; therefore, it is hypothesized that:

H5: Net worth will significantly contribute to the discriminant equation predicting nursing home financial distress.

METHODS

Data

This research utilizes data from three different sources: Medicare Cost Reports, Brown University's LTCFocus data and the Area Resource File from 2000 to 2015. The Medicare Cost Reports provides financial data for nursing homes that participate in the Medicare program. Brown University's LTCFocus data provides nursing home organizational, demographic, quality, and market information. This dataset is the

amalgamation of multiple sources of data, including the Minimum Data Set, CMS's Nursing Home Compare, Area Resource File, Bureau of Labor Statistics, Residential History File, OSCAR/CASPER and state policy surveys. The Area Resource File (ARF) provides market and demographic information for the county.

Sample

This sample consisted of all Medicare participating nursing homes in the United States from 2000 through 2015. There were 255,269 nursing home-year observations in this sample. First, all hospital-based nursing home observations were excluded, since these organizations may have different organizational structures as compared to free standing facilities (n = 391). Second, we excluded nursing homes with no ARF data and those that that did not report any Medicare financial data (n = 54,403). Third, all financial variables (33 financial variables) that were classified as extreme outliers (n = 5,280) were dropped. Fourth, the data was additionally cleaned by examining each financial variable per year since one of the assumptions of multiple discriminant analysis is the normality of data. Observations with financial variables that were ±5 standard deviations from the mean were dropped (n = 27,927). This left an analytical sample of 167,268 nursing home observations or an average of 10,454 nursing homes per year.

Dependent Variable: Financial Distress Category

Discriminant analysis requires a single nonmetric dependent measure to base categorizations on (Hair, Black, Babin, Anderson, & Tatham, 2006). In order to categorize the nursing home observations into groups of financial distress, risk-of-

financial distress, or healthy, we first had to identify the nursing homes that had closed or remained open. Financial distress can be classified by different metrics: consecutive financial losses (Altman & Hotehkiss, 2006), insufficient debt coverage (Molina & Preve, 2012), inability to repay financial obligations (Beaver, Correia, & McNichols, 2011); however, in this study, financial distress is classified as when an organization is no longer viable as a 'going-concern' due to the organization's inability to sustain its operations (Bhunia & Sarkar, 2011). Organizations that are at risk-of-financial distress are simply at moderate risk of experiencing this financial distress (Altman, 1968). However, this risk of being in financial distress can be minimized by increasing sales, decreasing expenses, and securing long-term financing (Altman, 1968). Organizations that are healthy or financially healthy, are classified as being a 'going-concern.' Under the 'going-concern' assumption, an organization will continue to operate as long as the business is viable (Sormunen & Laitinen, 2012). To determine if an organization was closed, a facility specific identification number was obtained from Brown University's LTCFocus. This unique identifier assigned to the facility was used track the organization over time despite name, owner, and other changes. This variable is similar to the approach that Castle (2009) utilized in his previous research on nursing home closure. From 2000 to 2015, on average, there were 15,954 nursing homes in operation per year; 200 nursing home closures per year, and 94 nursing home openings per year. In the original sample, the number of nursing home closures were around 1,696 but after cleaning the data, the sample of closed nursing home organizations fell to around 386. A table highlighting the trends of nursing home openings and closures can be found in Appendix A.

Predictor Variables: Altman Financial Variables

The primary variables utilized in this study were identified by the Altman in 1993 for general service organizations. The four primary variables of interest are the liquidity, efficiency, profitability and net worth ratio. The *liquidity ratio* (M=0.07, SD = 0.45) is calculated by dividing working capital (current assets less current liabilities) by total assets. The *profitability ratio* (M=0.23, SD, 0.72) is retained earnings divided by total assets. For this study, the profitability ratio will use the fund balance in lieu of retained earnings because in health care organizations, especially not-for-profits, retained earnings may also be known as the fund balance or net assets (Gapenski & Reiter, 2016). The *efficiency ratio* (M=0.04, SD =0.31) is the ratio that divides 'earnings before interest and taxes' (EBIT) by total assets. The last ratio, *net worth* (M=1.51, SD=2.70), takes the book value of equity or net-worth and divided by total liabilities. Net worth is derived by examining the difference in the organization's total assets and total liabilities (Altman, 1993).

Analysis

Univariate and bivariate statistics were examined for all variables included in the analysis. The purpose of this study is to identify nursing homes that are in financial distress, risk-of-financial distress, and healthy. In order to do this, we used multiple discriminate analysis (MDA) to analyze the four financial variables proposed by Altman. MDA is the appropriate multivariate technique in the case of a categorical dependent variable. Secondly, MDA has the advantage of accounting for all the variable interaction effects (Altman, 1968). This methodological approach removes potential ambiguities and

quantifies the weights given to specific variables (Altman, 1970). MDA results in a linear combination equation in which the independent variables will discriminate best between the groups in the dependent variable based on the observation's individual characteristics (Altman, 1968; Ho, 2014). Figure 1 is a visualization of this model to provide greater clarification.

The Altman Z-Score can also be seen in the equation format below:

$$F = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

In the MDA equation above, F is the latent variable formed by the linear combination of the dependent variables (X_1, X_2, X_3 and X_4) and the canonical discriminant function coefficients (β_0, β_1,β_2,β_3 and β_4). The error term is represented with ε. The discriminant function is the culmination of the partial weights of the coefficients that predict the classification of the group in the dependent variable (Ho, 2014). The standardized discriminant coefficients are used to assess the relative classifying importance of the independent variables (Ho, 2014). Once the Z-Score is calculated there will be a need to set the data according to some notion of similarity or groupings (i.e. financial distress, risk-of-financial distress and healthy). K-means clustering technique will be utilized (MacQueen, 1967). This method is used automatically partition a data set into *k* groups (Wagstaff, Cardie, Rogers, & Schrödl, 2001). For this analysis, the level of statistical significance was set at alpha = 0.05 and Stata 14 used.

RESULTS

Univariate Results

Univariate and bivariate statistics were used to explore the 167,268 unique nursing home observations from 2000 through 2015. The univariate statistics used in this model are shown in Table 2. The univariate results describe the distribution of the Altman Z-Score financial variables.

Bivariate Results

Bivariate analysis performed in this study are summarized in Table 3. T-tests were performed for each of the four financial variables specified by the Altman model, liquidity, profitability, efficiency, and net worth, as it related to open and closed nursing homes. When examining the liquidity ratio there was a significant difference ($t = 10.10$; $p < 0.001$) between closed ($M = -0.12$, $SD = 0.60$) and open ($M = 0.07$, $SD = 0.45$) nursing homes. A similar relationship was found with the profitability ratio ($t = 11.53$; $p < 0.001$) between closed ($M = -0.20$, $SD = 0.97$) and open ($M = 0.27$, $SD = 0.72$) nursing homes. The efficiency ratio ($t = 18.51$; $p < 0.001$) was significantly different between closed ($M = -0.25$, $SD = 0.43$) and open ($M = 0.05$, $SD = 0.314$) nursing homes. The only ratio that was different was net worth, while there was a significant difference ($t = 2.70$; $p < 0.05$) between closed ($M = 1.19$, $SD = 2.79$) and open ($M = 1.51$, $SD = 2.70$) nursing homes, it was not as statistically significant as the other variables.

Testing Assumptions of MDA

One of the key assumptions for deriving the discriminant function is that the variables need to be normally distributed and also be independent of each other. The financial variables identified in the Altman model were examined for correlation and interdependence. The correlation matrix performed on the Altman Z-Score financial variables are summarized in Table 4. While there was a statistically significant ($p < 0.05$) correlation between all the financial variables, there were no values that exceeded $r > 0.50$. The pairwise correlation between the variables appeared to be low, which suggested that the data satisfied the assumption of no correlation or independence of variables. Based on these findings and that these were the variables prescribed by the Altman Z-Score model, we continued to the next step.

Prior to running the multiple discriminant model, we wanted to examine how well each independent variable(s) would contribute to the discriminating power of the model. A Wilk's lambda test was run for each iteration of the independent financial variable's combination. The independent financial variables, *liquidity, profitability, efficiency* and *net worth,* were entered stepwise into model. The results of this analysis are summarized in Table 5. The Wilk's lambda produces a value that ranges from 0 to 1, were 0 means total discrimination and 1 means no discrimination. Starting with the liquidity ratio, the Wilk's lambda, $\Lambda = 0.9996$, with each subsequent addition of a variable (l*iquidity* and *profitability*, $\Lambda = 0.9991$; *liquidity, profitability* and *efficiency* $\Lambda = 0.9977$) the model improved because the Wilk's lambda kept going down. This was until *net worth* was added into the model. When *net worth* was added into the model, the Wilk's lambda

stayed the same, yet the F-statistic went down. When looking at *net worth* alone, the Wilk's lambda was $\Lambda = 1.000$, indicating no discrimination. This raised some concern that *net worth* may not contribute to the overall discriminate function since it was the only variable that was not statistically significant when comparing open and closed nursing homes. However, since we are testing the variables prescribed by the Altman model, it was decided to keep it in the model regardless.

One of the assumptions of discriminant analysis is that prior probabilities of group membership are identifiable but not necessarily equal. There was a different proportion of open and closed nursing homes in this sample. To account for a possible skewed distribution, group proportional prior probabilities was selected in the multiple discriminant analysis (Jaynes, 1968) After running the discriminant analysis, we found that the discriminant function was highly significant ($p < 0.001$) but the canonical correlation is only 0.048. The canonical correlation captures that association between the groups in the dependent variable and the discriminant function (Ho, 2014). This model only captured 0.004 percent of the variance in the dependent variable. The eigenvalue of this model was 0.0023. The eigenvalue is the ratio between the explained and unexplained variation in a model. An eigenvalue greater than one will be evidence of a good model (Ho, 2014). While these values were not optimal it was able to provide standardized canonical discriminant function coefficients that were able to differentiate the groups. A summary of the multiple discriminant output can be found in Appendix B.

Using the discriminant function standardized coefficients, the Altman Z-Score was calculated. The Altman Z-Score is just the latent variable formed by the linear combination of the dependent variables (X_1, X_2, X_3 and X_4). The weights that are

assigned to each independent variable are referred to as canonical discriminant function coefficients.

$$F = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

$$F = \beta_0 + (0.18 * \text{Liquidity}) + (0.30 * \text{Profitability}) + (0.81 * \text{Efficiency}) + (0.14 * \text{Net Worth}) + \varepsilon$$

Once the Altman-Z Score was calculated, K-means clustering, a form of vector quantization, was used to classify the latent variable into three categorical three groups, distressed, risk-of-financial distress and healthy. The cutoff scores to group firms "at risk-of-financial distress" are as follows: financially distressed firms have a score of Z less than -0.1082; firms that have the possibility of financial distress have a Z score of -0.1081 and 0.7767 and healthy firms have a Z score greater than 0.7768. A summary of the K-means clustering and the cut points can be found in Table 6.

Validity Check

After establishing the cut-points, there was a need to see how well the Altman Z-Score clustered groups (distressed, risk-of-financial distress, healthy) related to actual nursing home closure. Financial distress is to be the worst financial condition before bankruptcy and closure. It was assumed that distressed and at risk-of-distress nursing homes would have a higher probability of failure as compared to healthy. A significant interaction was found (χ^2 (2) 294.8, $p < 0.001$) with the Pearson chi-square statistic as it related to financial distressed grouping and closure. Out of the 386 nursing homes that closed, 217 were classified as distressed and 117 of classified as at risk-of-distress. A summary of the crosstabs can be found on Table 7.

When the Altman Z-Score clustered groups (distressed, risk-of-distress, healthy) were compared to closures-one-year-prior, an average of 44% of the closed organizations were correctly classified as being financially distressed and 46% were classified as risk-of-distress. When comparing the Altman Z-Score distressed group to actual closures-two-years-prior, only an average of 41% of the closed organizations were correctly classified as being financially distressed. But once again, over 44% of the closed organizations were categized as risk-of-distress. Three-years-prior to closure, the Altman Z-Score distressed group accurately predicted 39% of actual closures and put 42% of the actual closures in the risk-of-distress group. A summary of these findings is presented in Table 8.

This study did examine post-hoc analysis as it related to whether or not a nursing home was part of a chain or not. Chain affiliated nursing homes may have greater access to resources which in turn could impact financial performance. In this study, there were 69,130 free-standing nursing homes (41%) and 98,138 chain-affiliated nursing homes (59%). Bivariate analysis performed in this study are summarized in Table 9. The bivariate analysis showed that there was statistically significant ($p < 0.001$) difference in the liquidity, profitability, efficiency and net worth ratio for closed (M= -0.02, SD= 0.17) and open (M = 0.10, SD = 0.10).

However, when looking at the actual closed nursing homes (n= 386), 62% of the closures were chain-affiliated and 38% were free-standing nursing homes. Additional analysis was performed to see if there was a statistically significant difference between the distressed classifications (financially distressed, risk-of-distress, and healthy) and

chain-affiliation. An ANOVA was performed (Table 10) and there was a statistically significant difference ($p < 0.001$) as it related to chain-affiliated and free-standing nursing homes; however, it was a small effect size (Cramer's V = 0.0982). It was for this reason, that it was decided not to exclude chain-affiliation in the model. However, in the future, it may be important to examine the impact the specific role that chain-affiliation has on financial distress.

DISCUSSION

The goal of this study was to examine if the Altman Z-Score could be successfully applied to the nursing home industry to predict distress. The main hypothesis that the Altman Z-Score would be able to significantly predict nursing home closure, was partially supported. The Altman Z-Score allowed us to create distressed, risk-of-distress and healthy nursing home groups. We were able to identify closed organizations at the time of failure; however, the accuracy of the distressed grouping - decreased to 44% one-year-prior, 41% two-years-prior and 39% three-years-prior. While this is below the threshold cited by other researchers (Almwajeh, 2004; Hayes, Hodge, & Hughes, 2010) the predictive nature of this model and these groupings are important to examine.

Secondly, we hypothesized that the four financial variables identified by Altman model, liquidity, efficiency, profitability and net worth, would significantly contribute to the discriminating power of the model predicting nursing home distress. It was concluded that H1 (predictive power of Altman's model) was partially supported. Three of the four financial variable hypotheses, H2 (liquidity), H3 (profitability), and H4

(efficiency) were supported. When these three variables (liquidity, efficiency and profitability) were entered into the model, they were able to strengthen the discriminating power of the model, as seen by the decreasing Wilk's lambda scale. The only hypothesis that was not supported was H5 (net worth). While the variable, net worth, was statistically ($p < 0.05$) different between open and closed nursing homes, this variable did not significantly contribute to the discriminating power of the model. When this variable was entered into the multiple discriminant model, the Wilk's lambda did not change. However, we continued to include net worth into the discriminant analysis as it was specified by Altman's approach. In future analysis, it may be appropriate to look for other variables that may have better discriminating power. Net worth, may not have been an appropriate variable in this context. Net worth, as it was defined for this analysis, is the book value of equity or the difference in the organization's total assets and total liabilities, divided by total liabilities (Altman, 1993). The profitability ratio, was utilizing the fund balance, the cumulative amount of the difference between revenues and expenses for business from the date the organization came into existence, divided by total assets (Herzlinger & Nitterhouse, 1994). These two variables are looking at similar issues of the organization's financial health. In the future, instead of including net worth, it may help to examine a debt to asset ratio as a measure of solvency.

The grouping of the nursing homes by financial distress was completed solely with financial data. This initial analysis provides no insight into other important factors like nursing home quality or staffing. Nursing homes that were classified as distressed had increased likelihood of financial difficulties and possible closure. This lack of resources in distressed nursing homes could have the potential to impact the ability to

provide care. On the other hand, nursing homes classified as financially healthy, only have better financial performance as compared to distressed and risk-of-distress. At this point, there is no way to know if this is due to superior operations, better market positioning, increased focus on costs, or a combination of all. These differences and drivers will be explored in additional analysis.

LIMITATIONS

The Altman "Z-Score" methodology is not without its issues. Grice and Ingram (2001) examined the original 1968 model using information from 1988-1991. They found the accuracy prediction of Altman's model declined significantly over time. The coefficients established by Altman change based on the industry and the time in which they are evaluated. This paper attempted to address that be creating new coefficients and cut-points; however, the accuracy of the Altman Z-Score groupings depends on the availability of data that was accessible.

Most of this data came from Medicare Costs Reports. The use of this data has inherent risks. There are cited concerns over the accuracy and reliability of the financial data (Magnus & Smith, 2000). Steps were taken to mitigate this risk through extensive data cleaning; however, this may have resulted in some unintended consequences. Prior to cleaning the data, we found that there were 1,696 net nursing home closures from 2000 to 2015. Yet, after the data was cleaned for extreme values and outliars, the number of nursing home closures fell to 386. This indicates that possibly organizations that are in financial distress or at high risk of closure, may inaccurately report data or fail to report at all – which is one reason they got excluded from the analysis. Another concern with

using Medicare Cost Reports is that this data set will not have information on nursing homes that do not accept Medicare. Therefore, this study will exclude Medicaid dependent organizations. Based on a data review, this was a relatively small portion of analysis (566 organizations or 3.6% of the national sample); however, that will be a concern to be addressed in future research (CMS, 2015).

While the accuracy of the financial distressed groupings is not as high as we would have liked, this may be contributed to the fact that of the data cleaning process. Prior to cleaning the data there were 3,201 nursing homes that we had captured as having closed; however, after cleaning the data – that amount was reduced to 386. While the data cleaning process followed established protocols – this may suggest that there are other factors besides financial data that should be examined. It is possible that financially distressed organizations may be more prone to numerous mistakes or may fail to complete the Medicare Cost Reports – thus being susceptible to being thrown out of the sample.

This study only used financial data to classify distressed nursing homes. This study did not account for differences in nursing homes as it related to ownership, affiliation, or other organizational factors. The existing literature has found that organizational and ownership characteristics of a nursing home can have an impact on performance (Pradhan, Weech-Maldonado, Harman, Laberge, & Hyer, 2013; Weech-Maldonado, Laberge, Pradhan, Johnson, & Hyer, 2010). Even in not-for-profit nursing homes, variations in organizational structures (private secular nonprofit, religious-affiliated, and government) can result in differences in cost-efficiency and allocation efficiency (Knox, Blankmeyer, & Stutzman, 2006). The structure or affiliation of a

nursing home may provide greater access to additional resources as compared to other nursing homes. For example, religious-affiliated nursing homes may have greater access to contributions as compared to secular nonprofits, which in turn may impact the likelihood of organizational survival beyond financial performance. Since these factors were not accounted for, this was a limitation of this existing study.

Lastly, there are methodological concerns that have emerged between the continued use of MDA as opposed to logistic or probit models. A cited weakness with MDA is the assumption of equal probability of group membership or probabilities based on sample proportions (Jones, 1987). These two alternate methodological techniques have been widely accepted as alternatives to multiple discriminant analysis (Gentry, Newbold, & Whitford, 1985). These issues are recognized and will be explored in future research.

CONCLUSION

This study provides policymakers and other decision makers with another tool to predict nursing home financial distress. Nursing homes, like all other organizations operate under the 'going-concern' assumption, which is the presumption that the firm will continue to operate into the foreseeable future (Bauer & Agarwal, 2014; Sormunen & Laitinen, 2012). Organizations that are no longer a 'going-concern,' often are described as having deteriorating assets or failing operations, which negatively hampers the organization's ability to provide services or products efficiently and effectively (Bauer & Agarwal, 2014; Kordestani, Biglari, & Bakhtiari, 2011). Nursing homes that are no longer a 'going-concern' or that are financially distressed will likely lack the

appropriate resources necessary to provide quality care. When nursing homes do not have the appropriate resources to deliver quality care – this has serious and sometimes deadly repercussions.

Nursing homes play a critical role in the delivery of long-term care. Nursing homes that are in financial distress have an increased likelihood of organizational failure and closure. While the number of closures has slowed over the past several years, there were still 138 nursing homes that closed in 2014 but our model identified 2,297 nursing homes that are financially distressed and at risk of closing. If these organizations close, this can have access to care implications. As the population continues to age, the dependency for nursing homes will grow. Allowing more nursing homes to fail or close will, in this author's opinion, be short-sighted and dangerous. Identifying the nursing homes that are greatest risk of closing provides policy-makers opportunities to save these nursing homes before they fail indefinitely. As more minorities enter into nursing homes while Whites do not, the issue of financial distress could also become an issue of health care equity. Nursing home financial distress and closure can also have implications for the resident care quality, population health, long-term care access and equity. These are additional areas that will be explored using this financial distress model.

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TABLES

Table 1: A listing of all variables used in the calculation of the Altman Z-Score along with definitions and sources.

Variable	Definition	Operationalization	Data Source
Liquidity Ratio	X1= Working Capital / Total Assets	(Current Assets (CA) – Current Liabilities(CL)) / Total Assets (TA)	Medicare Cost Reports 2000-2015
Profitability Ratio	X2 = Retained Earnings / Total Assets	Fund Balance / Total Assets (TA)	Medicare Cost Reports 2000-2015
Efficiency Ratio	X3 = EBIT / Total Assets	(Net Patient Revenue – Operating Income) / Total Assets (TA)	Medicare Cost Reports 2000-2015
Net Worth	X4 = Book Value of Equity / Total Liabilities	Total Assets (TA) – Total Liabilities (TL) / Total Liabilities (TL)	Medicare Cost Reports 2000-2015

Table 2: Univariate Analysis of Altman Z-Score Financial Variables for Nursing Homes (2000-2015)

	N	Mean (%)	Std. Dev.	Minimum	Maximum
Altman Variables					
Liquidity Ratio	167,268	0.07	0.45	(2.34)	0.97
Profitability Ratio	167,268	0.23	0.72	(3.38)	3.85
Efficiency Ratio	167,268	0.04	0.31	(1.52)	1.61
Net Worth	167,268	1.51	2.70	(0.77)	15.00

Table 3: Bivariate Analysis of Altman Financial Variables for Open and Closed Nursing Homes (2000-2015)

	Closed			Open				
	N	**Mean**	**Std. Dev**	**N**	**Mean**	**Std. Dev**	**T-Value**	
Altman Variables								
Liquidity Ratio	386	(0.12)	0.60	166,882	0.067	0.448	10.956	***
Profitability Ratio	386	(0.20)	0.97	166,882	0.226	0.718	11.526	***
Efficiency Ratio	386	(0.25)	0.43	166,882	0.044	0.314	18.505	***
Net Worth	386	1.19	2.79	166,882	1.508	2.696	2.323	*

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 4: Correlation Matrix for Altman Financial Indicators for Nursing Homes (2000-2015)

	Liquidity	Profitability	Efficiency	Net Worth
Liquidity	1.0000			
Profitability	0.3906	1.0000		
Efficiency	0.2191 *	0.3409 *	1.0000	
Net Worth	0.3434 *	0.4207 *	0.09085 *	1.0000

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 5: Altman Z-Score Financial Variables for Nursing Homes (2000-2015)

	Test of Equality of Group Means		
	Wilks Lambda	**F Value**	**Significance**
Liquidity Ratio	0.9996	69.86	0.000 ***
Liquidity & Profitability Ratio	0.9991	75.21	0.000 ***
Liquidity, Profitability & Efficiency Ratio	0.9977	126.84	0.000 ***
Liquidity, Profitability, Efficiency and Net Worth	0.9977	96.68	0.000 ***
Net Worth	1.0000	5.4	0.0202 *

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 6: The K-Means Determined Cut-Points of the Altman Z-Score for Nurisng Homes (2000-2015)

	N	Mean	Std. Deviation	Min	Max
Distressed	34,819	-0.493	0.380	-2.592	-0.1082
Risk-of-Distress	96,584	0.277	0.239	-0.1081	0.7768
Healthy	35,865	1.277	0.431	0.7768	3.4987

Table 7: Altman Z-Score Identified Financial Distressed Nursing Homes as Compared to Actual Closed Nursing Homes (2000-2015)

	Distressed	Risk-of-Distress	Healthy	Total	
Open	34,602.0	96,467.0	35,813.0	166,882	Actual Results
	34,738.6	96,361.1	35,782.2	166,882	Expected Frequencies
	0.5	0.1	-	0.7	χ^2 Contribution
Closed	217.0	117.0	52.0	386	Actual Results
	80.4	222.9	82.8	386	Expected Frequencies
	232.4	50.3	11.4	294.1	χ^2 Contribution
Total	34,819.0	96,584.0	35,865.0	167,268	Actual Results
	34,819.0	96,584.0	35,865.0	167,268	Expected Frequencies
	232.9	50.4	11.4	295	χ^2 Contribution

Pearson ChiSquare = 294.842 Pr=0.000
Cramer's V =0.0420

Table 8: Predicted Nursing Home Financial Distress as Compared to Actual Nursing Home Failure One, Two, and Three Years Prior (2000-2015)

	Distress	**Risk-of-Distress**	**Healthy**	**Total**
Actual Nursing Home Closures	217	117	52	386
Expected Nursing Home Closures	80.4	222.9	82.8	386
Actual Closures - One Year Prior to Closure	145	151	34	330
Expected Frequency of Closures - One Year Prior	*44%*	*46%*	*10%*	*100%*
Actual Closures -Two Years Prior to Closure	119	129	45	293
Expected Frequency of Closures - Two Years Prior	*41%*	*44%*	*15%*	*100%*
Actual Closures -Three Years Prior to Closure	103	111	53	267
Expected Frequency of Closures - Three Years Prior	*39%*	*42%*	*20%*	*100%*

Table 9: Post-Hoc: Bivariate Analysis of Free-Standing Nursing Homes as Compared to Chain-Affiliated Nursing Homes of Altman Z-Score Predictor Financial Variables (2000-2015)

	Free-Standing			Chain Affiliated				
	N	**Mean**	**Std. Dev**	**N**	**Mean**	**Std. Dev**	**T-Value**	
Liquidity Ratio	69,130	0.100	0.411	98,138	0.043	0.472	25.548	***
Profitability Ratio	69,130	0.216	0.599	98,138	0.232	0.792	(4.334)	***
Efficiency Ratio	69,130	0.030	0.286	98,138	0.052	0.333	(14.004)	***
Net Worth	69,130	1.347	2.447	98,138	1.620	2.853	(20.437)	***

*p< 0.05, **p<0.01, ***p<0.001

Table 10: Post-Hoc: Analysis of Variance for Chain-Affiliated and Free-Standing Nursing Homes Per Financial Distress Grouping (2000-2015)

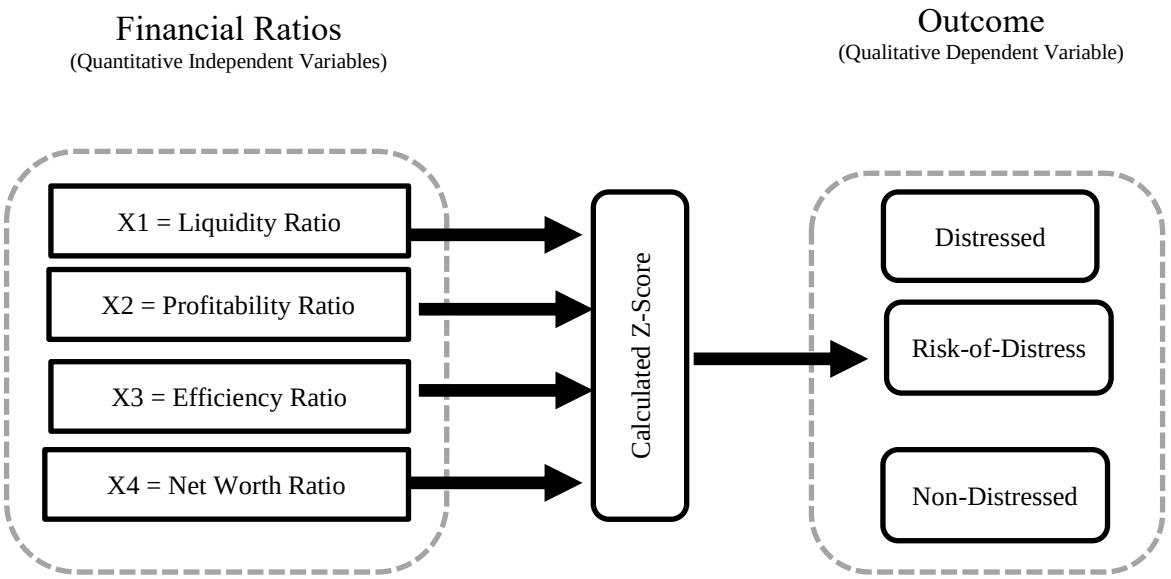
	Distressed	Risk-of-Distress	Non-Distressed	Totals
Free-Standing	13,162	43,779	12,189	69,130
	8%	26%	7%	41%
Chain Affiliated	21,657	52,805	23,676	98,138
	13%	32%	14%	59%
Total	34,819	96,584	35,865	167,268
	21%	58%	21%	100%

Cramér's V = 0.0982 Pr = 0.000
Fisher's exact = 0.000

*p< 0.05, **p<0.01, ***p<0.001

FIGURE

Figure 1: Altman Z-Score Model



APPENDIX

Appendix A: Summary of Nursing Home Closures Before and After Data Cleaning

	Orginal Dataset Nursing Homes (2000-2015)			Cleaned Dataset Nursing Homes (2000-2015)		
Year	**Total**	**Open**	**Closed**	**Total**	**Open**	**Closed**
2000	16,963	3	332	9,384	1	32
2001	16,778	156	341	9,358	41	35
2002	16,553	113	304	9,759	29	18
2003	16,366	110	297	9,721	30	24
2004	16,180	112	235	9,783	27	19
2005	16,047	98	218	9,967	23	18
2006	15,940	110	189	10,150	23	18
2007	15,875	124	183	10,134	34	16
2008	15,800	108	173	11,167	26	19
2009	15,750	123	146	11,328	26	13
2010	15,726	121	198	11,191	34	15
2011	15,564	39	147	10,235	10	20
2012	15,551	132	134	11,361	73	26
2013	15,515	96	157	11,263	56	39
2014	15,383	31	138	11,270	9	74
2015	15,278	29	9	11,197	12	
Total	255,269	1,505	3,201	167,268	454	386

Appendix B: Multiple Discriminant Analysis Output

Overall Model Fit: Canonical Discriminant Functions

	Percent of Variance						
Eigenvalue	**Prop. %**	**Cumulative %**	**Canonical Correlation**	**Likelihood Ratio**	**F**	***df***	**Significance**
0.0023	1.00	1.00	0.048	1.00	97	4	0.000

Discriminant Function and Classification Function Coefficients

Independent Variables	Standardized Coefficients
Liquidity Ratio	0.180
Profitability Ratio	0.300
Efficiency Ratio	0.813
Net Worth	0.143

Structure Matrix

Independent Variables	Canonical structure
Liquidity Ratio	0.425
Profitability Ratio	0.586
Efficiency Ratio	0.941
Net Worth	0.118

Group Means (Centroids) of Discriminant Functions

Closed (0)	-0.002313
Open (1)	0.999776

LET'S ASK PORTER: A RECONCEPTUALIZATION OF THE RESOURCE DEPENDENCY THEORY TO EXPLORE FINANCIAL DISTRESS

by

JUSTIN CALEB LORD

In Preparation for *Health Services Research*

Format adapted for dissertation

PAPER 2

LET'S ASK PORTER: A RECONCEPTUALIZATION OF THE RESOURCE DEPENDENCY THEORY TO EXPLORE FINANCIAL DISTRESS

ABSTRACT

Objective: Nursing homes operate in an increasingly challenging and competitive environment. This study examines the organizational and environmental factors that facilitate financial distress within nursing homes. This paper will utilize Resource Dependency Theory and Porter's Five Forces of Competition framework to explore these relationships. This study is an extension of existing work in which the Altman Z-Score was used to classify nursing homes into three categorical financially distressed groups: distressed, risk-of-distress, and healthy nursing homes.

Data Source/Study Design: This study utilizes seven different sources: Medicare Cost Reports, Brown University's LTCFocus, Certificate of Need State Laws, Certification and Survey Provider Enhanced Reporting (CASPER), Online Survey Certification and Reporting (OSCAR), Kaiser Family Foundation: HCBS States, and the Area Resource File from 2000 through 2015. The final analytical sample for this study was 167,268 Medicare participating nursing homes. This study examined the relationship of distressed, risk-of-distress, and healthy nursing homes and organizational and environmental variables. The nursing home organizational factors were occupancy, payer-mix, size and chain affiliation. The market factors were conceptualized as the bargaining power of suppliers (hospital referral power, availability of short-term hospital beds, and bargaining

power of service providers); the bargaining power of buyers (county-level proportion of Medicaid-funded nursing home residents and Medicare MCO market penetration); threat of substitutes (prevalence of home health care agencies; HCBS expansion, and number of hospital-based SNFs); threat of new entrants (Certificate of Need presence), and industry rivalry (nursing home excess capacity and Herfindahl Index).

Study Design: Data were analyzed using multinomial logistic regression, with healthy nursing homes as the reference dependent variable, robust clusters at the provider id and year and state fixed effects.

Principal Findings: The organizational level variables, such as, occupancy, payer-mix, size and chain-affiliation had a significant impact on nursing home financial distress. As it related to the market factors, distressed nursing homes (RRR=0.991) were more likely to be found to be in counties of lower Medicaid concentration; distressed (RRR=0.717) and risk-of-distress nursing homes (RRR=0.807) were less likely to be located in markets with home health agencies, and nursing homes at risk-of-distress (RRR=1.005) were in markets with a higher number of hospital-based SNF beds as compared to healthy organizations.

Conclusions: The effects of external market forces on nursing home financial distress were limited; however, organizational level variables had a significant impact on nursing home financial distress. These findings will help policymakers and practitioners understand what factors are associated with nursing home financial distress and provide greater insight into the structure of an industry and the magnitude of competition.

Keywords: Altman Z-Score; Porter's Five Forces of Competition; financial distress; Resource Dependency Theory;

INTRODUCTION

Nursing homes, like all organizations, are greatly impacted by internal and external forces (Nyhan, Ferrando, & Clare, 2002). The current operating environment for nursing homes is turbulent and ever-changing (Castle, 2003). Nursing homes are facing tremendous pressures, such as, increased competition (Mollica & Houser, 2012); shifting demographics (Feng *et al.*, 2011); changing regulations (Carter, Garrett, & Wissoker, 2012; Gage, 1999; GAO, 2008, 2011a, 2011b; Zinn *et al.*, 2006), and declining occupancy (KFF, 2015b). Nursing homes are having to adjust to this new reality. These changes have had an impact on the availability of resources that nursing homes depend on. The availability of resources and the munificence of the environment, can impact the quality and financial performance of a nursing home (Konetzka *et al.*, 2015). Financially distressed nursing homes are simply organizations that have failed to gain access to the appropriate resources.

Nursing homes have a critical role in our health care system. These institutions provide long-term and skilled nursing to aging individuals and people with disabilities (Boccuti, Casillas, & Neurman, 2015; Harris-Kojetin *et al.*, 2013; HHS, 2013). More importantly, nursing homes are safety-net institutions that can provide long-term care to a vulnerable population (Bowblis & Vasallo, 2014). When nursing homes fail to gain access to the appropriate resources this not only negatively impacts the organization but also impacts the nursing home residents and surrounding community (Castle, 2005a).

The closure of a nursing home can have consequential implications for all stakeholders. Research has found that closed nursing homes often had worse financial performance as compared to their peers. A study by Kitchener, Bostrom and Harrington (2004) found that nursing homes with lower profitability (net income margin losses of 5% or worse) were more than twice as likely to close as were facilities with stronger profitability. The financial health of a nursing home can be a good indicator of organizational success or failure. Therefore, identifying nursing homes that are in financial distress and that are at high-risk of closure is so important.

Research on nursing home failure is prevalent and expansive. Castle and colleagues (2005a, 2005b, 2006, 2009) have published work on the relationship between nursing home closure and nursing home organizational factors, external competitive forces, and quality. Some articles on nursing home closure have used longitudinal data from one state (Kitchener, Bostrom, & Harrington, 2004) while others have used national longitudinal data (Feng, Lepore, Clark, Tyler, Smith, Mor, & Fennell, 2011b). Other studies have used mixed method approach to examine some of the reasons for nursing home closures (Netten, Darton, & Williams, 2003). Some research has focused not on closure but termination from the Medicare and Medicaid programs (Angelelli, Mor, Vintrator, OFeng, & Zinn, 2003; Zinn, Mor, Feng, & Intrator, 2009). Others have focused on closures and nursing home conversions (Bowblis, 2011). Typically, in the existing literature financial performance is often viewed as a characteristic of nursing home closure if even referenced at all (Feng, Lepore, Clark, Tyler, Smith, Mor, & Fennell, 2011). This study provides a unique contribution to the existing field of literature on nursing home failure. This study examines financial distress as an indication

of organizational failure. Currently, as to this date there are no studies that have examined financial distress in the nursing home industry.

The purpose of this paper is to examine the environmental and organizational factors that may facilitate or hinder financial distress within nursing homes. This paper will utilize Porter's Five Forces of Competition and Resource Dependency Theory to explore the relationships of these factors and financial distress (Pfeffer & Salancik, 1978; Porter, 2008). Additionally, existing research has underlined the importance of organizational factors on nursing home survival and financial performance (Castle, Engberg, Lave, & Fisher, 2009; Zinn & Mor, 1998; Weech-Maldonado *et al.* 2012). The use of Resource Dependency Theory in conjunction with Porter's Five Forces of Competition will help explain organizational performance differences, stemming from changes in the environment, and provide a theoretical understanding of organizational failure (Starkey, Weech-Maldonado, & Mor, 2005). This study may provide valuable insight into the reason why some nursing homes fail and others do not. These findings could inform state and federal policy makers and lead to the development of better policies and regulations for nursing homes that are at risk of closure. This will be a contribution to the existing literature on nursing home distress and closure (Castle *et al.*, 2009; Kitchener, O'Neill, & Harrington, 2005; Knox *et al.*, 2009; Zinn, Mor, Feng, & Intrator, 2009).

BACKGROUND

Measuring Financial Distress in Nursing Homes

Financial distress simply reflects the financial health of an organization. Financial distress has been described as the worst financial performance that can lead an organization to the brink of bankruptcy or closure (Langabeer, 2006). Organizations that are in financial distress have a high likelihood of organization failure. The identification of financially distressed organizations is important because it can give stakeholders information or a sense of confidence of whether an organization will continue to be operational some time into the future. This could be important for strategic planning, financing, or potential partnerships (Shepphard, 1995).

Over the past several decades, there have been many models and approaches that have attempted to predict/identify organizations that are experiencing financial difficulties, insolvency, bankruptcy, and/or financial distress (Hughes, 1993). One of the most widely utilized financial distress prediction models is Altman's Z-Score model (1968). The Altman model used multiple discriminate analysis (MDA) to examine multiple financial ratios simultaneously to predict the likelihood of a firm's financial distress. Altman's model grouped observations based on the probability of being in financial distress. In 1993, Altman adjusted the original model to examine general service organizations (Altman, 1993).

Financial distress in the nursing home industry had not been previously explored. Previous work by this author, was the first work to apply the Altman Z-Score within the nursing home industry to predict nursing home financial distress. We utilized the

financial variables used in Altman's general service model, liquidity, efficiency, profitability and net worth. We also utilized longitudinal data from 2000-2015 for all Medicare participating nursing homes in the United States. After running the discriminant analysis, it was found that the discriminant function was highly significant ($p < 0.001$) with a canonical correlation of only 0.048 with an eigenvalue of 0.0023. Our revised four-variable "Z-score" model to predict financial distress in the nursing home industry is:

Z= 0.18(XI) + 0.30(X2) + 0.813(X3) + 0.143(X4) (Lord *et al.*, 2018)

In this model *Xl = working capital / total assets*; *X2 = retained earnings / total assets*; *X3 = earnings before interest and taxes / total assets*; *X4 = equity (book value) / total liabilities* and Z = overall index (Altman, 1993). Altman (1968) concluded that if the discriminant model is used correctly and periodically, it can successfully predict organizational failure.

This model generated a Z-Score which was a composite financial variable that was the result of the discriminant function coefficients being multiplied to their respective financial variables, liquidity, profitability, efficiency and net worth. Once the Z-Score was created, k-means clustering, a form of vector quantization, was used to classify the latent variable into three categorical three groups, distressed, risk-of-financial distress and healthy. We established the following cut-points for nursing homes in regards to financial distress: financially distressed firms have a score of Z less than -0.1082; firms that have the possibility of financial distress have a Z score of -0.1081 and 0.7767 and healthy firms have a Z score greater than 0.7768. This work provided a new tool in which to explore nursing home failure as it related to financial distress. Now we

want to use this methodological tool to examine the environmental, market, and organizational factors that may be associated with nursing home financial distress.

CONCEPTUAL FRAMEWORK

Resources play a critical role in an organization's success or failure (Pennings, 1975). Nursing homes, like all organizations, are greatly impacted by the market factors of the environment in which they operate (Nyhan, Ferrando, & Clare, 2002). The munificence of the environment and the availability of resources are key issues for organizational survival. In order to explore the relationship between resource availability and financial distress, we will utilize Resource Dependency Theory (RDT) and Porter's Five Competitive Forces. RDT partially explains how an organization's performance and survival are dependent on resources available in the environment (Kotter, 1979). Porter's Five Forces of Competition provides a way to understand the munificence of an organization's operating environment (Porter, 2008). The use of Resource Dependency Theory in conjunction with Porter's Five Forces of Competition will help explain organizational performance differences, stemming from changes in the environment, and provide a theoretical understanding of organizational failure (Starkey, Weech-Maldonado, & Mor, 2005).

Resource Dependency Theory

Resources are critical for organizations to function (Pennings, 1975). Resources can be considered anything that an organization receives in an exchange relationship with others and that are necessary for continued operations (Sheppard, 1995). An

organization's ability to accomplish its goals is dependent on the availability of necessary resources (Arbab Kash, Spaulding, Gamm, & Johnson, 2014; Rangan, 2004). Resource dependency theory (RDT) states that, "the key to organizational survival is the ability to acquire and maintain resources" (Pfeffer & Salancik, 1978, p.2).

RDT suggests that organizations engage in exchange relationships with other organizations and stakeholders, collectively termed as its environment, to acquire resources (Weech-Maldonado, Pradhan, Gupta, Davlyatov, & Lord, 2018). The ability to acquire critical resources can be challenging because some critical resources are controlled by other entities/organizations (Jacobs, 1974; Pfeffer & Salancik, 1978). No organization is totally self-sufficient or self-reliant (Levine & White, 1961; Stearns, Hoffman, & Heide, 1987). Pfeffer and Salancik (1978) suggest that if resources are properly allocated, resource exchanges will continue to flow to the organization; however, if resources are not properly allocated, critical coalitions will fail, causing the organization to fail. This may be due to organizational mismanagement; environmental change; failing to recognize new resource opportunities; lack of influence in the industry; minimal market share; inefficient operations or strategic mistakes (Argenti, 1976; Sheppard, 1995). An organization's ability or skill in acquiring resources is what differentiates successful and failing organizations.

The power of an organization will impact its ability to obtain critical resources from the environment (Kotter, 1979). Organizational factors can influence an organization's level of power in an environment, which in turn, will impact the ability of the organization to gain resources. An organization's viability is highly dependent on

available resources (Castle, Engberg, Lave, & Fisher, 2009). Organizational and internal factors can significantly impact an organizations ability to gain resources. These organizational resources represent enabling factors that allow the organization to respond to opportunities and threats in its environment. RDT assumes that failed organizations were not able to control or acquire the necessary resources within the environment. Financially distressed organizations lack the appropriate resources for continued operations. Organizations that are in financial distress are expected to lack the organizational resources and factors that can enable success in the market.

Organizational Factors

RDT suggests that variations in availability of resources may explain differences in organizational performance (Argenti, 1976; Sheppard, 1995). Occupancy reflects the number of residents who are utilizing the nursing home. As occupancy rates fall the financial performance of a nursing home also decreases (Castle, Engberg, Lave, & Fisher, 2009). This is because facilities continue to use existing resources and reserves to continue to operate; however, this depletion of resources cannot occur indefinitely. From 1991 to 2014, nursing home occupancy rate has fallen from 91% to 82% (Bishop, 1999; CMS, 2015). Organizations that are operating at capacity or that have high levels or occupancy are producing at their optimal levels and fully utilizing their fixed assets. In contrast, facilities with lower occupancy rates may be unable to cover their fixed costs. The lack of financial resources, due to falling occupancy, will increase the likelihood of a nursing home to be in financial distress; therefore, we hypothesize that:

Hypothesis 1: Nursing homes with lower resident occupancy are more likely to experience financial distress.

State Medicaid programs account for about approximately 50 percent of all nursing home revenues (Grabowski, 2002). State Medicaid payments for nursing home care is a substantial cost to most states. As a result, state Medicaid rates are typically kept as low as compared to other payers. Furthermore, Medicaid payments for nursing homes has not kept up with the rate of inflation (Grabowski, Feng, Intrator & Mor, 2004). As such, Medicaid is typically viewed as a low and unattractive payer (Bowblis, 2012). While nursing homes may be able to adapt to some reduction in reimbursements, over time, the revenue-mix will impact the organization's ability to remain financially viable (Castle, Engberg, Lave & Fisher, 2009). Nursing homes with a high Medicaid census will have less resource due to their payer-mix, it is therefore hypothesized:

Hypothesis 2: Nursing homes with a higher Medicaid payer-mix are more likely to experience financial distress.

Medicare reimbursements for post-acute services are an increasingly important source of revenue for nursing homes (Harris-Kojetin *et al.*, 2016; Reaves & Musumeci, 2015). Nursing homes that have a higher Medicare resident census typically have better financial performance because of its higher reimbursement for skilled nursing services compared to Medicaid (Zinn *et al.*, 2006). Medicare reimbursements are higher and more attractive than compared to Medicaid payments. These additional resources are

particularly valuable for nursing homes; however, financially distressed nursing homes are under resourced, therefore, we hypothesize that:

Hypothesis 3: Nursing homes with a lower Medicare payer-mix are more likely to experience financial distress.

Size is an important structural factor that can influence organizational performance (Kim, Harrington & Greene, 2009). Applying the concepts of RDT, larger facilities can exert greater power within their exchange relationships (Banaszak-Holl, Zinn, & Mor, 1996; Lucas, Avi-Itzhak, Robinson, Morris, Koren & Reinhard, 2005). Larger facilities also benefit from economies of scale, which are expected to result in lower resident cost per day (Banaszak-Holl, Berta, Bowman, Baum, & Mitchell, 2002), and can ultimately lead to better financial performance. Larger organizations command higher amounts of internal resources (Hannan & Freeman, 1984). Therefore, it is hypothesized that:

Hypothesis 4: Smaller nursing homes are more likely to experience financial distress.

Chain affiliated nursing homes are likely to have greater access to managerial talent and shared organizational resources. Chain affiliated nursing homes may achieve economies of scale by sharing resources such as administrative staff and nurses among their facilities facilitating maximization of slack resources (Weech-Maldonado, Zinn, & Hamilton, 2001). Chain affiliated facilities are also likely to benefit from economies of finance, borrowing and common stock issues, as well as, economies of promotion

(promotion of a single brand reduces consumer search for price and quality information) (Weech-Maldonado, *et al.*, 2012). All these factors can positively impact financial performance. Therefore, we hypothesize that:

Hypothesis 5: Free-standing nursing homes are more likely to experience financial distress.

Market Factors

Resource Dependency Theory boils down to the fact, that organizations rely on external resources for survival (Kotter, 1979). Changes in the availability of resources will impact all entities in the environment (Aldrich & Pfeffer, 1976). RDT views the organization as being an active participant in its fate (Scott & Davis, 2007). An organizations' dependence on others, hinges on how widely available and critical the resource is to the organization (Jacobs, 1974). RDT has an open systems approach to environmental contingency, in which, it places the burden of organizational success or failure on the organization. Managers must effectively manage their resources and relationships in an ever-changing environment in order to succeed (Scott & Davis, 2007). If the environment changes, it is contingent on the organization to stabilize or find new flows of resources (Pfeffer & Salanick, 1978). Uncertainty regarding the availability of resources may explain changes in organizational behavior and performance (Pfeffer & Salancik, 1978; Ulrich & Barney, 1984).

RDT partially explains how an organization's performance and survival are dependent on resources available in the environment. RDT provides the groundwork for

how/why organizations may be forced to make structural and/or behavior changes to control these resources (Oliver, 1990; Starkey, Weech-Maldonado, & Mor, 2005). Porters' Five Forces of Competition Model also provides a way in which the competitive structure of the environment can be conceptualized. According to the Porter's model, the competitive structure of the market is determined by the collective strength of the five forces, that will be explored further below (Porter, 1980; Starkey, Weech-Maldonado, & Mor, 2005).

Porter's Five Forces of Competition

Porter's Five Forces of Competition are used to explain the structure of an industry and the magnitude of competition (Dobbs, 2014; Magretta, 2011). These five forces were originally used to determine potential profitability of an organization within an industry (Dobbs, 2014; Porter, 1980). Porter's Five Forces of Competition provides a way to understand the organization's operating environment (Porter, 2008). The five forces that are examined are as follows: the bargaining power of suppliers; the bargaining power of buyers; threat of new entrants; threat of substitute products or services and the rivalry among existing competitors (Porter, 2008). A conceptual framework illustrating the Porter's Five Forces of Competition is shown in Figure 1.

The bargaining power of suppliers can impact the competitive structure of the industry. Organizations depend on suppliers (or outside parties) to provide them with critical resources. These resources are then used to create or deliver the product or service (Porter, 2008). A supply/input can be tangible (raw material, labor, utilities, etc.) or intangible (knowledge). A supplier can be any individual, group, or organization that

supplies an input to the industry. Suppliers may utilize the control they have over resources to exact concessions from an organization (Starkey, Weech-Maldonado, & Mor, 2005; Zinn, Weech-Maldonado, & Brannon, 1998). A supplier has high bargaining power, when their product or service is rare, unique or differentiated. When a supplier has high bargaining power, they can enrich themselves at the expense of the purchaser (Porter, 2008). If the supplier is reliant on one industry or client, there is a forced mutual relationship as their existences are intertwined. However, if the supplier is not reliant on one industry solely for its success, there is the incentive to extract maximum profits (Porter, 2008).

Within the nursing home industry, hospitals are a key supplier to skilled nursing facilities because they can 'lightly' steer individuals to preferred providers of post/sub-acute care. Nursing homes, that provide skilled nursing care, will want to have favorable relationships with hospitals as to maximize the number of Medicare referrals. Nursing homes that have a higher Medicare resident census typically have better financial and operating performance (Zinn *et al.,* 2006). Nursing homes will have to effectively manage their resources and relationships to succeed (Scott & Davis, 2007). The willingness of a hospital to steer patients to one nursing home versus another can be contingent on the market and their relationship. A supplier has high bargaining power when their resource is rare. If SNFs rely on hospitals for post-acute care referrals, the bargaining power of the hospitals will depend on the supply / demand structure of that market. In a market that only has one hospital (the supplier of post-acute residents) and many SNFs (purchaser), it would be assumed that the supplier has high bargaining power. However, a market that has a relatively large number of hospital beds as

compared to skilled nursing beds, will indicate a weaker supplier. Nursing homes in financial distress are expected to have less access to critical resources or be in markets where the supplier has a greater bargaining power, it is therefore hypothesized that:

H6: Nursing homes are more likely to experience financial distress when they are in markets where hospitals have greater bargaining power.

It is anticipated that SNFs derive benefit from the presence and referral power of hospitals. While the strength of the hospital/nursing home relationship is important, it is ultimately the potential volume / supply of referrals that matters. Hospitals have the incentive to discharge patients in a timely manner. The more short-term hospital beds in the market, the more demand for post-acute care. This provides referral opportunities for Medicare residents to nursing homes. Nursing homes with a higher Medicare resident census typically have better financial and operating performance (Zinn, Mor, Feng, & Intrator, 2006). A skilled nursing home that is in a market with a limited number of short-term hospital beds will have fewer opportunities for referrals. Nursing homes that are in financial distress are expected to have less access to critical resources, it is therefore hypothesized that:

H7: Nursing homes are more likely to experience financial distress when they are in markets where hospitals have fewer short-term beds.

A supplier is an individual(s) who supplies a skill or input that is critical to the creation or delivery of a service/product (Porter, 2008). The nursing home industry is

service-intensive and relies heavily on RNs and LPNs (Huda, 1995). On average, only about 7% of RNs and 31% of LPNs work in nursing homes (HRSA, 2013). RNs and LPNs supply their services to many other types of health care organizations and are highly sought after throughout the health care industry (DeFriese, 2009). Due to scope of practice laws, nursing homes cannot substitute out the level of care provided by RNs or LPNs to less expensive and lower trained CNAs. Nursing homes must abide by federal and state requirements dictating staffing levels of RNs and LPNs (Hirdes *et al.*, 2011). Suppliers have increased bargaining power if they are in high demand from multiple purchasers and industries (Porter, 2008). Due to the high demand for RNs and LPNs from multiple health care organizations; current shortage of nurses, and federal/state staffing regulations, the bargaining power of suppliers is strong, it is therefore hypothesized that:

H8: Nursing homes are more likely to experience financial distress in markets with a lower supply of RNs and LPNs.

Bargaining power of buyers is high if there are only a few large buyers that make significant purchases. Buyers with high levels of power can demand lower prices, better quality, or require more services (Porter, 2008). The bargaining power of buyers is high if the service is undifferentiated or there are low switching costs (Porter, 2008). If the bargaining power of buyers is high, this can result in the industry being compelled to lower the price of goods / services because there are limited alternative outlets. In the health care industry, the powerful buyers are the 'payers' of health care. Large payers

can dictate payment terms because of the volume of patients that they represent. One of the largest payers in the nursing home industry is Medicaid.

All nursing homes must be state licensed to accept Medicare and Medicaid patients but their participation in these programs is voluntary (KFF, 2013). Medicaid is the primary payer for over 63% of all nursing home residents in the U.S. (Kaye, Harrington, & LaPlante, 2010). While Medicaid is the dominant payer for nursing home care it also pays the least due to its bargaining power (Grabowski, 2002). Medicaid is a significant purchaser of nursing home care. In communities where there is a high Medicaid population, this purchasing power will be more pronounced. In these markets, the competition for private-pay individuals will also be greater because there is a smaller potential pool of private-pay residents. Typically nursing homes do not compete for individuals on Medicaid due to the low reimbursements (Reaves & Musumeci, 2015; Starkey, Weech-Maldonado, & Mor, 2005). Payer-mix can impact nursing homes financial performance. It is therefore hypothesized:

H9: Nursing homes are more likely to experience financial distress when they are located in markets with a higher county-level proportion of Medicaid-funded nursing home residents.

Medicare managed care organizations (MCOs) or Medicare Advantage, attempt to control costs and limit utilization (Zinn, Mor, Castle, Intrator, & Brannon, 1999). Medicare MCOs yield significant purchasing power. In 2013, Medicare MCOs accounted for 10% of long-term care spending (Eiken *et al.*, 2015). Medicare MCOs attempt to steer patients to post-acute care providers that are efficient and effective in

their care delivery (Reaves & Musumeci, 2015). The greater the Medicare MCOs penetration rate, the greater the bargaining power. When Medicare MCOs have greater bargaining power, they have increased leverage in negotiating lower nursing home per diem rates. MCOs have been shown to significantly reduce the length of stay for post-acute patients, thus reducing the potential revenue for skilled nursing facilities through lower per diem rates and fewer length of stay days (Chandra, Dalton, & Holmes, 2013). If a Medicare MCO has a dominant presence in a market, this could potentially reduce the revenue and volume for nursing homes that provide skilled nursing care to Medicare beneficiaries. The reduction of Medicare managed care revenue may lead to worse financial performance; therefore, it is hypothesized that:

H10: Nursing homes are more likely to experience financial distress when they are located in markets with higher Medicare MCOs penetration.

The threat of substitutes is a prevalent issue in the long-term care industry. A substitute performs the same or similar function as the existing product and/or service (Porter, 2008). Substitutes are always present but are often overlooked because they may be non-traditional to the industry. If an industry is not aware of substitutes and/or not responsive to the consumer then substitutes have the potential to usurp the existing industry. The threat of substitutes is high if the substitutes offer more perceived value as compared to the existing product or service. Substitutes can put a 'premium cap' on industry prices (Porter, 2008). Porter's value chain analysis as modified for health care

defines value as the "amount of satisfaction received relative to the price paid for health care services" (Ginter, Swayne, & Duncan, 2002).

Home and community-based services (HCBS) are defined as long-term support that assist older adults to remain in their homes and/or community rather than institutions or other isolated settings (Harris-Kojetin *et al.*, 2016; Kassner, 2011). Home health care agencies are one mechanism of delivering home and community-based care. Home health care agencies provide a variety of services that include items such as personal care, chore assistance, transportation, meals or adult day services. These agencies supply the necessary personnel, such as, nurses, therapists, and aides into an individual's home to assist with the individual's health care needs (Benjamin, 2001; Mollica, Simms-Kastelein, & Kassner, 2009). Home health care provides less intensive care as compared to nursing homes; however, home health care can provide comparable levels of care for less-acute individuals who otherwise would be in a nursing home. The presence of HCBS is a substitute to nursing homes and has the potential to depress profits in an industry (Porter, 2008). It is therefore hypothesized that:

H11: Nursing homes are more likely to experience financial distress when they are located in markets with a higher supply of home health agencies.

Home and community-based services (HCBS) have exploded in popularity over the past two decades and are available in every state to a varying degree (Benjamin, 2001; Kassner, 2011). The percentage of Medicaid spent on home health care has increased by 374% from $6.7 billion in 2000 to $32 billion in 2015 (CMS, 2017). As of 2014, there were over 12,400 home health agencies helping keep individuals in their home (Harris-Kojetin *et al.*, 2016). Nearly 3.2 million people received HCBS through

Medicaid programs in 2014 (Watts & Musumeci, 2018). The demand for these services continues to grow as there was a 27% increase in HCBS enrollments from 2013 to 2014 (Watts & Musumeci, 2018). The demand for HCBS outpaces the supply. With existing HCBS services there is often capped enrollment and wait times that exceed 23 months. As of 2016, there were over 656,195 people waiting to get HCBS (Watts & Musumeci, 2018). HCBS are a competitor to nursing homes, yet, currently, there are constrained due to maxed out / capped enrollment. However, in the past several years, there have been some states that have made efforts to raise the enrollment caps to expand the number served in the community. They have done this by expanding the slots in existing 1915(c) waivers, implementing new 1915(c) waivers or expanding the 1915(i) state plan amendments. In these states, the policy makers are making efforts to allow more individuals to be served by HCBS instead of receiving care at a nursing home. Nursing homes that operate in states, where there is increased enrollment will face greater threat of new entrants and are expected to have worse financial success, it is therefore hypothesized that:

H12: Nursing homes are more likely to experience financial distress when they are located in markets with regulations expanding HCBS enrollment.

As mentioned previously, skilled nursing homes provide post-acute care to individuals who are discharged from the hospital (Carter, Garrett, & Wissoker, 2012). Medicare covers additional rehabilitation or recuperative care in a post-acute facility for a maximum of 100 days immediately following a hospital discharge. Skilled nursing services can be provided by acute care facilities (hospital-based) or by

independent nursing homes (freestanding) (Carter, Garrett, & Wissoker, 2012). Medicare sub/post-acute services are an increasingly important source of revenue for nursing homes. If a hospital chooses to compete with SNFs with their own sub-acute beds, this could be a potential competitor for freestanding skilled nursing homes. This type of competition could negatively impact the occupancy and revenue of the nursing home; therefore, it is hypothesized that:

H13: Nursing homes are more likely to experience financial distress when they are located in markets where there is a higher supply of hospital-based SNF beds.

Threat of new entrants explains how the intrusion of competitors can create pressure on existing organizations for market share and resources (Porter, 2008). The threat of entry puts a cap on the potential profit of an industry. Existing organizations can attempt to deter new entrants by keeping their prices low; increasing investment; differentiating their product, or enacting regulatory barriers (Porter, 2008). In the nursing home industry, the primary barrier to entry are regulatory barriers.

Certificate-of-need (CON) and construction moratorium laws are widely wielded by states to control Medicaid nursing home expenditures (Grabowski, Ohsfeldt, & Morrisey, 2003). There are thirty-six states that regulate nursing homes through certificate-of-need programs (NCSL, 2016). In these states, new nursing home entrants are required to get prior state approval before a new nursing home is permitted to enter the market. Frequently state planning boards will not grant other providers permission to open a new nursing home if existing facilities have excess capacity because the state does not want nursing home facilities to induced demand. Nursing homes are constrained in

their ability to grow or reallocate beds due to state specific certificate-of-need laws (GAO, 2003). The effectiveness of these regulations is questionable; however, these policies are still in place (Grabowski, Ohsfeldt, & Morrisey, 2003). CON laws, which are made at the state level, limit the growth of additional capacity, which then reduces the competitive threat posed by new entrants (Starkey, Weech-Maldonado, & Mor, 2005; Rahman, Galarraga, Zinn, Grabowski & Mor, 2016). The threat of increased competition can drive down profitability of an industry (Porter, 2008). States in which all long-term care providers (assisted living, home health and nursing homes) are required to obtain CON approval there is the reduced threat of new entrants. However, nursing homes that operate in states where CON laws have been removed or repealed, there is increased threat of new entrants and competition. Nursing homes that operate in states where there are no regulatory barriers (i.e., CON laws), will face greater threat of new entrants and are expected to have worse financial success, it is therefore hypothesized that:

H14: Nursing homes are more likely to experience financial distress when they are located in markets where there are no certificate-of-need laws.

Rivalry among existing competitors can be measured by the intensity with which organizations compete (Porter, 2008). High rivalry limits the profitability of an industry. Rivalry is high if the products or services of rivals are nearly identical; the competitors numerous, and there are few switching costs for buyers (Porter, 2008). Differentiation is difficult in the nursing home industry, since most nursing homes provide residents similar services at comparable prices (Starkey, Weech-Maldonado, & Mor, 2005). In this

fragmented industry, rivalry would be high in markets where there is a concentration of nursing home providers.

Excess capacity describes a situation when an organization has lower production/service output than what was originally designed for (Caves & Porter, 1977). Organizations that are producing at their optimal levels, or full capacity, are better able to cover their fixed costs. Nursing homes have an average occupancy rate of 82% (CMS, 2015) but that can vary by market. Excess capacity in a nursing home indicates that the organization has the potential to care for more residents than they are currently seeing. Markets that have high levels of excess capacity will have increased competition, because the organizations in that market are under-utilizing their assets. It is expected that nursing homes in markets with high levels of excess capacity, would face more intense competition and more likely to have worse profitability, therefore, it is hypothesized that:

H15: Nursing homes are more likely to experience financial distress when they are located in markets with higher levels of excess capacity, i.e., lower occupancy rates

Another important measure is competition which is measured by the Herfindahl-Hirschman Index (HHI). The measure, HHI, captures market concentration. The higher the concentration, the lower the competition. Nursing homes in competitive markets are hypothesized to have worse financial performance because there are multiple nursing homes competing for the same pool of residents; it is therefore hypothesized that:
H16: Nursing homes are more likely to experience financial distress when they are located in more competitive markets, i.e., lower Herfindahl Index

The next section will provide additional information on the operationalization of the variables and the methodology associated with this paper.

METHODOLOGY

Data

This study utilizes seven different sources: Medicare Cost Reports, Brown University's LTCFocus, Certificate of Need State Laws, Certification and Survey Provider Enhanced Reporting (CASPER), Online Survey Certification and Reporting (OSCAR), Kaiser Family Foundation: HCBS States, and the Area Resource File from 2000 through 2015. Medicare Cost Reports provides financial data for nursing homes that participate in the Medicare program. Brown University's LTCFocus is an amalgamation of multiple sources of data, including the Minimum Data Set, CMS's Nursing Home Compare, Area Resource File, Bureau of Labor Statistics, Residential History File, OSCAR/CASPER and state policy surveys that collects organizational and market factors regarding nursing homes. This dataset captures items, such as but not limited to, resident demographics, quality, acuity, staffing, reimbursement rates, state policies, market, and organizational variables. The Certificate of Need State Laws comes from the National Conference of State Legislatures (NCSL) publicly available website (http://www.ncsl.org/) that is updated with each states' regulations.

CASPER (Certification and Survey Provider Enhanced Reporting) replaced the OSCAR (Online Survey Certification and Reporting) data set in 2012. This data set contains nursing home operational characteristics and aggregate patient characteristics for

each facility. The Kaiser Family Foundation: State Health Facts, had survey data that reflected the states who reported at least one action to expand Medicaid home and community-based services. The Area Resource File (ARF) data set contains county-level information on socio-economic status, population demographics and environmental characteristics for a county (HRSA, 2011).

Sample

This sample consisted of all Medicare participating nursing homes in the United States from 2000 through 2015. There were 255,269 nursing home observations in this sample. First, we excluded nursing homes with no ARF data and those that that did not report any Medicare financial data (n = 54,403). Second, all financial variables (33 financial variables) that were classified as extreme outliers (n = 5,280) were dropped. Third, the data was additionally cleaned by examining each financial variable and computed variable per year and then dropping the observations with financial variables that were ±5 standard deviations from the mean (n =28,318). This left an analytical sample of 167,268 nursing home observations or an average of 10,454 nursing homes per year.

Variables

A listing of all of the dependent, independent and control variables can be found in Table 1. This table will list each variable used in this study and notes the definition and source of each.

Dependent Variable – Financially Distressed Groups

The dependent variable in this analysis was a categorical variable that grouped nursing home observations as financially distressed, risk-of-distress, and healthy. In order to do this, we used multiple discriminate analysis (MDA) and a financial model proposed by Altman (1968). The purpose of multiple discriminant analysis (MDA) is to successfully predict a single qualitative variable from one or more independent variable(s). The four financial variables specified by the Altman model were *liquidity* (M = 0.07, SD = 0.45), *profitability* (M = 0.23, SD = 0.72), *efficiency* (M = 0.04, SD = 0.31) and *net worth* (M = 1.51, SD = 2.70). Using the discriminant function standardized coefficients, the Altman Z-Score was calculated. The Altman Z-Score is a latent variable formed by the linear combination of the dependent variables (X_1, X_2, X_3 and X_4). The weights that are assigned to each independent variable are referred to as canonical discriminant function coefficients.

$$F = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

$$F = \beta_0 + (0.18 * \text{Liquidity}) + (0.30 * \text{Profitability}) + (0.81 * \text{Efficiency}) + (0.14 * \text{Net Worth}) + \varepsilon$$

The cutoff scores to group firms "at risk-of-distress" are as follows: financially distressed firms have a score of Z less than -0.1082; firms that have the possibility of distress have a Z score of -0.1081 and 0.7767 and healthy firms have a Z score greater than 0.7768.

Independent Variables

There are five organizational variables that are explored in this study. *Occupancy rate* (H1) is the percentage of occupied nursing home beds. As the occupancy rate decreases, nursing homes will likely have worse financial performance because of the underutilization of the nursing home resources. *Payer mix* (H2, H3) identifies the proportion of the facilities residents who are on Medicaid and Medicare. Nursing homes with a higher proportion of Medicaid are expected to have worse financial performance because the reimbursement is low. *Size* (H4) captures the total number of beds within the nursing home. Due to economies of scale, it is expected that larger nursing homes will have better financial performance. *Chain affiliation* (H5) reflects whether the nursing home is part of a chain (0 = free-standing; 1= chain affiliated). It is expected that nursing homes that are part of chain will have greater access to resources and have better financial performance.

The second set of variables are the market level variables that are conceptualized using Porter's Five Forces of Competition framework. The bargaining power of suppliers has three hypotheses: hospital referral power (H6), availability of short-term hospital beds (H7), and bargaining power of service providers (H8). *Hospital referral power* (hypothesis 6) is measured by the number of nursing home beds per 1,000 individuals over the age of 65 relative to the number of hospital beds per 1,000 individuals over the age of 65 in the county. *Availability of short-term hospital beds* (hypothesis 7) is measured by the number of short-term hospital beds per 1,000 individuals over the age of 65 in a county. The *bargaining power of service providers* (hypothesis 8), is measured by the number of RNs and LPNs per 1,000 individuals over

the age of 65 in the county. The bargaining power of buyers had two hypotheses, the county-level proportion of Medicaid-funded nursing home residents (H9) and the Medicare MCO market penetration (H10). *The county-level proportion of Medicaid-funded nursing home residents* (hypothesis 9) is the proportion of residents in the county whose primary support for nursing home care is Medicaid. *Medicare MCO market penetration* (hypothesis 10) is calculated as the proportion of all Medicare beneficiaries in the county who are enrolled in a Medicare MCO. The threat of substitutes, has three hypotheses, the prevalence of home health care agencies in the county (H11), HCBS expansion (H12), and the number of hospital-based SNFs in the county (H13). The *prevalence of home health care agencies in the county* (hypothesis 11) can be calculated as the number of home health agencies in the county for every 1,000 individuals 65 and older. *HCBS expansion* (hypothesis 12) reflects whether or not a state took regulatory action to expand the number of HCBS individuals served in the community. The *number of hospital-based SNFs in the county* (hypothesis 13) can be calculated as the number of hospital-based SNFs in the county for every 1,000 individuals 65 and older. The threat of new entrants, is captured by the *Certificate of Need presence* (hypothesis 14) in the state. Industry rivalry is composed of two hypotheses, *nursing home excess capacity* in the county (H15) and the level of *industry competition* (H16). The proportion of excess nursing home capacity in the county (hypothesis 15) can be calculated as the average number of empty beds in the county relative to the total number of nursing home beds. The level of industry rivalry (hypothesis 16) is calculated as each facility's total beds is squared and the sum for all facilities in the county is calculated, and then this sum is divided by the sum of all county beds squared. HHI is a continuous variable that ranges

from 0 to 1 with lower values associated with higher competition----a HHI score of zero would represent perfect competition. A table outlining the sources of the data, structure and details can be found in the Table 1.

Control Variables – Organizational and Market

Multiple organizational and market variables that could impact financial performance and/or financial distress were included in the model. The organizational control variables include, ownership, race/ethnicity, and average acuity of the resident. *Ownership* is a dichotomous variable that identifies whether a nursing home is for-profit (0 = not for-profit; 1= for-profit). *Race/ethnicity* shows the proportion of nursing home residents who are Black and Hispanic. *Acuity Index* is an average measure of the resident's level of care needed. This measure is based on the number of residents needing various levels of assistance with mobility, activities of daily living (ADL), special treatments, as well as, the proportion of residents that are bedfast, exhibit dementia and who require assistance with ambulation or transfers. A facility with higher resident acuity may get adjusted on a case-mix payment but these residents are very resource intensive. The three market level variables are *per capita income, proportion of individuals over the age of 65*, and *metro/nonmetro/rural*. *Per capita income* is a measure of the average wealth of individuals in a county. This is a market level variable found in ARF. Higher per capita income is an indication of environmental munificence. *Number of individuals over the age of 65* is simply taking the proportion of all individuals who are 65 and older to the total population. It is expected that these individuals will have a greater demand for long-term care. The *metro/nonmetro/rural*

variable was included to capture the difference as it related to different markets. Rural is the reference category.

Analysis

Given the categorical nature of the dependent variable (financial distress, risk-of-distress, and healthy), data were analyzed using multinomial logistic regression, with healthy nursing homes as the reference dependent variable, robust clusters at the provider id and year and state fixed effects. Because the data used for this analysis will be looking at observations collected from the same nursing homes repeatedly over time, the observations may be correlated at the facility level. To control for these interdependences, robust clustering will be used at the provider level to produce robust standard errors for the estimates (Amirkhanyan, Kim, & Lambright, 2008; Williams, 2000). State fixed effects were used to control for interstate differences in the regulatory environment, and year fixed effects to control for time trends. The results report the relative risk ratios between the stated hypotheses and financial distress, with healthy nursing homes serving as the reference group. Stata 14 was used for the statistical analysis. Statistical tests were evaluated at the 0.05 level of significance.

Multinomial logistic regression is a statistical methodology for analyzing a dataset in which there are one or more independent variables and a categorical dependent outcome. It was for these reasons that this statistical methodology was selected to describe the relationship between the categorical variable of interest (financial distress, risk-of-distress, and healthy) and the set of independent (predictor or explanatory)

variables. The multinomial logistic regression equation is presented below. All of the independent and control variables are represented. The general model specification for the "i"th is the nursing home, the "j"th is the state and the "t" is the year.

Logistic Equation

$$\text{Multinomial logit } (\pi) = \log (\pi / (1-\pi) = \beta_0 + \beta_1 (\text{Occupancy}_{it}) + \beta_2 (\text{Payer Mix - Medicaid}_{it}) + \beta_3 (\text{Payer Mix - Medicare}_{it}) + \beta_4 (\text{Size}_{it}) + \beta_5 (\text{Chain Affiliation}_{it}) \beta_6(\text{Referral power of hospitals}_{jt}) + \beta_7(\text{Short-term hospital beds}_{jt}) + \beta_8(\text{Bargaining power of RNs and LPNs}_{jt}) + \beta_9(\text{County-level proportion of Medicaid-funded nursing home residents}_{jt}) + \beta_{10}(\text{Medicare MCO penetration}_{jt}) + \beta_{11} (\text{Prevalence of Home Health Care Agencies}_{jt}) + + \beta_{12} (\text{HCBS Benefit Expansion}_{jt}) + \beta_{13}(\text{Number of Hospital-Owned SNF Beds}_{jt}) + \beta_{14}(\text{Presence of CON Laws}_{jt}) + \beta_{15}(\text{Excess Capacity}_{jt}) + \beta_{16}(\text{Rivalry}_{jt}) + \beta(\text{Ownership}_{it}) + \beta(\text{Race/ethnicity}_{it}) + \beta(\text{Acuity Index}_{it}) + \beta(\text{Per Capita Income}_{jt}) + \beta(\text{Proportion of Older Adults}_{jt}) + \beta(\text{Rural / Nonmetro/ Metro}_{jt}) \beta(\text{State Dummy Variables}_{jt}) + \beta(\text{Year Dummy Variables}_{jt}) + \mu(\text{Year}_t) + \mu(\text{State}_j) + \psi_i + \varepsilon_{it}$$

Π = the probability of financial distress / Ψ – robust cluster at the facility level / ε – Error term

RESULTS

Based on the Altman Z-score methodology, the nursing home observations were classified into three groups: financially distressed (n = 34,819), risk-of-distress (n = 96,584) and healthy (n = 35,865). The descriptive statistics for the dependent and independent variable by financial group are presented in Table 2. In addition, the tests of significance, one-way ANOVA for continuous variables and Chi-square for categorical

variables, that were used to explore the relationships of the independent variables and the nursing home groups are also presented in Table 2.

Bivariate Results

When examining the organizational variables, financially distressed nursing homes had lower occupancy, higher percentage of Medicaid, a lower percent of Medicare, and were less likely to be a part of a chain as compared to healthy and at risk-of-distressed nursing home groups. The only organizational variable that did not have a statistically significant differences between all groups was the number of total beds in distressed (M=108) as compared to at risk-of-distress (M=111) nursing homes (0.525 ± 0.310, $p > 0.05$).

For the market level factors, it was found that distressed nursing homes were more likely to be in markets that had greater hospital referral power; higher number of RNs and LPNs per 1,000 individuals over the age of 65; a higher proportion of residents funded by Medicaid on a county-level; less HCBS benefit expansion; higher rates of nursing home excess capacity, and increased competition as compared to healthy and at risk-of-distressed nursing home groups. There was no significant difference in the availability of short-term hospital beds per 1,000 individuals for distressed (M=20.09, SD=14.02) versus healthy (M=19.89, SD=14.04). For the percent of Medicare Advantage penetration, there was a significant difference between distressed (M=19, SD=15.09) and healthy (M=18.40, SD= 15.11) nursing homes, but not for risk-of-distressed (M=18.86, SD=15.32) and distressed (M=19.00, SD=15.09). There was no statistically significant difference as it related to the number of hospital based SNF beds

for any of the nursing home groups. As it related to the prevalence of home health agencies per 1,000 individuals over the age of 65 there was a statistically significant difference among all the groups. Healthy (M=0.29, SD=0.33) nursing homes were located in markets with more home health agencies as compared to distressed (M=0.27, SD=0.30) and risk-of-distress (M=0.26, SD=0.29) nursing homes. Also, for presence of CON laws there was a statistically significant difference among all the groups with healthy (64%) nursing homes being more likely to be located in states with no CON presence as compared to distressed (66%) and risk-of-distress (69%).

When examining the organizational control variables, financially distressed nursing homes were more likely to be for-profit; have a higher percent of Black and Hispanic residents, and have lower resident acuity, as compared to healthy and risk-of-distress nursing homes. For the market control variables, distressed nursing homes were more likely to be found in metro markets with a higher per capita income, a lower percent of individuals over the age of 65 as compared to healthy and risk-of-distress nursing home groups.

Multinomial Results

The multinomial logistic regression results are presented as relative risk ratios (RRR) with healthy as the reference group. A summary of these findings can be found on Table 3.

Three of the five organizational hypotheses were supported by the data with H1 (nursing home occupancy), H3 (payer mix: percent Medicare), and H5 (chain affiliation)

exhibiting statistically significant relationships in the predicted direction. The remaining two organizational hypotheses were partially supported by the data with H2 (payer-mix: percent Medicaid) and H4 (total number of nursing home beds). Distressed (RRR=0.955) and risk-of-distress (RRR=0.992) nursing homes had significantly lower occupancy (H1) as compared to healthy nursing homes. Distressed nursing homes (RRR=1.012) had significantly higher percent of Medicaid residents (H2) as compared to healthy nursing homes. However, there was not a statistically significant difference in the percent of Medicaid residents for nursing homes at risk-of-distress as compared to healthy. Distressed (RRR=0.992) and at risk-of-distress nursing homes (RRR=0.992) had a significantly lower Medicare payer-mix (H3) as compared to healthy nursing homes. There were fewer total beds (H4) in distressed nursing homes (RRR=0.997) as compared to healthy nursing homes. However, the number of beds was not statistically significant when comparing nursing homes at risk-of-distress and healthy. Distressed (RRR=0.818) and risk-of-distress (RRR=0.653) nursing homes were less likely to be chain affiliated (H5) as compared to healthy nursing homes.

For the bargaining power of suppliers, none of the three proposed hypotheses, H6 (hospital referral power), H7 (availability of short-term hospital beds), and H8 (bargaining power of suppliers) were supported. The likelihood of a nursing home being at distressed or risk-of-distress, relative to healthy, was not significant for hospital referral power (H6); availability of short-term hospital beds (H7), or for the bargaining power of service providers (H8).

Neither of the bargaining power of buyers' hypotheses, H9 (county-level proportion of Medicaid-funded nursing home residents) or H10 (% Medicare MCO enrollees) were supported. However, there was significant but contradictory findings for H9 (county-level proportion of Medicaid-funded nursing home residents) as it related to distressed as compared to healthy nursing homes. Nursing homes that were distressed (RRR=0.991) were more likely to be found to be in counties of lower Medicaid concentration as compared to healthy nursing homes. There was no statistically significant difference in the percent of Medicare MCO enrollees for distressed or risk-of-distress as compared to healthy.

Only one of the threat of substitutes' hypotheses, H13 (number of hospital-based SNF beds) was partially supported. However, there was significant but contradictory findings for H11 (prevalence of home health agencies) as it related to distressed and risk-of-distress as compared to healthy nursing homes. Distressed nursing homes (RRR=0.717) and nursing homes at risk-of-distress (RRR=0.807) were less likely to be located in markets with home health agencies (H11) as compared to healthy nursing homes. There was no statistically significant relationship as it related to state HCBS benefit expansion (H12). The one partially supported hypothesis was H13 (number of hospital-based SNF beds). Nursing homes that were at risk-of-distress (RRR=1.007) as compared to healthy organizations, were more likely to be in markets that had a higher number of hospital-based SNFs (H13).

The threat of new entrants' hypotheses, H14 (Certificate of Need presence) was not supported. There was no significant difference in nursing home groupings as it related to Certificate of Need presence (H14).

None of the hypotheses for industry rivalry, H15 (nursing home excess capacity) and H16 (competition) were supported. There was no statistically significant difference between the nursing home groups for nursing home excess capacity (H15) or competition (H16).

As it related to the control variables, distressed (RRR=1.013) and risk-of-distress (RRR=1.005) were more likely to have Black residents as compared to healthy nursing homes. There was no statistically significant difference for ownership, percent of Hispanic residents, or acuity as it related to the nursing home distressed groupings. None of the market control variables, per capita income, percent of individuals 65 years and older, and rural/nonmetro/metro were significant.

DISCUSSION

This study examined the organizational and external competitive factors that were hypothesized to impact nursing home financial performance / distress. According to RDT, organizational factors can influence an organization's level of power and resource in an environment, so it was hypothesized that these factors, would explain why some nursing homes were likely to be in financial distress. Porter's Five Forces of Competition have been used to assess the potential profitability of an industry, so it was hypothesized the same forces would help predict financial distress (Dobbs, 2014; Porter,

1980). We believe these findings provide greater insight into the actual organizational and market factors that impact nursing homes and facilitate financial distress.

Organizational level variables had the most impact as it related to nursing home financial distress. Distressed and risk-of-distress nursing homes had lower occupancy as compared to healthy nursing homes. Prior research has shown that higher occupancy rate is associated with both higher financial performance and better quality (Weech-Maldonado, Neff, Mor, 2003a, 2003b). Lower occupancy implies the underutilization of existing fixed assets, which may affect the facility's ability to cover its fixed costs and result in worse financial performance.

The payer-mix of the nursing home had a significant impact on the likelihood of nursing home financial distress. Distressed nursing homes had a higher Medicaid census as compared to healthy nursing homes. Nursing homes with a higher Medicaid payer-mix were expected to have worse financial performance due to the reduced revenues. Distressed nursing homes had a Medicaid payer-mix of (M=67%) as compared to risk-of-distress (M=63%) and healthy (M=62%), this suggests the percentage of Medicaid could be one of the elements that significantly impacts a nursing home's likelihood of being in distress. Similarly, the percent of Medicare had a significant impact on the likelihood of a nursing home being distressed or at risk-of-distress as compared to healthy organizations. Both distressed (M=12.4%) and risk-of-distress (M=13.5%) nursing homes had lower Medicare payer-mix as compared to healthy nursing homes (M=14.7%). Medicare reimbursements are significantly more attractive to nursing homes as compared to Medicaid. Healthy nursing homes appeared to be able to differentiate themselves from distressed and risk-of-distress nursing homes by having a more

attractive payer-mix, higher percent of Medicare and lower percent of Medicaid. The difference in the payer mix can impact the revenue stream and ultimately financial performance. These additional resources may be critical for a nursing homes survival.

Nursing home structural factors were also found to be of importance when exploring distress. Distressed nursing homes had fewer beds relative to healthy nursing homes. Larger facilities benefit from economies of scale, which can translate cost and expense efficiencies. In addition, larger organizations command higher amounts of internal resources which may help them survive periods of resource uncertainty (Hannan & Freeman, 1984). There was no statistically significant difference in size as it related to nursing homes in risk-of-distress (M=110.76) and healthy (M=111.29) but they were both higher as compared to distressed (M=108) nursing home group, suggesting that perhaps size does matter. Distressed and risk-of-distress nursing homes were less likely to be chain affiliated as compared to healthy nursing homes. Chain affiliated nursing homes benefit from the shared economies of scale and size (Weech-Maldonado, *et al.,* 2012). Free-standing nursing homes have fewer opportunities to benefit these shared resources and economies.

The market factors as conceptualized by Porter's Five Forces of Competition were not as impactful as it related to financial distress as compared to the organizational variables. The only hypothesis that was supported, was the threat of substitutes, primarily the number of hospital based SNF beds. Nursing homes at risk-of-distress were in markets with a higher number of hospital-based SNF beds, as compared to healthy nursing homes. Hospital-based skilled nursing beds are a substitute to nursing homes

skilled nursing beds. Hospitals and/or physicians could prefer to refer patients to hospital-based facilities instead of nursing homes. The greater presence of hospital-based skilled nursing beds could result in additional competitive and financial pressures for at risk-of-distress nursing homes. However, there was no significant difference between distressed and healthy nursing homes as it related to the number of hospital-based SNF beds. Distressed nursing homes may be perceived as having lower quality because of their lack of resources, therefore, hospitals and/or physicians may be less likely to refer patients to that facility regardless.

Hospital referral power was not significantly associated with the likelihood of financial distress. This may be due to the fact that hospital referral power is more nuanced and complex than a simple proportion of beds or perceived market power. There is still much unknown regarding how hospitals establish / promote post-acute referral networks or how these referral patterns vary by geographic areas or providers (Lau, Alpert, Huckfeldt, Hussey, Auerbach, Liu, & Mehrotra, 2014). Hospitals and physicians are prohibited from limiting or forcing patients to choose a particular post-acute provider. While providers can be influential in the patient's decision-making process, the decision is ultimately the patients (Lau, Alpert, Huckfeldt, Hussey, Auerbach, Liu, & Mehrotra, 2014). Regardless of the hospital's 'potential' referral power, there may be other factors that lessen the impact.

The availability of short-term hospital beds was not significant as it related to the likelihood of financial distress. This was interesting as 'supply' is a key component of market power (Hall, 2000). It was hypothesized that hospitals (as suppliers) would exploit their market power (Newhouse, 1970; Simpson & Shin, 1998); however, this was

not supported. Similarly, to the previous finding, there is still a lot unknown regarding hospitals establish / promote post-acute referral networks (Lau, Alpert, Huckfeldt, Hussey, Auerbach, Liu, & Mehrotra, 2014). Further analysis, may require more detailed analysis that focuses on the organization level and not the county.

The bargaining power of service providers was not found to be statistically significant as it related to financial distress. Nurses are a key input in the delivery of health care. Nurse staffing typically represents two-thirds of nursing homes expense. While nurses are critical to the successful delivery of care, their power may be limited (Davis, Sloan, & Wunderlich, 1996; Sojourner, Frandsen, Town, Grabowski, & Chen, 2015). Previous research focused on nurses' unions in nursing homes, found that even nurses unionized, there was not a large increase in total payroll. This indicates that nurses, even when they have collective bargaining, still have low supplier power (Sojourner, Frandsen, Town, Grabowski, & Chen, 2015).

As it was related to the bargaining power of buyers, there were some contradictory but significant findings. Contrary to our hypothesis, distressed nursing homes were more likely to be located in markets that had a lower county-level proportion of Medicaid-funded nursing home residents as compared to healthy nursing homes. One explanation is that in markets with fewer Medicaid-funded nursing home residents, there could be more private-pay individuals. Distressed nursing homes could be faced with additional financial/competitive pressures in these markets. In order to remain competitive, financially distressed nursing homes may have to increase operating costs, on items such as, marketing and other amenities in order to attract residents. While

healthy nursing homes may be able to afford these activities, distressed nursing homes may not be able to support these levels of increased expenses.

There was no difference as it related to percentage of Medicare MCOs penetration rate and financial distress. Even though Medicare MCOs can potentially lower reimbursements, this may be offset by the potential increased steering of Medicare participants; thus, this may explain why the percentage of Medicare MCO had no significant effect on these nursing homes (Chandra, Dalton, & Holmes, 2013).

The threat of substitutes had mixed results. Contrary to our hypothesis, distressed and risk-of-distressed nursing homes were less likely to be in markets with a greater supply of home health agencies as compared to healthy nursing homes. One possible explanation is that home-health agencies as profit-seeking organizations, may establish themselves in profitable markets where there is higher demand for post-acute services. This may explain the observed relationship between healthy nursing homes and a higher supply of home health agencies.

State HCBS expansion was not associated with the likelihood of financial distress. This variable was defined as any HCBS benefit expansion through 1915(i) SPA, 1915(c) waiver services, 1915(k), state plan personal care services, state plan home health, private duty nursing. It has been found that when states have modified or expanded their HCBS benefits, it has been done in a measured and deliberate fashion (Watts & Musumeci, 2018). Expansion does not mean that the states open up the proverbial flood-gates for people seeking care. Even under Medicaid HCBS waiver authority, states have used a range of cost containment strategies to meet federal cost neutrality requirements and

control state spending. This conservative approach may be explained by the fact that states are having to fund long-term care services. States that expanded access were also found to have incorporated some of the following cost containment strategies as well, waiting lists; financial and functional eligibility criteria; cost controls; self-direction, overtime rules; quality measures; waiver consolidation; and changes in response to the home and community-based settings rule (Watts & Musumeci, 2018). In 2016, sixty-three percent (32 of 51 states) applied cost controls, such as expenditure caps or hourly limits, to their home health state plan services (Watts & Musumeci, 2018). The incremental changes and expansions to states HCBS waivers were probably offset by some sort of continued cost containment strategy or practice.

The presence of CON laws was not significantly associated with nursing home financial distress. Similar research found that the repeal of CON and moratorium laws had no significant growth in either nursing home or long-term care Medicaid expenditures (Grabowski, Ohsfeldt, & Morrisey, 2003). Since the repeal of these laws were found to result in limited changes for nursing homes, it is not surprising that these laws had no significant impact on nursing home performance.

Industry rivalry, as conceptualized by nursing home excess capacity and the level of industry competition (Herfindahl Index) were found not to be significantly associated with financial distress. Both of nursing home excess capacity and industry competition, only captured the impact of direct competition and did not account for indirect competitors, such as, assisted living facilities. Perhaps in this current market, one has to look outside of direct competitors to capture the full-scope of industry rivalry.

Distressed and at-risk-of-distress nursing homes were found to have a higher percentage of Black residents, as compared to healthy nursing homes. This finding was concerning but not surprising given the documented racial disparities in long-term care (Chisholm, Weech-Maldonado, Laberge, Lin, & Hyer, 2013). Nursing homes located in areas with large minority populations have been found to have worse financial and operational performance (Angelelli, Grabowski, & Mor, 2006; Grabowski, 2004; Konetzka, Grabowski, Perraillon, & Werner, 2015; Smith, Feng, Fennell, Zinn, & Mor, 2007). Blacks are more likely to be placed in nursing homes that have greater financial vulnerability, lower levels of staffing and worse quality, as compared to Whites (Smith, Feng, Fennell, Zinn, & Mor, 2007). This finding has implications for equitable delivery of long-term care in nursing homes. Ownership, percent of Hispanic residents, average resident acuity, per capita income, percent of individuals over the age of 65 and rural/nonmetro/metro were not significantly associated with financial distress.

Surprisingly, there were only a few external market factors that had an impact on nursing home financial distress. When comparing the organizational to the market factors, the findings suggest that the competitive environment in which the nursing home is located has less of an impact on financial distress but instead it is the actual organizational characteristics that provide a better indication of nursing home performance.

LIMITATIONS

There are several potential issues, that we would like to address with this study. First, the dependent categorical variable, financial distress, risk-of-distress, and non-

distress, is the product of previous statistical analysis. In the original model, all of the financial data that was used to calculate the Z-Score came from Medicare Costs Reports. The use of this data has innate risks. There are cited concerns over the accuracy and reliability of the financial data (Magnus & Smith, 2000). Steps were taken to mitigate this risk through extensive data cleaning; however, this may have resulted in some unintended consequences, such as, lost observations. Another concern with using Medicare Cost Reports is that this data set will not have information on nursing homes that do not accept Medicare. Therefore, this study will exclude Medicaid dependent organizations. Based on a data review, this was a relatively small portion of analysis (566 organizations or 3.6% of the national sample); however, that will be a concern to be addressed in future research (CMS, 2015).

Another concern with the current study is that there are numerous factors that can impact an organization in the real world; however, it is not feasible to model all those factors. There was great effort to include all relevant variables and to use a sound theoretical basis for inclusion. Most of the organizational relationship variables were calculated on a county-level, perhaps more granular data and hierarchical modeling would have been allowed us to understand these relationships better. All data used is secondary data that has been collected by others, so there is the risk of missing and/or inaccurate data. This is simply an innate risk of secondary data.

CONCLUSION

The purpose of this paper was to explore the relationship between organizational and external market factors of competition and nursing home financial distress. These

findings will help provide greater insight into how the structure and magnitude of competition really impacts nursing homes. Nursing homes that are in financial distress have an increased likelihood of organizational failure and closure. If these organizations close, this can negatively impact resident's health, access, and the surrounding community. As the population continues to age, the dependency for nursing homes will grow. If policymakers want to intervene in financially distressed nursing homes prior to closure, they first need to understand the factors that are causing nursing homes to be in financial distress. This study provides clear insight into what external factors of competition were erroneous and what factors need to be addressed. In this study, it was found that the market level factors had less to do with financial distress as did the underlying organizational characteristics, such as, occupancy, race and payer-mix. By identifying the positive and negative internal and external factors, it may provide possible policymakers, practitioners and stakeholders a starting point in order to develop solutions to help provide relief to these distressed nursing homes.

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TABLES

Table 1: A listing of all variables used in the analysis along with definitions and sources.

Variable		Description	Data Source
Dependent Categorical Variable			
	Distressed Nursing Homes	Have a Z-Score of less than -0.1082	Medicare Cost Reports
	At Risk-of-Distress Nursing Homes	Have a Z score between -0.1081 and 0.7767	Medicare Cost Reports
	Healthy Nursing Homes	Have a Z score greater than 0.7768	Medicare Cost Reports
Independent Variables			
		Organizational	
H1	Nursing Home Occupancy	Percentage of occupied nursing home beds	LTCFocus
H2	Payer Mix: Percent Medicaid	Proportion of the facilities residents who are on Medicaid	LTCFocus
H3	Payer Mix: Percent Medicare	Proportion of the facilities residents who are on Medicare	LTCFocus
H4	Total Number of Nursing Home Beds	Total number of nursing home beds in a facility	LTCFocus
H5	Chain Affiliation (Chain Affiliated)	Indicates whether or not facility is part of a chain	LTCFocus

Variable		Description	Data Source
		Bargaining Power of Suppliers	
H6	Hospital Referral Power	# of Nursing Home beds in the county / # of Hospital beds per 1000 individuals over the age of 65 in the county	LTCFocus / Area Resource File
H7	Short-term Hospital Beds	# of short-term hospital beds per 1,000 individuals over the age of 65 in the county	Area Resource File
H8	Service Providers: RNs and LPNs	# of RNs and LPNs per 1,000 individuals over the age of 65 in the county	LTCFocus
		Bargaining Power of Buyers	
H9	County-level Proportion of Medicaid Funded Nursing Home Residents	Within the county the percent of nursing home residents who are funded through Medicaid	LTCFocus
H10	Medicare Managed Care Penetration	% of Medicare Advantage enrollees in a county	LTCFocus

Variable		Description	Data Source
		Threat of Substitutes	
H11	Prevalence of Home Health Agencies	Number of home health agencies in the county for every 1000 persons age 65 or older	LTCFocus
H12	HCBS Benefit Expansion	Reflects whether or not a state took regulatory action to expand the number of HCBS individuals served in the community (i.e. expanding the slots in existing 1915(c) waivers, implementing new 1915(c) waivers or implementing/expanding 1915(i) state plan amendments)	Kaiser Family Foundation: HCBS States
H13	Number of Hospital Based SNF Beds	Number of hospital-based SNFs in the county for every 1,000 individuals 65 and older	LTCFocus
		Threat of New Entrants	
H14	Certificate of Need Programs	Presence of state CON regulation	Certificate of Need State Laws
		Industry Rivalry	
H15	Nursing Home Excess Capacity	The proportion of empty beds in the county relative to the total number of nursing home beds	LTCFocus / Area Resource File
H16	Nursing Home Competition	As the total beds divided by the sum of all the county beds squared, and then this sum is divided by the sum of all county beds squared	LTCFocus / Area Resource File

Variable	Description	Data Source
Organizational: Control Variables		
Ownership (For-Profit)	Identifies whether a nursing home is for-profit	LTCFocus
Race/Ethnicity: % of Black Residents	Proportion of nursing home residents who are Black	LTCFocus
Race/Ethnicity: % of Hispanic Residents	Proportion of nursing home residents who are Hispanic	LTCFocus
Acuity Index	Average measure of the resident's level of care needed	LTCFocus
Market: Control Variables		
Per Capita Income	Measure of the average wealth of individuals in a county	Area Resource File
Percent of Individuals 65+	Proportion of all individuals who are 65 and older to the total population	Area Resource File
Rural / Nonmetro / Metro	Identifies if the nursing home is in an urban, nonmetro, or metro area	Area Resource File

Table 2: Descriptive and ANOVA Results of Distressed, Risk-of-Distress, and Healthy Nursing Homes (2000-2015)

	Distressed			Risk-of-Distress			Healthy			Degrees of Freedom within Groups	F	Prob> F	
	N	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**				
Dependent Variable													
Altman Z-Score	34,819	-0.493	0.380	96,584	0.277	0.239	35,865	1.277	0.431	167,265	270,000	0.000	***
Independent Variables													
Organizational Factors													
Nursing Home Occupancy	34,796	79.67	*15.73*	96,515	85.73	*12.53*	35,855	85.96	*12.13*	167,163	2980.52	0.000	***
Payer Mix: Percent Medicaid	34,819	66.86	*19.25*	96,584	62.92	*18.95*	35,865	61.76	*18.97*	167,265	737.37	0.000	***
Payer Mix: Percent Medicare	34,819	12.43	*11.16*	96,584	13.51	*11.21*	35,865	14.67	*11.78*	167,265	347.71	0.000	***
Total Number of Nursing Home Beds	34,819	108.26	*51.12*	96,584	110.76	*50.10*	35,865	111.29	*47.12*	167,265	48.99	0.000	***
Chain Affiliation (1=YES)	21,657	62%		52,805	55%		23,676	66%		167,265	814.37	0.000	***

*$p < 0.05$, **p < 0.01, ***p < 0.001

	Distressed			Risk-of-Distress			Healthy			Degrees of Freedom within Groups	F	Prob> F	
Independent Variables	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**				
Bargaining Power of Suppliers													
Hospital Referral Power	33,162	0.011	*0.04*	91,371	0.010	*0.03*	33,776	0.010	*0.03*	158,305	5.18	0.001	***
Availability of Short-Term Hospital Beds	34,819	20.09	*14.02*	96,580	19.59	*13.84*	35,850	19.89	*14.14*	167,246	18.22	0.000	***
Bargaining Power of Service Providers	34,819	7.03	*5.20*	96,580	6.91	*5.50*	35,850	6.61	*5.00*	167,246	60.04	0.000	***
Bargaining Power of Buyers													
County-Level Proportion of Medicaid-Funded Nursing Home Residents	34,819	64.27	*8.91*	96,582	63.72	*9.41*	35,858	63.54	*9.76*	167,256	61.23	0.000	***
% Medicare MCO Enrollees	34,803	19.00	*15.09*	96,508	18.86	*15.32*	35,819	18.40	*15.11*	167,127	16.18	0.000	***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Independent Variables	Distressed			Risk-of-Distress			Healthy			Degrees of Freedom within Groups	F	Prob> F	
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.				
Threat of Substitutes													
Prevalence of Home Health Agencies	34,819	0.27	*0.30*	96,580	0.26	*0.29*	35,850	0.29	*0.33*	167,246	118.3	0.000	***
State HCBS Benefit Expansion (1=YES)	15,833	45%		46,932	49%		18,032	50%		167,265	85.56	0.000	***
Number of Hospital Based SNFs	27,910	3.31	*5.83*	76,761	3.48	*6.29*	28,840	3.29	*5.99*	133,508	13.9	0.000	***
Threat of New Entrants													
Certificate of Need Presence	23,052	66%		66,355	69%		23,056	64%		167,265	126.55	0.000	***
Industry Rivalry													
Nursing Home Excess Capacity	34,819	0.18	*0.09*	96,581	0.16	*0.09*	35,858	0.17	*0.09*	167,255	602.08	0.000	***
Herfindahl Index	34,819	0.18	*0.23*	96,584	0.20	*0.23*	35,865	0.22	*0.24*	167,265	224.86	0.000	

*$p < 0.05$, **p < 0.01, ***p < 0.001

	Distressed			Risk-of-Distress			Healthy			Degrees of Freedom within Groups	F	Prob> F	
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.				
Control Variables													
Organizational Controls													
Ownership (For-Profit)	28,361	81%		72,682	75%		27,885	78%		167,265	285.2	0.000	***
Race/Ethnicity: % of Black Residents	19,717	20.18	*24.70*	57,145	14.84	*22.35*	20,703	13.71	*20.52*	97,562	514.56	0.000	***
Race/Ethnicity: % of Hispanic Residents	20,511	4.51	*12.93*	62,197	3.66	*12.08*	23,553	4.04	*13.53*	106,258	37.18	0.000	***
Acuity Index	34,819	11.43	*1.49*	96,584	11.45	*1.46*	35,865	11.49	*1.46*	167,265	16.62	0.000	***
Market Controls													
Per Capita Income	34,723	37,826	*10,865*	96,267	37,627	*10,790*	35,720	36,768	*10,024*	166,707	107.35	0.000	***
Percent of Individuals 65+	34,818	0.14	*0.04*	96,574	0.14	*0.04*	35,858	0.14	*0.04*	167,237	26.94	0.000	***
Rural (Ref)	1,103	3%		3,484	4%			1,416	4%	167,247	63.99	0.000	***
Nonmetro	7,792	22%		21,959	23%			9,005	25%				
Metro	25,923	74%		71,131	74%			25,437	71%				

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 3: Multinomial Logistic Regression with Relative Risk Ratios for Nursing Home Financial Distress:
Distressed as compared to Healthy
Risk-of-Distress as compared to Healthy

	Distressed vs. Healthy				Risk-of-Distress vs. Healthy			
	RRR	**Robust Std. Error**	**P> | z |**	**Sig**	**RRR**	**Robust Std. Error**	**P> | z |**	**Sig**
Organizational Variables								
Nursing Home Occupancy	0.955	0.002	0.000	***	0.992	0.002	0.000	***
Payer Mix: Percent Medicaid	1.012	0.002	0.000	***	0.999	0.002	0.547	
Payer Mix: Percent Medicare	0.992	0.003	0.006	**	0.992	0.002	0.000	***
Total Number of Nursing Home Beds	0.997	0.001	0.000	***	1.000	0.000	0.960	
Chain Affiliation (Chain Affiliated)	0.818	0.049	0.001	***	0.653	0.030	0.000	***
Market Variables								
Bargaining Power of Suppliers								
Hospital Referral Power	2.430	2.061	0.295		1.642	1.270	0.521	
Availability of Short-Term Hospital Beds	1.003	0.003	0.275		0.998	0.002	0.280	
Bargaining Power of Service Provider	0.997	0.008	0.636		1.000	0.006	0.994	

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

	Distressed vs. Healthy				Risk-of-Distress vs. Healthy			
	RRR	Robust Std. Error	P> | z |	Sig	RRR	Robust Std. Error	P> | z |	Sig
Market Variables								
Bargaining Power of Buyers								
County-Level Proportion of Medicaid-Funded Nursing Home Residents	0.991	0.004	0.027	*	1.003	0.003	0.344	
% Medicare MCO Enrollees	1.005	0.003	0.094		0.997	0.002	0.229	
Threat of Substitutes								
Prevalence of Home Health Agencies	0.717	0.081	0.003	**	0.806	0.068	0.011	*
State HCBS Benefit Expansion	1.040	0.058	0.496		0.974	0.042	0.524	
Number of Hospital Based SNFs	1.001	0.004	0.762		1.007	0.003	0.028	*
Threat of New Entrants								
Certificate of Need Presence	0.754	0.240	0.378		0.885	0.227	0.633	
Industry Rivalry								
Nursing Home Excess Capacity	1.313	0.585	0.487		0.944	0.312	0.862	
Herfindahl Index	0.867	0.156	0.428		0.838	0.109	0.175	

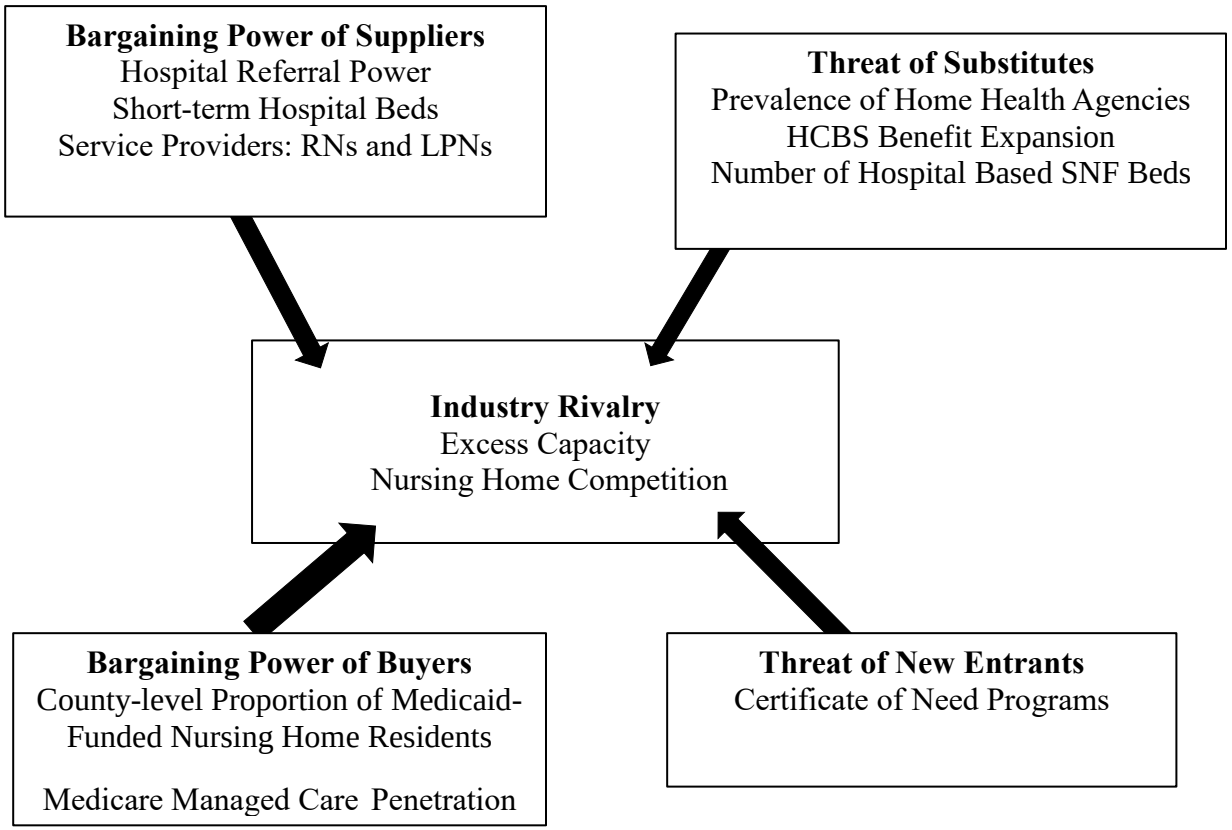
*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

	Distressed vs. Healthy				Risk-of-Distress vs. Healthy			
	RRR	Robust Std. Error	P> | z |	Sig	RRR	Robust Std. Error	P> | z |	Sig
Organizational: Control Variables								
Ownership (For-Profit)	1.058	0.084	0.468		1.040	0.063	0.514	
Race/Ethnicity: % of Black Residents	1.013	0.002	0.000	***	1.005	0.001	0.000	***
Race/Ethnicity: % of Hispanic Residents	0.997	0.003	0.228		0.997	0.002	0.234	
Acuity Index	1.001	0.018	0.963		0.997	0.014	0.875	
Market: Control Variables								
Per Capita Income	1.000	0.000	0.148		1.000	0.000	0.639	
Percent of Individuals 65+	0.493	0.534	0.514		0.561	0.454	0.475	
Rural (Ref)								
Nonmetro	0.818	0.106	0.12		0.897	0.087	0.254	
Metro	0.929	0.123	0.564		0.985	0.098	0.880	

*p < 0.05, **p < 0.01, ***p < 0.001

FIGURES

Figure 1: Porter's Five Forces of Competition



FROM THE CFO TO THE BED SIDE: AN EXAMINATION OF NURSING HOME FINANCIAL DISTRESS ON QUALITY

by

JUSTIN CALEB LORD

In Preparation for *Medical Care*

Format adapted for dissertation

PAPER 3

FROM THE CFO TO THE BED SIDE: AN EXAMINATION OF NURSING HOME FINANCIAL DISTRESS ON QUALITY

ABSTRACT

Objective: Nursing homes quality-of-care continues to be an area of focus and concern, as a disproportionate number of serious quality deficiencies still exist in nursing homes that have inadequate resources. The purpose of this paper is to explore the relationship between financially distressed nursing homes and resident's quality of care. This paper will utilize the Resource-Based View of the Firm theory and Donabedian's structure-process-outcomes framework to explore the relationship between nursing home financial distress and quality of care. This study is an extension of existing work in which the Altman Z-Score was used to classify nursing homes into three categorical financially distressed groups: distressed, risk-of-distress, and healthy nursing homes.

Data Source/Study Setting: This study utilizes six different sources: Medicare Cost Reports, Brown University's LTCFocus, Certification and Survey Provider Enhanced Reporting (CASPER), Online Survey Certification and Reporting (OSCAR), Nursing Home Compare, and the Area Resource File from 2000 through 2015. The final analytical sample for this study was 167,268 Medicare participating nursing homes. This study examined the relationship between the Donabedian's structure-process-outcomes

(SPO) variables and nursing home financial distress. The dependent SPO variables were conceptualized as structure (RN, LPN, and CNA staffing intensity and staffing mix of RNs); process (prevalence of catheters, percent of restraints, and the use of anti-psychotic medications), and outcomes (prevalence of contractures, prevalence of pressure ulcers/bed sores, and percentage of hospitalizations).

Study Design: Data were analyzed using a panel data linear regression with facility fixed effects (FE), robust clusters, year fixed effects to examine the relationship between the structure, process, and outcome (SPO) variables and a lagged independent categorical variable that identified financial distress.

Principal Findings: Nursing homes at risk-of-distress had higher RN staffing intensity (β=0.009); higher LPN staffing (β=0.008); CNA staffing (β=0.029), and RN staffing mix (β=0.003) as compared to distressed nursing homes. Healthy nursing homes had higher LPN staffing (β=0.015) and CNA staffing (β=0.044) as compared to distressed nursing homes. Joint tests found that nursing homes at risk-of-distress had higher RN staffing intensity and RN staffing mix as compared to healthy nursing homes, but that healthy nursing homes had higher levels of LPN and CNA staffing as compared to nursing homes at risk-of-distress. Healthy nursing homes had a lower use of restraints (β=-0.464) and lower prevalence of contractures (β=-0.010) as compared to distressed nursing homes. Nursing homes at-risk-distress had a lower prevalence of catheters (β=-0.210) as compared to distressed nursing homes.

Conclusions: Financial distress can have a significant impact on a nursing homes structures, processes and outcomes as compared to non-distressed nursing homes. The

findings suggest that increasing LPN and CNA staffing intensity may provide additional benefits to nursing homes, especially as it relates to manual processes. Healthy nursing homes had staffing models that reduced the cost of labor-intensive practices but increased direct care coverage. These findings will help policy makers and practitioners fully understand the impact that financial distress can have on a nursing home and what interventions are needed.

Keywords: financial distress; nursing homes; quality; Donabedian

INTRODUCTION

The delivery of high quality health care is important throughout all segments of the health care industry (Baldwin & Sohal, 2003; Derrett, Paul, & Morris, 1999; Keeler *et al.* 1992), yet it may be even a more important issue within the nursing home industry. On average, nursing home residents have less independence, more complex chronic health conditions, and poorer health as compared to other demographic groups (HHS, 2013; Sasson *et al.*, 2012). Due to the health of nursing homes residents, this population is already predisposed to having worse health outcomes (Sasson *et al.,* 2012). The vulnerable status of nursing home residents is why the focus and emphasis on delivering high quality care is so important in nursing homes.

The issue of quality within the nursing home industry has been a concern since it was first brought up in the Commission on Chronic Illness in 1956 (IOM, 1986). Multiple reports, inquires, committees have been commissioned to examine this issue throughout the years (GAO, 2003, 2007, 2008, 2015; IOM, 1986; Pizzo, Walker, & Bomba, 2014). Federal and state government agencies have implemented policies and new regulations, such as, minimum staffing requirements and public reporting tools, to improve nursing home quality (Li *et al.*, 2011). For the most part, these changes have resulted in improvements in nursing home quality as the number of number of serious deficiencies have decreased by 41% from 2005 to 2014 (GAO, 2015). However, while there has been a trend of quality improvement, there are still major quality gaps and deficiencies with nursing home quality that place residents in undue harm.

A disproportionate number of serious quality deficiencies still exist in nursing homes that have inadequate resources, such as, low levels/mix of staff and limited financial resources (Harrington *et al.,* 2012; GAO, 2015). These under-resourced nursing homes have not made improvements to the quality of care as equally or as consistently as other nursing homes (GAO, 2015). These differences in the availability of resources may arise from differences in the environment (Nyhan, Ferrando, & Clare, 2002). In 2004, Mor and colleagues, found that nursing homes with poor quality tended to have a higher Medicaid census, fewer nurses, and lower rates of occupancy. These nursing homes were also more likely to be located in poor communities with a larger minority population (Mor *et al.,* 2004). These nursing homes lack the resources to invest in their organizations and are at high risk of financial distress and/or closure (David *et al.,* 2007; Langabeer, 2006; Mor *et al.,* 2004). These closures can have negative consequences for the health of the residents, families of the residents, and the surrounding community (Castle, 2005b).

The existing literature on nursing home quality and financial performance is extensive. Within the nursing home industry, Weech-Maldonado and colleagues (2003a,b) used cross-sectional data to examine nursing home quality and nursing home financial performance. Rantz and colleagues (2004) examined the costs of care and resident outcomes in Missouri. Similarly, Mukamel and Spector (2000) studied 525 nursing homes in New York to see the relationship between nursing home costs and quality. Parker and Werner (2011) studied nursing home quality and financial performance as it related to changes in public reporting (i.e. Nursing Home Compare). Other studies have examined nursing home financial performance and quality of care but

in the context of ownership status (O'Neill, Harrington, Kitchener, & Saliba, 2005) and racial composition (Chisholm, Weech-Maldonado, Laberge, Lin, & Hyer, 2013). Recent work has examined the relationship between nursing home outcomes and financial performance (Weech-Maldonado, Pradhan, Dayama, & Lord, 2016). However, this study will provide a unique contribution to the existing literature by exploring the relationship of nursing home financial distress and quality.

The purpose of this paper is to explore the relationship between financially distressed nursing homes and resident's quality of care. This research on nursing home financial distress is important as it may provide some insight as to why there are disparities in access and quality care. Nursing homes that are in financial distress could disproportionately affect some of the sickest, frailest, financially, and socially vulnerable individuals in long-term care (Capezuti, Boltz, Renz, Hoffman, & Norman, 2006; Castle, 2005b). The examination of nursing home financial distress may enrich our understanding of the structures and process that contribute to poor health outcomes. These findings could inform state and federal policy makers and inform the development of better policies and regulations to ensure equitable health care for all.

BACKGROUND

The examination of financial distress and nursing home closures is important given the safety-net role that nursing homes have in providing care to vulnerable populations (HHS, 2013). Nursing home closures can have a major impact on the community and the residents (Grabowski, Feng, Intrator, & Mor, 2010; Sasson *et al.*,

2012). Residents at facilities that are at risk of closure and financial distress receive lower quality care and have worse health outcomes as compared to their counterparts in high-tiered facilities (Rahman & Foster, 2015). These low-tiered facilities lack the financial and organizational resources to invest in quality improvement or resident care. The delivery of poor quality can have cost implications for other sectors of the health care environment. Poor performing nursing homes often have higher rates of unnecessary hospitalizations due to avoidable health care mistakes (Gaugler, 2014). Addressing and correcting the quality deficiencies in the financially distressed nursing homes, not only can improve residents' health but help reduce unnecessary health care spending.

Measuring Financial Distress

The term financial distress is used to described an organization's financial state prior to insolvency or bankruptcy (Langabeer, 2006). Financial distress and organization failure often goes hand-in-hand. The identification of financially distressed nursing homes may be important as it relates to quality and health disparities. Over the years, there have been many models that have attempted to predict/identify organizations that are in financial distress (Blum, 1974; Hughes, 1993). One of the most widely utilized financial distress prediction models is Altman's Z-Score (1968). This model used multiple discriminate analysis (MDA) to examine multiple financial ratios: liquidity, profitability, efficiency, and productivity, simultaneously to predict the likelihood of an organizational financial distress (Altman, 1993). The Altman model will group

observations based on the probability of being in financial distress. In 1993, Altman adjusted the model to examine financial distress in general service organizations.

Financial distress in the nursing home industry had not been previously explored. Previous work by this author, was the first work to apply the Altman Z-Score within the nursing home industry to predict nursing home financial distress. We utilized the financial variables used in Altman's general service model, liquidity, efficiency, profitability and net worth. We also utilized longitudinal data from 2000-2015 for all Medicare participating nursing homes in the United States. After running the discriminant analysis, it was found that the discriminant function was highly significant ($p < 0.001$) with a canonical correlation of only 0.048 with an eigenvalue of 0.0023. Our revised four-variable "Z-score" model to predict financial distress in the nursing home industry is:

Z= 0.18(XI) + 0.30(X2) + 0.813(X3) + 0.143(X4) (Lord *et al.*, 2018)

In this model *Xl = working capital / total assets*; *X2 = retained earnings / total assets*; *X3 = earnings before interest and taxes / total assets*; *X4 = equity (book value) / total liabilities* and Z = overall index (Altman, 1993).

This model generated a Z-Score which was a composite financial variable that was the result of the discriminant function coefficients being multiplied to their respective financial variables, liquidity, profitability, efficiency and net worth. Once the Z-Score was created, k-means clustering, a form of vector quantization, was used to classify the latent variable into three categorical three groups, distressed, risk-of-financial distress and healthy. We established the following cut-points for nursing homes in regards to financial distress: financially distressed firms have a score of Z less than -

0.1082; firms that have the possibility of financial distress have a Z score of -0.1081 and 0.7767 and healthy firms have a Z score greater than 0.7768. This work provided a new tool in which to explore nursing home failure as it related to financial distress.

Financial performance is said to reflect the internal capabilities of the nursing home (Zinn *et al.,* 2009). One of the primary tenets of resource-based view is that it is the firm's resources and capabilities are the basis of competitive advantage for a firm within an industry (Peteraf & Barney, 2003). Nursing homes that are in distress, due to lack of resources, will lack the necessary resources to provide adequate resident care. Now we that we have a method to identify financial distress, we can explore the relationship between nursing home financial distress and resident's quality of care.

CONCEPTUAL FRAMEWORK

An internal resource is anything that could be thought of as a strength or a weakness of a given organization (Wernerfelt, 1984). Resources are the (tangible and intangible) assets that an organization possess (Caves, 1980). Resources are not only essential to organizational survival but they can be the basis of a competitive advantage (Peteraf, 1993; Peteraf & Barney, 2003). Resource-Based View of the Firm (RBV) finds that it is an organization's internal resources and capabilities that result in the success and failure of an organization (Hitt, Bierman, Shimizu, & Kochhar, 2001; Weech-Maldonado, Meret-Hanke, Neff, & Mor, 2004). Similarly, the Donabedian's structure-process-outcomes framework attributes positive health outcomes to the capabilities and resources

of the organization. The Donabedian framework provides a way to conceptualize a health care organization's internal resource.

Resource-Based View of the Firm

Resource-Based View (RBV) of the Firm is a theory that stipulates that superior performance is derived from organizational resources (Miles, 2012). Resources can be tangible and/or intangible. Not all organizational resources will contribute to an organizations sustainable competitive advantage (Helfat & Peteraf, 2003). For an organization to have a sustained competitive advantage, the resources possessed by the organization need to be rare, valuable, inimitable, non-tradable, and non-substitutable, as well as firm-specific (Barney, 1991). These resources cannot be easily bought, transferred, or copied, and simultaneously, they must add value to a firm while being rare. An organization's level of successes as compared to others, is based on its allocation and utilization of its unique resources and relationships (Rumelt, 1974). Differences in organizational performance are a result of the heterogeneity of the firm's assets (Helfat & Peteraf, 2003).

The underlying theory of RBV has been around for many years. Penrose (1959) laid the groundwork for the Resource-Based View of the Firm when she described organizations/firms as "a collection of productive resources" (Penrose, 1959). In this earlier conceptualization, she stated that the "firm was a collection of productive resources" both human and physical (Penrose 1959, 24). She emphasized the importance of the heterogeneous nature of an organization's resources, stating that "it is the heterogeneity, and not the homogeneity, of the productive services available or

potentially available from its resources that gives each firm its unique character" (Penrose 1959, 75). In 1984, Wernerfelt suggested that organizations are nothing more than a "bundle of resources" (Wernerfelt, 1984, 172). These resources included items, such as, but are not limited to, employees, relationships, brand names, distribution channels, technology, capital, skilled personal, efficient procedures, patents, and so on. In 1991, Barney further contributed to this idea of RBV, by providing further clarification on organizational performance, heterogeneous resources, and the relationship between the two. Barney also separated resources into three primary groups: physical capital resources, human capital resources, and capital systems. Within the physical capital resources, items such as, property plant and equipment, technology, and geographic location were included. Human capital resources included, employee knowledge, training, experience, relationships, and intelligence. Last was capital resources and this group contained items, such as, planning, systems, structures and relationships. A few years later, Peteraf (1993) suggested that for resources and capabilities to provide a competitive advantage, they must be unique to the industry and limit competition.

Organization's heterogeneity of unique resources and capabilities are acquired and cultivated through specific development, investment or other acquisition activities. These unique resources and capabilities are the foundation on which a sustainable competitive advantage is built (Peteraf, 1993; Peteraf & Barney, 2003). Sustainable competitive advantages will lead to superior organizational performance (Mahoney & Pandian, 1992). Superior performance does not happen by chance. Superior performance is likely to occur when the organization's resources and capabilities are aligned with environmental factors, strategic industry factors or characteristics of the

competitive environment (Amit & Schoemaker, 1993). Organizations that have a sustainable competitive advantage relative to their competitors typically have better than average financial performance (Hoopes, Madsen, & Walker, 2003). RBV is typically used to explore above-normal organizational and financial performance, yet, it can also be used to examine sub-par performance.

Organizational failure can occur when there is a misalignment between the organization's resources and capabilities and what the competitive environment requires (Thornhill & Amit, 2003). When this misalignment occurs, this can often lead to sub-par financial performance, bankruptcy, and even closure (Thornhill & Amit, 2003). RBV provides a theory to examine the relationship between internal resources and capabilities to the success or failure of the organization (Barney, 1991; Barney, Wright, & Ketchen, 2001; Heine & Rindfleisch, 2013; Mahoney & Pandian, 1992; Wernefelt, 1984). To fully explore how resources can impact organizational performance, the next section will introduce Donabedian's structure-process-outcomes framework and its relationship with RBV.

Donabedian's Structure-Process-Outcomes Framework

Donabedian's structure-process-outcome (SPO) framework views organizational outcomes, such as financial performance or quality, as stemming from the structures and processes of an organization (Donabedian, 1966). The underlying assumption of Donabedian's SPO framework is that when good structural inputs are in place, this will lead to better processes and ultimately better outcomes (Bostick *et al.*, 2006; Hillmer, Wodchis, Gill, Anderson, & Rochon, 2005; Sainfort, Ramsay, Ferreira, & Mezghani,

1994). This framework is comprised of three distinct but interrelated dimensions: structure (S), process (P) and outcomes (O) (Castle & Ferguson, 2010). This framework was developed in the 1960s and has been used extensively in the study of health care (Donabedian, 1980); efficient care delivery (Carey, 2003); quality performance (Chukmaitov *et al*., 2009); patient safety (Makary *et al*., 2006); readmission reduction (McHugh & Ma, 2013) and patient outcomes in nursing homes (Weech-Maldonado *et al*., 2004).

The Donabedian SPO framework attributes positive outcomes to the capabilities and resources of the organization. This aligns with the Resource-Based View of the Firm. RBV attributes variations in performance to differences in an organization's resources and capabilities (Hitt, Bierman, Shimizu, & Kochhar, 2001; Weech-Maldonado, Meret-Hanke, Neff, & Mor, 2004). It is an organization's unique and imitable resources and capabilities that are the basis for an organization to have a sustainable competitive advantage (Barney, 1991). We have conceptualized Donabedian's SPO framework to explore the relationship between financial distress and nursing homes' structures, processes, and outcomes. These relationships will be explored further in depth but have been summarized in the figure below.

Structure is defined as the environment where care is being provided and the attributes of the environment (Donabedian, 1966). The structure of the health care setting can have a direct influence on patient outcomes (Castle & Ferguson, 2010). Structural characteristics are considered necessary in the delivery of health care but not sufficient predictors of outcomes (Hearld, Alexander, Fraser, & Jiang, 2008). Structure can also refer to the professional and organizational resources associated with providing care

(Kane & Kane, 1988). Nursing homes are labor intensive and are an example of a service-focused industry (Naidu, 2009). Service focused organizations, differentiate their services based on their human-centered labor process and skills (Batt, 2002; Meyer, Skaggs, & Youndt, 2014).

Nurses represent the human capital of a nursing home, or more specifically the employee knowledge, expertise, experience, and intelligence (Hitt *et al.,* 2001; Weech-Maldonado *et al.,* 2004). It is this human element, nursing staffing, that is the critical, imitable, valuable resource in the nursing home industry. In nursing homes, structural indicators of quality have been conceptualized as the levels of nurse staffing and the skill mix (Binns, 1990; Weech-Maldonado *et al*., 2004; Hearld, Alexander, Fraser, & Jiang, 2008).

Nurses, such as RNs and LPNs, are the primary drivers of resident care within nursing homes. Research has found a positive association between nurse staffing levels (especially for registered nurses) and the processes and outcomes of care in nursing homes (Institute of Medicine, 1986, 2001; Weech-Maldonado *et al.,* 2004). The levels of nurse staffing intensity may be influenced by a desire to maximize quality or financial performance. Resources are scarce in financially distressed nursing homes, as such, staffing decisions may be made accordingly. Since RNs are more expensive to employ as compared to LPNs and CNAs, it is expected that distressed nursing homes will have fewer RNs, it is hypothesized that:

H1: Non-distressed nursing homes will have higher RN staffing intensity as compared to financially distressed nursing homes.

Nurse staffing levels (RNs, LPNs, CNAs) are important for resident quality. It is expected that nursing homes want to provide the best care possible. Strategic increases in nurse staffing hours has been associated with fewer nursing home deficiencies (Harrington *et al*., 2000), yet changes in staffing can result in higher expenses and decreased financial performance (Castle, Engberg & Men, 2007). Even though, LPNs and CNAs are less expensive to employee as compared to RNs, they are still an additional cost, therefore, it is hypothesized that:

H2: Non-distressed nursing homes will have higher LPN staffing intensity as compared to financially distressed nursing homes

H3: Non-distressed nursing homes will have higher CNA staffing intensity as compared to financially distressed nursing homes.

Nurse staffing mix has been found to have a significant impact on resident outcomes and processes of care (Bostick *et al.*, 2006; Konetzka, Stearns, & Park, 2008; Weech-Maldonado *et al.*, 2004). Worsening resident acuity, greater resident disabilities and more complex chronic conditions have made the delivery of quality resident care increasingly difficult (Feng, Grabowski, Intrator, & Mor, 2006; Mor, Gruneir, Feng, Grabowski, Intrator, & Zinn, 2011). As residents become harder to treat, the need for more skilled nurses, such as RNs, will become greater. RNs have a higher level of training and greater nursing expertise as compared to LPNs and CNAs (Coccia, & Cameron, 1999; Dellefield, Castle, McGilton, & Spilsbury, 2015; Harrington & Swan, 2003). The Institute of Medicine's Committee on the Adequacy of Nurse Staffing in Hospitals and Nursing homes called RNs ''essential'' to the delivery of resident's quality

of care (Kane, 1995). Higher RN staffing mix has been associated with various improvements in resident outcomes, including but not limited to, decreased prevalence of pressure ulcers, hospitalizations, catheterizations, and weight loss (Horn, Buerhaus, Bergstrom, & Smout, 2005). Even though RNs are associated with better resident outcomes - RNs are more expensive to employ relative to LPNs and CNAs. It is expected that financially distressed nursing homes will minimize the use of RNs relative to other nurses, it is therefore hypothesized that:

H4: Non-distressed nursing homes will have a higher nursing skill mix as compared to financially distressed nursing homes.

Processes refers to any actions that are directly performed to the patient and/or resident throughout the delivery of their care (El-Jardali & Lagace, 2005; Thomas, Hyer, Castle, Branch, Andel, & Weech-Maldonado, 2012). Processes are more direct indicators of quality because these are the actual activities performed by an organization. The presence of organizational processes cannot guarantee a quality outcome but they can increase the probability of success (Hearld, Alexander, Fraser, & Jiang, 2008). Organizational processes can be conceptualized as the specific treatments, interventions, services, or standards of care provided to the patient and/or resident. Processes assess what is being done and not necessarily the appropriateness of what is being done (Castle & Ferguson, 2010). Some processes are deemed proactive and good for the resident while others can often be an indicator of poor quality in nursing home care (Zinn, Brannon, & Weech-Maldonado, 1998). Processes reflect the level of interactions between the nursing staff and the residents (Eaton, 2000). The quality of care processes

examined here are all examples of poor quality processes: the use of catheters, restraints, and antipsychotic medications.

Urethral catheterization of nursing home residents has been used in previous research as an indicator of poor quality (Zinn, Brannon & Weech-Maldonado, 1998). Over the years, concerns have been raised that catheters were being used inappropriately for reasons of convenience, such as, to reduce the need to change wet bedding or clothing (Gurwitz *et al.,* 2016). The prolonged use of catheters has been found to place residents at greater risk for urinary tract infections (UTIs) and long-term complications, such as, renal failure (Ouslander & Kane, 1984). In addition to increasing risks of UTIs, catheters can restrict activities of daily living for residents because it provides another reason not to get them out of bed (Gurwitz *et al.,* 2016; Saint, Lipsky, & Goold, 2002). It is expected that poor structures will lead to poor processes of care. If nursing homes have inadequate staff, catheters could be used to make the nurses jobs easier because there would be fewer requests for assistance and less monitoring needed. Financially distressed nursing homes will lack the resources to invest in quality improvements or processes, it is therefore hypothesized that:

H5: Non-distressed nursing homes will have lower prevalence of urethral catheterization as compared to financially distressed nursing homes.

A restraint is any device or medication used to restrict a patient' movement (Agens, 2010). The use of physical restraints was meant to decrease the number of resident falls and injuries (Evans, Wood, & Lambert, 2003), yet, it had been cited as a factor in numerous deaths and injuries. As a result, the federal government has imposed

restrictions on their use (Evans, Wood, & Lambert, 2003). Many studies have examined the prevalence of physical restraints as an indicator of poorer quality (Castle & Anderson, 2011). There is little evidence to suggest that restraints were ever useful in a nursing home setting (Castle, 1998). Because the risks of restraining residents are greater than the benefits, this has lead researchers to conclude that restraints were being used because it was convenient for the staff and to control undesirable behavior (Castle, 1998, Coleman, 1993). Restraints have been thought of as substitutes for good clinical care and appropriate staffing (Phillips, Hawes, & Fries, 1993), therefore, it is hypothesized that:

H6: Non-distressed nursing homes will have fewer physical restraints as compared to financially distressed nursing homes.

Restraints can be physical and/or chemical. Concerns have been raised within the nursing home industry regarding the improper use of anti-psychotic medications given to control the residents as a chemical restraint (Agens, 2010; Chen, Briesacher, Field, Tjia, Lau, & Gurwitz, 2010; Kamble, Chen, Sherer, & Aparasu, 2009). In 2011, it was reported that nearly 19% of nursing home residents were given antipsychotic medications (CMS, 2016). The use of chemical physical restraints has been associated with increased reports of resident confusion, ulcers, falls, and longer lengths of stay (Evans, Wood, & Lambert, 2003; Frank, Hodgetts, & Puxty, 1996). Nursing homes that lack necessary structural resources, such as, adequate levels and skill mix of staff, may be more inclined to use processes that subdue and restrain residents, thus making it easier for staff, it is therefore hypothesized:

H7: Non-distressed nursing homes will use fewer antipsychotic medications as compared to financially distressed nursing homes.

Outcomes are defined as the states or levels of well-being which result from care processes (Donabedian, 1966). Donabedian's SPO framework stipulates that an organization's structures and processes will contribute to the level of outcomes (Weech-Maldonado *et al.*, 2004). Research has found that better structural variables, such as, higher nursing staff intensity and a higher skill mix has been associated with higher quality care outcomes, such as, better functional status (Cohen & Spector, 1996); fewer pressure sores (Weech-Maldonado *et al*. 2004); lower rates of hospitalization (Carter & Porell, 2003), and fewer facility deficiencies (Harrington, Zimmerman, Karon, Robinson & Beutel, 2000; Konetzka, Stearns, & Park, 2008). Financially distressed nursing homes are expected to lack the necessary resources to invest in their structures and processes, thus contributing to worse health outcomes. This paper has will selectively examine nursing home resident quality outcome indicators that are potentially avoidable if the proper delivery of care had been implemented.

Contractures are the abnormal muscle shortening and joint fixation often seen in individuals who are immobile or who have central nervous system disorders (Fergusson, Hutton & Drodge 2007). Contractures are a highly prevalent condition within nursing homes and are considered a measure of resident quality (Wagner, Capezuti, Brush, Clevenger, Boltz, & Renz, 2008). Contractures can form when residents do not receive the proper amount of physical exercise. The decrease in physical movement will lead to

muscle degeneration and increased stiffness in the joints. The development of contractures can often precede other negative health outcomes, such as, pressure ulcers, functional disability, infections, and discomfort (Kane *et al.,* 2007). Contractures have been found to be preventable with proper supervision and intervention. They have also been identified as an understudied measure of nursing home quality (Bowblis, Meng, & Hyer, 2013; Wagner & Clevenger, 2010). Federal rules state that residents who come to the facility without the condition (contractures) should not incur it, so the development of contractures during the nursing home stay is considered a poor-quality outcome (Wagner *et al.* 2008). The prevention of contractures occurs when nursing home staff properly exercise the residents. Financially distressed nursing homes may not have the necessary staff to ensure that residents are exercised and moved, it is therefore hypothesized that:
H8: Non-distressed nursing homes will have fewer contractures as compared to financially distressed nursing homes.

Pressure ulcers are a negative resident health outcome that often results in injuries to the skin and underlying tissue. Pressure ulcers form where the weight of a person's body presses the skin against a firm surface (like a bed) for a prolonged period of time. The pressure (from the body's weight) will temporarily cut off the skin's blood supply. This results in injuries to skin cells, which over time can result in pressure ulcers. Pressure ulcers are preventable. Movement is the way to prevent pressure ulcers. When people move, pressure is relieved and blood can flow back to the skin. Residents who remain in the same position for extended periods of time are likely to develop these pressure ulcers (Weech-Maldonado, Neff, & Mor, 2003). The prevalence of residents with pressure ulcers has been used as an indicator of nursing home quality (Ramsay,

Sainfort, & Zimmerman, 1995). If nursing home residents are immobile, the nurse staff has to come in periodically and move the resident. Prolonged failure to move the residents will result in pressure ulcers. The moving of residents requires staff time and effort. Financially distressed nursing homes may lack the appropriate staff to move residents in a timely manner, it is therefore hypothesized that:

H9: Non-distressed nursing homes will have fewer pressure ulcers as compared to financially distressed nursing homes.

On average, 25% of all nursing home residents have been hospitalized (Levinson & General, 2013). Hospitalizations not only have a high financial cost to Medicare but they impose a high personal cost on nursing home residents by increasing the risks of complications and infections (Ouslander *et al*., 2010). These hospitalizations often occur because of the limited physical health and multiple co-morbidities of the nursing home residents (Jones, Dwyer, Bercovitz, & Strahan, 2009), yet, many of these hospitalizations have been found to be potentially avoidable (Walsh, Freiman, Haber, Bragg, Ouslander, & Wiener, 2010). Some of the primary reasons for nursing home hospitalizations are things like electrolyte imbalance, respiratory infection, sepsis, and urinary tract infections. Most of these conditions could have been prevented with proper primary care (Kramer, Eilertsen, Goodrich, & Min, 2007; Bishop, Meagher, Perloff, & Zolotutsky, 2010; Walsh *et al*., 2010). For example, electrolyte imbalance can be avoided if the resident is closely monitored and assessed for intake and output of fluids. Properly trained medical and nurse staff should be able to identify, treat, and prevent these issues. A high number of hospitalizations is a sign of poor quality of care. It is expected that

financially distressed nursing homes will lack the appropriate skill mix and nurse staff to provide adequate attention and primary care to residents, it is therefore hypothesized that:

H10: Non-distressed nursing homes will have lower rates of hospitalizations as compared to financially distressed nursing homes.

METHODS

Data

This study utilizes six different sources: Medicare Cost Reports, Brown University's LTCFocus, Certification and Survey Provider Enhanced Reporting (CASPER), Online Survey Certification and Reporting (OSCAR), Nursing Home Compare, and the Area Resource File from 2000 through 2015. Medicare Cost Reports provides financial data for nursing homes that participate in the Medicare program. Brown University's LTCFocus is an amalgamation of multiple sources of data, including the Minimum Data Set, CMS's Nursing Home Compare, Area Resource File, Bureau of Labor Statistics, Residential History File, OSCAR/CASPER and state policy surveys that collects organizational and market factors regarding nursing homes. This dataset captures items, such as but not limited to, resident demographics, quality, acuity, staffing, reimbursement rates, state policies, market, and organizational variables.
CASPER (Certification and Survey Provider Enhanced Reporting) replaced the OSCAR (Online Survey Certification and Reporting) data set in 2012. This data set contains nursing home operational characteristics and aggregate patient characteristics for each facility. Nursing Home Compare provides nursing home inspection results, staffing

levels, enforcement actions as well as resident quality and assessments. The Area Resource File (ARF) data set contains county- level information on socio-economic status, population demographics and environmental characteristics for a county (HRSA, 2011).

Sample

This sample consisted of all Medicare participating nursing homes in the United States from 2000 through 2015. There were 255,269 nursing home observations in this sample. First, we excluded nursing homes with no ARF data and those that that did not report any Medicare financial data (n = 54,403). Second, all financial variables (33 financial variables) that were classified as extreme outliers (n = 5,280) were dropped. Third, the data was additionally cleaned by examining each financial variable and computed variable per year and then dropping the observations with financial variables that were ±5 standard deviations from the mean (n =28,318). This left an analytical sample of 167,268 nursing home observations or an average of 10,454 nursing homes per year.

Variables

A listing of all of the dependent, independent and control variables can be found in Table 1. This table lists each variable used in this study and notes the definition and source of each.

Dependent variable. The dependent variables used in this study were identified using Donabedian's structure-process-outcomes framework.

Structure has four hypotheses, RN staffing intensity (H1), LPN staffing intensity (H2), CNA staffing intensity (H3), and staffing mix of RNs (H4). The RN staffing intensity (H1) was calculated as the number of RN hours per resident day. LPN staffing intensity (H2) was calculated as the number of LPN hours per resident day. CNA staffing intensity (H3) was calculated as the number of CNA hours per resident day. RN staffing mix (H4) was calculated as the ratio of full-time RNs divided by the number of full-time LPNs and full-time RNs.

Process has three hypotheses, prevalence of catheters (H5), percent of restraints (H6), and the use of anti-psychotic medications (H7). Prevalence of catheters (H5) was calculated as the proportion of residents at the first of the month who are using a catheter. Percentage of restraints (H6) was calculated as the proportion of residents who were restrained at the time of the annual survey. The utilization of anti-psychotic medications (H7) was calculated as the total number of anti-psychotic medications prescribed divided by the total number of residents.

Outcome has three hypotheses, prevalence of contractures (H8); prevalence of pressure ulcers/bed sores (H9) and percentage of hospitalizations (H10). The prevalence of contractures (H8) was calculated as the total number of contractures reported at the annual survey, less the number of contractures that the resident had prior to being admitted to the nursing home, divided by the total number of residents. The prevalence of pressure ulcers/bed sores (H9) was calculated the same way as the prevalence of

contractures. The percent of hospitalizations (H10) was calculated as the number of total hospitalizations during the year, divided by every 365 nursing home resident days.

Main Independent Variable. The main independent categorical variable in this analysis was calculated using the Altman Z-Score. The dependent variable in this analysis was a categorical variable that grouped nursing home observations as financially distressed, risk-of-distress, and healthy. In order to do this, we used multiple discriminate analysis (MDA) and a financial model proposed by Altman (1968). The purpose of multiple discriminant analysis (MDA) is to successfully predict a single qualitative variable from one or more independent variable(s). The four financial variables specified by the Altman model were liquidity (M = 0.07, SD = 0.45), profitability (M = 0.23, SD = 0.72), efficiency (M = 0.04, SD = 0.31) and net worth (M = 1.51, SD = 2.70). Using the discriminant function standardized coefficients, the Altman Z-Score was calculated. The Altman Z-Score is a latent variable formed by the linear combination of the dependent variables (X_1, X_2, X_3 and X_4). The weights that are assigned to each independent variable are referred to as canonical discriminant function coefficients.

$$F = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

$$F = \beta_0 + (0.18 * \text{Liquidity}) + (0.30 * \text{Profitability}) + (0.81 * \text{Efficiency}) + (0.14 * \text{Net Worth}) + \varepsilon$$

The cutoff scores to group firms "at risk-of-distress" are as follows: financially distressed firms have a score of Z less than -0.1082; firms that have the possibility of distress have a Z score of -0.1081 and 0.7767 and healthy firms have a Z score greater than 0.7768.

Control variables. Organizational and market level control variables were also included in the analysis. The organizational control variables were occupancy rate, size, chain affiliation, ownership, and average acuity of the resident. *Occupancy rate* is the percentage of occupied nursing home beds. As the occupancy rate decreases, nursing homes will have less revenue, which ultimately can impact the ability of the nursing home to provide quality care. *Size* will capture the total number of beds within the nursing home. Due to economies of scale and shared efficiencies, it is expected that larger nursing homes will have better quality. *Chain affiliation* reflects whether the nursing home is part of a chain. It is expected that nursing homes that are part of chain will have greater access to resources (i.e. staff, training) and have better quality. This variable will be dichotomized as (0=not part of a chain; 1=yes, part of a chain). *Ownership* is a dichotomous variable that identifies whether a nursing home is for-profit (0 = not for-profit; 1= for-profit). *Acuity Index* is an average measure of the resident's level of care needed. This measure is based on the number of residents needing various levels of assistance with mobility, activities of daily living (ADL), special treatments, as well as, the proportion of residents that are bedfast, exhibit dementia and who require assistance with ambulation or transfers. Quality may be affected by the level of resident acuity.

The market control variables included, per capita income, percent of adults over the age of 65, the Herfindahl index and rural/nonmetro/metro. *Per capita income* is a measure of the average wealth of individuals in a county. Higher per capita income is an indication of environmental munificence. *Percentage of individuals 65 years and older*

is simply referring to all individuals who are 65 and older, divided by the total population. *Industry Rivalry* will be captured using the Herfindahl-Hirschman Index. This is the which is a measure of nursing home concentration/competition in the county. This is a continuous variable that ranges from 0 to 1. The closer to 1, the less competitive the market for nursing homes. The closure to 0, the more competitive the market is. *Rural/nonmetro/metro* variable was included to capture the difference between rural, nonmetro, metro. Rural is the reference category.

Analysis

This study utilized panel data linear regression with facility fixed effects (FE), robust clusters, year fixed effects to examine the relationship between the structure, process, and outcome (SPO) variables and a lagged independent categorical variable that identified financial distress. FE focuses on within-facility variations, as such, it controls for time-invariant unobservable variables that may explain between-facility differences (Allison, 2005; Wooldridge, 2015). Robust-cluster was used to address any remaining within-group correlation. Year fixed effects will control for time trend.

The dependent variables explored in this analysis are based on Donabedian's structure, process, and outcome variables. There is a separate regression model for each dependent variable (total of 10 regression models). The main independent variable of interest, will be the categorical financial distress variable that groups nursing home observations as financially distressed, risk-of-distress, and healthy, with distress as the reference category. The organizational and control variables will be included as well. The main independent variable, financial distress, will be a lagged for one year to better

assess the relationship of changes in financial performance and the changes within the nursing home (Park & Werner, 2010). Stata 14 was used for the statistical analysis. Statistical tests were evaluated at the 0.05 level of significance.

The general regression model specification for the "i"th nursing home (facility), and the "t" is the year.

$$Y_{it}\,(\text{Quality}) = \beta_0 + \beta_1(\text{Financial Distress}_{i\,t-1}) + \beta_2(\text{Occupancy}_{it}) + \beta_3(\text{Size}_{it}) + \beta_4(\text{Chain Affiliation}_{it}) + \beta_5(\text{Ownership}_{it}) + \beta_6(\text{Acuity Index}_{it}) + \beta_7(\text{Per Capita Income}_{it}) + \beta_8(\%\text{ of Older Adults in County}_{it}) + \beta_9(\text{Industry Rivalry}_{it}) + \beta_{10}(\text{Rural / Nonmetro / Metro}_{it}) + \beta_{11}(\text{Year Dummy Variables}_{it}) + \beta_{12}(\text{Facility Dummy Variables}_{it}) + ų\,(\text{Year}_t) + ų\,(\text{Facility}_i) + \varepsilon_{it,}$$

whereas, Yit (Quality)= Structure (RN staffing intensity; LPN staffing intensity; CNA staffing intensity; RN staffing mix), Process (prevalence of catheters; percent of restraints; use of anti-psychotic medications), and Outcomes (prevalence of contractures; prevalence of pressure ulcers/bed sores; percentage of hospitalizations).

RESULTS

Based on the Altman Z-score methodology, the nursing home observations were classified into three groups: financially distressed (n = 34,819), risk-of-distress (n = 96,584) and healthy (n = 35,865). The descriptive statistics for the dependent and independent variable by financial group are presented in Table 2. In addition, the tests of significance, one-way ANOVA for continuous variables and Chi-square for categorical

variables, that were used to explore the relationships of the independent variables and the nursing home groups are also presented in Table 2.

Bivariate Results

For the structure variables, distressed nursing homes had significantly higher RN staffing intensity as compared to healthy nursing homes. However, there was not a significant difference in distressed nursing homes (M=0.36, SD=0.48) RN staffing intensity as compared to nursing homes at risk-of-distress (M=0.36, SD=0.38). Distressed nursing homes had significantly higher LPN staffing intensity as compared to healthy and risk-of-distress nursing homes. Distressed nursing homes had significantly higher CNA staffing intensity as compared to healthy nursing homes. However, there was not a significant difference in distressed (M=2.23, SD=0.99) nursing homes CNA staffing intensity as compared to nursing homes at risk-of-distress (M=2.23, SD=0.82). Distressed nursing homes had significantly lower RN staffing mix as compared to healthy and risk-of-distress nursing homes.

For the process variables, distressed nursing homes prevalence of catheters was significantly higher as compared to healthy nursing homes. However, distressed nursing homes (M=7.86, SD=7.94) prevalence of catheters was not significantly different as compared to risk-of-distress (M=7.70, SD=7.49) nursing homes. Distressed nursing homes had significantly higher use of restraints as compared to healthy and at risk-of-distress nursing homes. Distressed nursing homes had significantly higher use of anti-psychotic medications as compared to healthy nursing homes. However, distressed nursing homes (M=22.93, SD=17.72) use of anti-psychotic medications was not

significantly different as compared to nursing homes at risk-of-distress (M=22.97, SD=18.45).

For the outcome variables, distressed nursing homes prevalence of contractures was significantly lower as compared to healthy nursing homes. However, there was not a significant difference between distressed (M=0.34, SD=0.33) nursing homes prevalence of contractures as compared to nursing homes at risk-of-distress (M=0.34, SD=0.32). Distressed nursing homes prevalence of pressure ulcers/bed sores was not significantly different as compared to healthy and at risk-of-distress nursing homes. Distressed nursing homes had significantly higher rate of hospitalizations as compared to healthy and risk-of-distress nursing homes.

For the organizational control variables, distressed nursing homes had significantly lower occupancy as compared to healthy and risk-of-distress nursing homes. Distressed nursing homes had significantly fewer beds as compared to healthy nursing homes. However, distressed nursing homes (M=108, SD=47) total beds were not significantly different as compared to risk-of-distress (M=111, SD=51). Chain-affiliation was significantly higher for distressed nursing homes as compared to healthy nursing homes. Distressed nursing homes for-profit status was significantly higher as compared to healthy and at risk-of-distress nursing homes. Distressed nursing homes had significantly lower resident acuity as compared to healthy and risk-of-distress nursing homes. For the market control variables, distressed nursing homes were in markets with higher per capita income as compared to healthy and risk-of-distress nursing homes. Distressed nursing homes were in markets with a lower percentage of elderly as

compared to healthy and at risk-of-distress nursing homes. Distressed nursing homes were in more competitive markets as compared to healthy and risk-of-distress nursing homes.

Linear Regression Results

Regression results are shown in Table 3. In terms of the structural variables, all of the hypotheses were either fully or partially supported by the data, H1 (RN staffing intensity), H2 (LPN staffing intensity), H3 (CNA staffing intensity), and H4 (RN staffing mix). For H1, nursing homes at risk-of-distress nursing homes had higher RN staffing intensity ($\beta = 0.009$, $p < 0.001$) as compared to distressed nursing homes. RN staffing intensity was not statistically different in healthy nursing homes as compared to distressed nursing homes. Joint tests showed that risk-of-distress nursing homes had higher RN staffing intensity as compared to healthy ($F(2, 13{,}861) = 13.45$, $p < 0.001$). For H2, both healthy ($\beta = 0.015$, $p < 0.001$) and risk-of-distress ($\beta = 0.008$, $p < 0.01$) nursing homes had higher LPN staffing intensity as compared to distressed nursing homes. In addition, joint tests showed that healthy nursing homes had higher LPN staffing as compared to those at risk of distress ($F(2, 13{,}861) = 7.58$, $p < 0.01$). For H3, both healthy ($\beta = 0.044$, $p < 0.001$) and risk-of-distress ($\beta = 0.029$, $p < 0.001$) nursing homes had higher CNA staffing intensity as compared to distressed nursing homes. Once again, joint tests showed that healthy nursing homes had higher CNA staffing as compared to at risk-of-distress ($F(2, 13{,}861) = 14.67$, $p < 0.001$). H4 (RN staffing mix) was partially supported. For H4, risk-of-distressed nursing homes had higher RN staffing mix ($\beta = 0.003$, $p < 0.01$) as compared to distressed nursing homes. On the other hand,

distressed and healthy nursing homes did not have a statistically significant difference as it related to RN staffing mix. Joint tests found that risk-of-distress nursing homes had higher RN staffing mix as compared to healthy nursing homes ($F(2, 13{,}861) = 8.34$, $p < 0.01$).

For the process variables, two of the three hypotheses were partially supported by the data, H5 (the prevalence of catheters) and H6 (use of restraints). Risk-of-distressed nursing homes had lower prevalence of catheters ($\beta = -0.210$, $p < 0.05$) as compared to distressed nursing homes. The prevalence of catheters was not statistically different in healthy nursing homes as compared to distressed nursing homes. The use of restraints (H6) was partially supported. Healthy nursing homes had significantly less use of restraints ($\beta = -0.464$, $p < 0.001$) as compared to distressed nursing homes. There was no statistically significant difference in the use of restraints in distressed nursing homes as compared to nursing homes at risk-of-distress. The use of anti-psychotic medications (H7) was not supported. There was no significant difference in the use of anti-psychotic medications in distressed nursing homes as compared to healthy and risk-of-distress nursing homes.

For the outcome hypotheses, only one hypothesis, H8 the prevalence of contractures (H8) that was partially supported. Healthy ($\beta = -0.010$, $p < 0.05$) nursing homes had lower rate of contractures as compared to distressed nursing homes. There was no statistically significant difference in the prevalence of contractures between risk-of-distress and distressed nursing homes. The prevalence of pressure ulcers (H9) and hospitalizations (H10) were not supported. In both of these hypothesis, healthy and risk-

of-distress nursing homes were not statistically different as compared to distressed nursing homes.

DISCUSSION

This study examined how financial distress impacts nursing homes structure, process, and outcomes. It was hypothesized that nursing homes in financial distress would have worse health outcomes as compared to healthy and risk-of-distressed nursing homes. Distressed organizations lack the necessary organizational resources to survive, so it was hypothesized that they would lack the necessary resources to provide adequate resident care. These findings provided greater insight into how financial distress truly impacts nursing homes.

Nursing homes at risk-of-distress had higher levels of RN staffing intensity as compared to distressed nursing homes. RNs are associated with better processes and resident outcomes (Weech-Maldonado *et al.*, 2004). Nursing homes at risk-of-distress had more resources as compared to distressed nursing homes. These resources allowed risk-of-distress nursing homes to have higher levels of nurse staffing. However, there was no difference in RN staffing intensity between healthy and distressed nursing homes. Risk-of-distress nursing homes had higher RN staffing intensity as compared to healthy nursing homes.

Both healthy and risk-of-distress nursing homes had higher levels of LPN staffing and CNA staffing as compared to distressed nursing homes. However, healthy nursing homes had higher LPN and CNA staffing as compared to risk-of-distress nursing homes. Having an adequate number of nurses, regardless of skill mix, is essential for patient and resident safety (Harrington, Schnelle, McGregor, & Simmons, 2016). Increased staffing

levels of LPNs and CNAs have been shown to improve functional status as measured by activities of daily living (Cohen and Spector, 1996). Increases in total nurse staffing have been found to be negatively associated with total deficiencies, quality of care deficiencies, and serious deficiencies (Kim, Kovner, Harrington, Greene, & Mezey, 2009). Even CNAs have been found to improve nursing home quality. Hyer and colleagues found that a positive relationship between higher CNA staffing levels and lower deficiency scores (Hyer, Thomas, Branch, Harman, Johnson, & Weech-Maldonado, 2011). One of the key factors associated with improving quality is addressing inadequate nurse staffing levels (Harrington, Schnelle, McGregor, & Simmons, 2016).

Nursing homes at risk-of-distress had higher levels of RN staff mix as compared to distressed nursing homes. However, there was no difference in RN staffing mix between healthy and distressed nursing homes. While RNs are associated with improvements in quality they are also more expensive (RNs average salary is $68,450 compared to LPNs average salary of $44,090 and CNAs average salary of $26,590) (Bureau of Labor Statistics, 2016). Risk-of-distress nursing homes were found to have higher RN staffing intensity and RN nurse skill mix as compared to healthy nursing homes. Healthy nursing homes had higher LPN and CNA staffing intensity as compared to nursing homes at risk-of-distress. Healthy nursing homes were not statistically different in RN staffing intensity and RN skill mix as compared to distressed nursing homes. This suggests that healthy and risk-of-distress nursing homes have different cost structures and staffing philosophies. But more importantly, healthy nursing homes are possibly more efficient in their RN staff intensity and RN skill mix as compared to

nursing homes at risk-of-distress. Healthy nursing homes had staffing models that reduced the cost of labor-intensive practices but increased direct care coverage. Risk-of-distressed nursing homes had higher cost structures but were less efficient and effective in their processes and outcomes as compared to healthy nursing homes, this may highlight why these nursing homes are at risk of financial distress.

As it related to the process variables, the findings were mixed. Nursing homes at risk-of-distress had a lower prevalence of catheters as compared to distressed nursing homes. This may be associated with the risk-of-distress nursing home's processes. These organizations had a higher level of RN staff intensity and RN staffing mix as compared to distressed nursing homes. These additional RNs may be the key in reducing the use of catheters as compared to distressed nursing homes. RNs may be more aware that the dangers associated with catheter-acquired urinary infection (CAUTI) (Lo *et al.*, 2014) and how preventable they are (Meddings, Rogers, Macy, & Saint, 2010; Umscheid, Mitchell, Doshi, Agarwal, Williams, & Brennan, 2011). There was no statistically significant difference in the use of catheters in healthy nursing homes as compared to distressed nursing homes. In the healthy nursing homes, there were similar rates of RN staffing as compared to distressed nursing homes. It is possible, that despite the known risks associated with catheters, distressed and healthy nursing homes may lack the appropriately trained staff to effectively reduce this practice (AHRQ, 2017; Gurwitz *et al.*, 2016; Harrington, Carrillo, & Garfield, 2015).

Financially healthy nursing homes had significantly less use of restraints as compared to distressed nursing homes. There was no significant difference in restraints

between risk-of-distress and distressed nursing homes. Restraints, while potentially harmful to the resident, can make the delivery of care easier for nurses. Restraints have been referred to as a substitute for appropriate staffing (Phillips, Hawes, & Fries, 1993). If a resident is restrained, the nurses on call do not have to worry about the resident wandering off or falling down and hurting themselves. Healthy nursing homes had greater LPN/CNA staffing intensity than both distressed and at-risk-of-distress nursing homes. CNAs are responsible for the majority of direct care of residents and their presence (Bowblis, 2011). It is possible that the use of restraints be particularly sensitive to higher use of direct care workers, such as CNAs.

There was no significant difference in the use of anti-psychotic medications in healthy or risk-of-distress nursing homes as compared to distressed. A possible explanation, is that there have been changes in medical practices that have impacted all nursing homes with lower rates. Anti-psychotic medications have to be prescribed by someone on the medical staff (Williams & Edwards, 2015). In 2005, the FDA issued a public health advisory to alert consumers and providers that anti-psychotics have been associated with increased mortality when used to treat behavioral disorders in elderly patients with dementia (CMS, 2013). After the FDA warning, the Office of the Inspector General addressed the overuse of anti-psychotics in nursing facilities (Levinson, 2011). CMS also launched an initiative to safeguard nursing facility residents from unnecessary antipsychotic medication use. These actions and others may have been enough to result in changed behaviors for most all medical providers. In 2010, the rate of antipsychotic medications was 39% in nursing homes (MDS, 2012; Rigler *et al.*, 2013). As of 2013, the rate of antipsychotic use fell to 20.75% (CMS, 2014).

As it related to resident outcomes, only the prevalence of contractures was found to differ between healthy and distressed nursing homes. Residents develop contractures when they are not moved or exercised properly (Selikson, Damus, & Hamerman, 1988; Wagner *et al.*, 2008). Within a nursing home, various levels of staff can help residents properly stretch and exercise but it is often seen as an aside rather than a central tenet of nursing home care (Remsburg, Armacost, Radu, & Bennett, 2001; Wagner *et al.*, 2008). CNAs are responsible for the majority of direct care of residents (Bowblis, 2011). Healthy nursing homes had greater LPN/CNA staffing intensity than both distressed and at-risk-of-distress nursing homes. Healthy nursing homes also had lower use of physical restraints. Contractures may be particularly sensitive to the higher presence of direct care workers, such as CNAs.

There was no significant difference in the prevalence of contractures between risk-of-distress and distressed nursing homes. Range of motion exercises are an important countermeasure to the development of contractures. It has been found that in a nursing home, instead of making restorative nursing care a priority for all nursing staff, it often becomes the responsibility of one nursing assistant rather than all the nurses (Wagner *et al.*, 2008). In nursing homes at risk-of-distress there were more highly skilled nurses, but fewer LPNs/CNAs as compared to healthy nursing homes. Restorative nursing care is more likely to be handled by direct-care workers like CNAs. Therefore, the lower levels of CNAs may explain the non-significant relationship.

The prevalence of pressure ulcers and percentage of hospitalizations were found not to be significantly different in healthy and at risk-of-distress nursing homes as

compared to distressed. Pressure ulcer reduction has been a top priority in health care for at least 40 years (Bergstrom & Horn, 2011). The focus has worked, a study by Li and colleagues, suggests that overall pressure ulcer rates in the United States among high-risk individuals in nursing homes have decreased between 2003 and 2008 (Bergstrom & Horn, 2011; Li, Yin, Cai, Temkin-Greener, & Mukamel, 2011). Due to the increased national focus on pressure ulcer prevention this may explain why there was not a significant difference in the prevalence of pressure ulcers across all the nursing home groups. There was no statistically significant difference in hospitalizations as it related to nursing home groups. The mean resident acuity index was similar for distressed, risk-of-distress, and healthy nursing homes. We had hypothesized that financially distressed nursing homes would have increased hospitalizations due to poor structure and processes of care; however, this was not found to be the case.

LIMITATIONS

There are several potential issues, that we would like to address with this study. First, the financial data that was used to calculate the Z-Score came from Medicare Costs Reports. The use of this data has innate risks. There are cited concerns over the accuracy and reliability of the financial data (Magnus & Smith, 2000). Steps were taken to mitigate this risk through extensive data cleaning; however, this may have resulted in some unintended consequences, such as, lost observations. Another concern with using Medicare Cost Reports is that this data set will not have information on nursing homes that do not accept Medicare. Therefore, this study will exclude Medicaid dependent organizations. Based on a data review, this was a relatively small portion of analysis

(566 organizations or 3.6% of the national sample); however, that will be a concern to be addressed in future research (CMS, 2015).

This study utilized OSCAR/CASPER data for some of the nurse staffing variables, and while this data is widely used in the literature (Grabowski *et al.* 2004; Castle, 2009), there are cited concerns about the accuracy of this data. The staffing data reported in OSCAR/CASPER is self-reported and only collected for only a 2-week period at the time of the annual survey. Additionally, this data is generally not audited by surveyors. It is possible that some nursing home facilities may increase their staff during the period around the survey, to overstate actual staffing to make themselves look favorable (Harrington, Zimmerman, Karon, Robinson, & Beutel, 2000). In the future, it may be valuable to explore payroll data to get a better understanding of nursing homes true staffing models.

Another concern with the current study is that there are numerous factors that can impact resident's health outcomes; however, it is not feasible to model all those factors. There was great effort to include all relevant variables and to use a sound theoretical basis for inclusion. All data used is secondary data that has been collected by others, so there is the risk of missing and/or inaccurate data. This is simply an innate risk of secondary data.

CONCLUSION

Nursing homes provide residents with long-term health, personal and supportive services to meet the needs of frail older individuals and disabled adults (Harris-Kojetin *et al.*, 2013; HHS, 2013). Residents of nursing homes typically have limited capacity for self-care because of a chronic illness; injury; physical, cognitive, or mental disability; or

other health-related conditions (HHS, 2013). Since nursing home residents are at higher risk due to health complications and limited independence, the issue of delivering high quality care is a critical issue (Sasson *et al.*, 2012). This issue because increasingly important when examining residents in financially distressed nursing homes.

The purpose of this paper was to explore the relationship between financial distress in nursing homes and a nursing homes' structure, process and outcomes. We believe this study provided unique insight, into how an organization's unique and imitable resources and capabilities can ultimately impact organizational performance. We found that financial distress is associated with lower quality in terms of quality and volume of nurse staffing, restraints, and contractures. However, we were very interested in the findings between risk-of-distress and healthy nursing homes, especially as it relates to direct care workers. The findings suggest, that increasing LPN and CNA staffing intensity may provide additional benefits to nursing homes, especially as it relates to manual processes. But more importantly, this may be a cost-effective strategy that could be more widely adopted. Healthy nursing homes had staffing models that reduced the cost of labor-intensive practices but increased direct care coverage.

This study of nursing home financial distress is important because it may highlight some of the reasons why there are disparities in access and quality care. Nursing home financial distress has the potential to disproportionately affect some of the sickest, frailest, financially and socially vulnerable individuals in long-term care (Castle, 2005). This examination of nursing home financial distress may provide insight into some of the quality deficiencies found in nursing homes. Policymakers should monitor financial distress of nursing homes given its implications for quality of care. The

identification of financially distressed nursing homes, may help policy-makers better tailor interventions to prevent nursing home closures because if nursing homes are ‘safety net’ institutions or ‘care-takers of last resort’ – then what happens when these facilities close (Bowblis, 2012).

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TABLES

Table 1: A listing of all variables used in the analysis along with definitions and sources.

Variable		Description	Data Source
Dependent Variable(s)			
Structure			
H1	RN Staff Intensity	Number of RN hours per resident day	LTCFocus
H2	LPN Staffing Intensity	Number of LPN hours per resident day	LTCFocus
H3	CNA Staffing Intensity	Number of CNA hours per resident day	
H4	RN Staffing Mix	Ratio of full-time RNs divided by number of full-time RNs and LPNs	LTCFocus
Process			
H5	Prevalence of Catheters	Proportion of residents at the first of the month who are using a	LTCFocus
H6	Use of Restraints	Proportion of residents who were restrained at the time of the annual	LTCFocus
H7	Use of Anti-psychotic Medications	Total number of anti-psychotic medications prescribed divided by the total number of residents	OSCAR/CASPER

Variable		Description	Data Source
Dependent Variable(s)			
Outcomes			
H8	Prevalence of Contractures	Total number of contractures reported at the annual survey, less the number of contractures that the resident had prior to being admitted to the nursing home, divided by the total number of residents	OSCAR/CASPER
H9	Prevalence of Pressure Ulcers/Bed sores	Total number of pressure ulcers reported at the annual survey, less the number of pressure ulcers that the resident had prior to being admitted to the nursing home, divided by the total number of residents	OSCAR/CASPER
H10	Percentage of Hospitalizations	Number of total hospitalizations during the year, divided by every 365 nursing home resident days	LTCFocus
Main Independent Variable: Categorical			
	Distressed Nursing Homes	Have a Z-Score of less than -0.1082	Medicare Cost Report
	At Risk-of Distress Nursing Homes	Have a Z-Score between -0.1081 and 0.7767	Medicare Cost Report
	Healthy Nursing Homes	Have a Z-Score greater than 0.7768	Medicare Cost Report

Variable	Description	Data Source
Organizational: Control Variables		
Nursing Home Occupancy	Percentage of occupied beds	LTCFocus
Total Number of Nursing Home	Total number of nursing home beds in a facility	LTCFocus
Chain Affiliation (Chain	Indicates whether or not a facility is part of a chain	LTCFocus
Ownership (For-Profit)	Indicates whether a nursing home is for-profit	LTCFocus
Acuity Index	Average measure of the resident's level of care needed	LTCFocus
Market: Control Variables		
Per Capita Income	Measure of the average wealth of individuals in a county	Area Resource File
Percent of Individuals 65+	Proportion of all individuals who are 65 and older to the total population	Area Resource File
Herfindahl Index	The total number of beds divided by the sum of all the county beds squared, and then this sum is divided by the sum of all county beds squared	Area Resource File
Rural / Nonmetro / Metro	Identifies if the nursing home is in an rural, nonmetro, or metro area	Area Resource File

Table 2: Descriptive and ANOVA Results of Distressed, Risk-of-Distress, and Healthy Nursing Homes (2000-2015)

	Distressed			Risk-of-Distress			Healthy			Degrees of Freedom within Groups		
	N	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**		**F**	**Prob> F**
Dependent Variable(s)												
Structure												
RN Staff Intensity	34,813	0.36	*0.48*	96,576	0.36	*0.38*	35,862	0.34	*0.32*	167,248	61.73	0.000 ***
LPN Staffing Intensity	34,776	0.82	*0.67*	96,551	0.78	*0.48*	35,857	0.76	*0.40*	167,181	121.24	0.000 ***
CNA Staffing Intensity	34,735	2.23	*0.99*	96,493	2.23	*0.82*	35,853	2.17	*0.74*	167,078	68.23	0.000 ***
RN Staffing Mix	34,816	0.29	*0.19*	96,579	0.31	*0.19*	35,863	0.30	*0.18*	167,255	157.81	0.000 ***
Process												
Prevalence of Catheters	6,173	7.86	*7.94*	16,447	7.70	*7.49*	5,941	7.38	*7.56*	28,558	6.49	0.002 **
Use of Restraints	34,819	6.12	*8.79*	96,584	5.34	*8.13*	35,865	5.17	*7.98*	167,265	144.5	0.000 ***
Use of Anti-psychotic Medications	25,246	22.93	*17.72*	71,061	22.97	*18.45*	26,210	21.55	*16.56*	122,514	63.36	0.000 ***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

	Distressed			Risk-of-Distress			Healthy			Degrees of Freedom within Groups		
	N	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**	**N**	**Mean**	**Std. Dev.**		**F**	**Prob> F**
Dependent Variable(s)												
Outcomes												
Prevalence of Contractures	24,808	0.34	*0.33*	70,015	0.34	*0.32*	25,861	0.35	*0.32*	120,681	4.63	0.010 **
Prevalence of Pressure Ulcers/Bed sores	23,914	0.47	*0.32*	67,535	0.47	*0.32*	24,865	0.47	*0.32*	116,311	1.16	0.313
Percentage of Hospitalizations	32,127	0.98	*0.65*	89,310	0.94	*0.69*	33,368	0.95	*0.56*	154,802	33.64	0.000 ***
Dependent Variable(s)												
Altman Z-Score	34,819	-0.493	0.380	96,584	0.277	0.239	35,865	1.277	0.431	167,265	270,000	0.000 ***

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

	Distressed			Risk-of-Distress			Healthy			Degrees of Freedom within Groups		
	N	Mean	Std. Dev.	N	Mean	Std. Dev.	N	Mean	Std. Dev.		F	Prob> F
Organizational: Control Variables												
Nursing Home Occupancy	34,796	79.67	*15.73*	96,515	85.73	*12.53*	35,855	85.96	*12.13*	167,163	2980.52	0.000 ***
Total Number of Nursing Home Beds	34,819	108.26	*47.12*	96,584	110.76	*51.12*	35,865	111.29	*47.12*	167,265	48.99	0.000 ***
Chain Affiliation (Chain Affiliated)	21,657	62%		52,805	55%		23,676	66%		167,265	814.37	0.000 ***
Ownership (For-Profit)	28,361	81%		72,682	75%		27,885	78%		167,265	285.2	0.000 ***
Acuity Index	34,819	11.43	*1.49*	96,584	11.45	*1.46*	35,865	11.49	*1.46*	167,265	16.62	0.000 ***
Market: Control Variables												
Per Capita Income	34,723	37,826	*10,865*	96,267	37,627	*10,790*	35,720	36,768	*10,024*	166,707	107.35	0.000 ***
Percent of Individuals 65+	34,818	0.14	*0.04*	96,574	0.14	*0.04*	35,858	0.14	*0.04*	167,237	26.94	0.000 ***
Herfindahl Index	34,819	0.18	*0.23*	96,584	0.20	*0.23*	35,865	0.22	*0.24*	167,265	224.86	0.000 ***
Rural (Ref)	1,103	3%		3,484	4%		1,416	4%		167,247	63.99	0.000 ***
Nonmetro	7,792	22%		21,959	23%		9,005	25%				
Metro	25,923	74%		71,131	74%		25,437	71%				

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

Table 3: Panel Data Linear Regression with Fixed Effects, Robust Clusters, and Year Fixed Effects for Distressed and Risk-of-Distressed Nursing Homes (2000-2015)

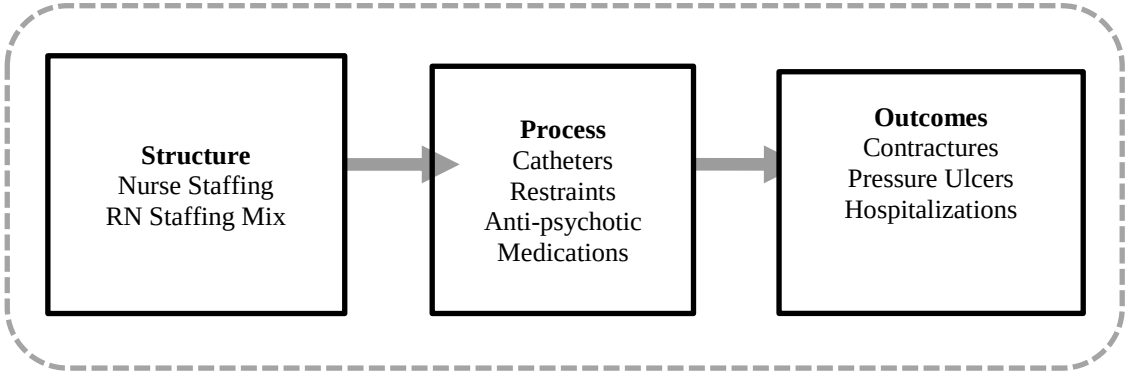
	Healthy				**Risk-of-Distress**			
	Coef.	Robust Std. Err.	p > | t |	Sig	Coef.	Robust Std. Err.	p > | t |	Sig
Structure								
RN Staff Intensity	0.005	0.003	0.093		0.009	0.002	0.000	***
LPN Staffing Intensity	0.015	0.004	0.000	***	0.008	0.003	0.004	**
CNA Staffing Intensity	0.044	0.008	0.000	***	0.029	0.006	0.000	***
RN Staffing Mix	0.000	0.002	0.791		0.003	0.001	0.004	**
Process								
Prevalence of Catheters	-0.126	0.120	0.293		-0.210	0.092	0.023	*
Use of Restraints	-0.464	0.097	0.000	***	-0.101	0.072	0.159	
Use of Anti-psychotic Medications	-0.125	0.124	0.313		-0.145	0.098	0.138	
Outcomes								
Prevalence of Contractures	-0.010	0.004	0.025	*	-0.003	0.003	0.304	
Prevalence of Pressure Ulcers/Bed sores	-0.002	0.004	0.679		-0.001	0.003	0.756	
Percentage of Hospitalizations	0.007	0.006	0.247		0.001	0.004	0.826	

Results adjusted for occupancy, facility size, chain-affiliation, ownership, resident acuity, per capita income, % of individuals 65 years and older, Herfindahl Index, rural/nonmetro/metro

*$p < 0.05$, **$p < 0.01$, ***$p < 0.001$

FIGURE

Figure 1: Donabedian's Structure, Process, Outcomes Framework



CONCLUSION

The purpose of this study, consisting of three distinct papers, was to satisfy gaps in the current literature and broaden our knowledge regarding financial distress within the nursing home industry. This was the first study to utilize the Altman Z-Score within the nursing home context. Once nursing homes were classified according to likelihood of financial distress, we were able to study the organizational and environmental factors that facilitate financial distress, as well as, the impact that financial distress has on nursing home's structures, processes, and outcomes.

Summary of Findings

The purpose of the first paper was to apply the Altman Z-Score to predict nursing home financial distress. The Altman-Z Score, a financial distress prediction model, had been used to identify financially distressed organizations in other industries but never within the nursing home area (Altman, 1968; Mossman, Bell, Swartz & Turtle, 1998). Given the historic rate of nursing home closures, the turbulent environment, and shifting demographic trends, we felt as if it were important to identify nursing homes that were in financial distress (KFF, 2013).

The Altman Z-Score model used multiple discriminate analysis (MDA) to examine multiple financial ratios (liquidity, efficiency, profitability and net worth) simultaneously to predict the likelihood of a firm's financial distress. This study utilized data from three different sources but primarily from Medicare Cost Reports. The sample

of Medicare participating nursing homes in the United States from 2000 to 2015, resulted in a final analytical sample of 167,268 nursing home observations. We used the financial variables identified by Altman, liquidity, profitability, efficiency and net worth. When the variables were entered stepwise into the multiple discriminant analysis model, it was determined that net worth did not contribute significantly to the discriminating power of the model. The model produced a discriminant function which was then clustered into three groups: distressed, risk-of-distress and healthy groups. We created cutoff scores to group firms "at risk-of-financial distress" are as follows: financially distressed firms have a score of Z less than -0.1082; firms that have the possibility of financial distress have a Z score of -0.1081 and 0.7767 and healthy firms have a Z score greater than 0.7768. After the cut-points were established, these cut-points were used to assess how well they reflected actual nursing home closure. At the time of event (closure), the distressed groupings accurately classified 56% of the closures.

This first paper was important because it provided a model to identify nursing homes that are in financial distress. This paper was the first foray into the exploration of financial distress within the nursing home industry. This provides an unique opportunity to develop and grow this stream of research. The Altman Z-Score model is not the only financial distress prediction model in the literature. Also, given the fact that net-worth did not contribute to the discriminating power of this model, this provides opportunities to explore other financial variables and models.

The second paper built off of the findings from the first paper to explore the organizational and environmental factors associated with nursing home financial distress. Nursing homes operate in an increasingly challenging and competitive environment.

These changes make it increasingly difficult for nursing homes to obtain the necessary resources that are needed to survive and thrive. Existing research has underlined the importance of organizational factors on nursing home survival and financial performance (Castle, Engberg, Lave, & Fisher, 2009; Zinn & Mor, 1998; Weech-Maldonado *et al.* 2012). The use of Resource Dependency Theory in conjunction with Porter's Five Forces of Competition helped explain organizational performance differences, stemming from changes in the environment, and provide a theoretical understanding of organizational failure (Starkey, Weech-Maldonado, & Mor, 2005). This study wanted to provide a better understanding of what organizational and environmental factors have a role in financial distress.

The second paper used seven different sources: Medicare Cost Reports, Brown University's LTCFocus, Certificate of Need State Laws, Certification and Survey Provider Enhanced Reporting (CASPER), Online Survey Certification and Reporting (OSCAR), Kaiser Family Foundation: HCBS States, and the Area Resource File from 2000 through 2015. The final analytical sample for this study was 167,268 Medicare participating nursing homes. This study examined the relationship of distressed, risk-of-distress, and healthy nursing homes and organizational and environmental variables. The nursing home organizational factors were occupancy, payer-mix, size and chain affiliation. The market factors were conceptualized as the bargaining power of suppliers (hospital referral power, availability of short-term hospital beds, and bargaining power of service providers); the bargaining power of buyers (county-level proportion of Medicaid-funded nursing home residents and Medicare MCO market penetration); threat of substitutes (prevalence of home health care agencies; HCBS expansion, and number of

hospital-based SNFs); threat of new entrants (Certificate of Need presence), and industry rivalry (nursing home excess capacity and Herfindahl Index). Data were analyzed using multinomial logistic regression, with healthy nursing homes as the reference dependent variable, robust clusters at the provider id and year and state fixed effects.

This second paper found that the organizational level variables, had a significant impact on nursing home financial distress. Distressed nursing homes had lower occupancy, less Medicare, and were more likely to be free-standing as compared to healthy and at risk-of-distressed nursing homes. Additionally, distressed nursing homes had a significantly higher percent of Medicaid residents but fewer beds as compared to healthy nursing homes. As it related to the market factors, the only hypothesis that was partially supported was that risk-of-distressed nursing homes were in markets with a greater number of hospital-based SNF beds as compared to healthy nursing homes. The other findings were significant but contrary to what was hypothesized. Distressed nursing homes were more likely to be found to be in counties of lower Medicaid concentration. Nursing homes at risk-of-distress and distressed were less likely to be located in markets with home health agencies. Lastly, distressed and risk-of-distressed nursing homes had significantly higher percentages of Black residents as compared to healthy nursing homes. These findings were important because it highlighted that it was the organizational level variables that had the most impact as it related to nursing home financial distress.

The third paper examined nursing home structures, processes, and outcomes as it related to nursing home financial distress. This paper emphasized the impact that

financial distress can have on resident quality-of-care. It had been reported that a disproportionate number of serious quality deficiencies existed in nursing homes that had inadequate resources. It was for this reason, that the identification of those under-resourced nursing homes was so important. This paper utilized the Resource-Based View of the Firm theory and Donabedian's Structure, Process, Outcomes (SPO) framework to explore the relationship between nursing home financial distress and quality of care.

This study utilizes six different sources: Medicare Cost Reports, Brown University's LTCFocus, Certification and Survey Provider Enhanced Reporting (CASPER), Online Survey Certification and Reporting (OSCAR), Nursing Home Compare, and the Area Resource File from 2000 through 2015. The final analytical sample for this study was 167,268 Medicare participating nursing homes. The dependent SPO variables were conceptualized as structure (RN, LPN, and CNA staffing intensity and staffing mix of RNs); process (prevalence of catheters, percent of restraints, and the use of anti-psychotic medications), and outcomes (prevalence of contractures, prevalence of pressure ulcers/bed sores, and percentage of hospitalizations). Data were analyzed using a panel data linear regression with facility fixed effects (FE), robust clusters, year fixed effects to examine the relationship between the structure, process, and outcome (SPO) variables and a lagged independent categorical variable that identified financial distress.

This third paper found that nursing homes at risk-of-distress had higher RN, LPN, and CNA staffing intensity as well as, higher RN staffing mix as compared to distressed nursing homes. Healthy nursing homes had higher LPN staffing and CNA staffing as

compared to distressed nursing homes. Healthy nursing homes had a lower use of restraints (a process variable) and lower prevalence of contractures (outcome) as compared to distressed nursing homes. Nursing homes at-risk-distress had a lower prevalence of catheters as compared to distressed nursing homes. These findings showed how the financial state of a nursing home can impact the resident of the nursing home. Financially distressed nursing homes had lower levels of nurse staff and nurse skill mix. This resulted in less than worse processes and health outcomes. This research was important because it showed the relationship between outcomes and financial distress. However, this work leaves plenty of opportunities to further this stream of research and focus on additional health outcomes or new models.

These three papers represent a unique contribution to the existing literature. The preceding papers explored the causes and consequences of nursing home financial distress. The findings from these papers have academic and practical significance. Practitioners and policy makers could benefit from being able to identify nursing homes in financial distress before they actually fail. Secondly, since we identified some of the organizational and environmental factors associated with nursing home distress, interventions could be developed to help prevent nursing home failure. Examining the negative impact that distress has on resident quality of care could help strengthen this argument.

Policy Implications

The primary purpose of using the Altman Z-score is to detect financial distress. The practical implication of this model is that it could help policymakers regularly check

the financial condition of nursing homes to identify organizations that are at risk of failure (Calandro, 2007). The findings from the third paper, found that distressed nursing homes had worse process and outcomes as compared to non-distressed nursing homes. This model could also be used as a risk indicator of quality.

The second paper identified the organizational characteristics associated with financial distress. The findings suggest that underlying characteristics, such as, occupancy, race, payer-mix, bed size, and chain affiliation were significantly associated with financial distress. This should be troubling to policy-makers that race and Medicaid were associated with distress. There is already documented inequity within the health care system. With the changing socio-economic and demographic trends of nursing home residents – these issues will only become more prevalent (Feng *et al.*, 2011). Since the demographics of nursing homes are shifting more to minority residents this may exasperate existing financial conditions and lead to increased health care disparities (Feng *et al.*, 2011).

Lastly, the identification of distressed nursing homes could provide opportunities to address wasteful spending in the healthcare environment. The third paper found that financially distressed nursing homes had worse quality as compared to risk-of-distress and healthy nursing homes. State or local governments, if they wanted to, could provide targeted interventions to these distressed nursing homes to help reduce the poor health outcomes like hospitalizations. Even small investments, in direct care workers (i.e. LPNs and CNAs) could have a significant impact in improving processes and resident outcomes.

Managerial Implications

The Altman Z-score model has managerial implications because it can be utilized as a comprehensive tool to assess the financial condition of an organization. The Altman Z-Score is more effective than simply looking at financial ratios by themselves. It is possible that typical profitability or cash flow ratios do not provide the big picture necessary to foresee declining financial health. Nursing homes that are in distress or at risk-of-distress could use this to try to find alternative strategies, business opportunities to turn things around.

Future Research

From an academic perspective, this work provides the first foray into an under-researched area of the health services literature. Personally, I believe that this initial research will provide future research opportunities to expand and build on this work. For example, there are other financial distress models cited in the literature. The exploration of nursing home financial distress could benefit from the application of these models in this context. This work did not explore the changing demographics and utilization patterns in distressed nursing homes. Given the racial inequities in our health care system, it would be interesting to explore the relationship between race and financial distress. Distressed nursing homes had worse quality outcomes, I would like to expand this and explore the cost implications of this poor quality. If the cost associated with poor quality is too high, this may create a business case for intervention. The exploration of distressed nursing homes and the competitive environment could be explored again, as there are other long-term competitors (i.e. assisted living communities) that were

excluded from this study. This research could benefit from mixed-methods perspective as it relates to financial distress and closure. In communities with distressed nursing homes, it would be beneficial to explore how that closure would impact the community. This may provide greater understanding on health care deserts and the implications of nursing home death spiral.

There is a need for more research into nursing home financial distress. The need for nursing home care will increase as baby-boomers continue to age. Nursing home utilization is estimated to almost double from current levels. However, it is a different population who are utilizing nursing homes today. More minorities are utilizing nursing homes as the percent of Whites continue to fall. Despite this potential demand, nursing homes continue to close (National Center for Health Statistics, 2015). This poses a problem as it relates to nursing homes access and equity (Sade, 2012). Nursing homes that are in financial distress are at increased likelihood of failure. This work has highlighted that distressed nursing homes have higher percentage of Black residents and worse health outcomes. Given that we are aware of this inequity and inequality, are we ok with allowing it to continue?

The study of nursing home financial distress is important because it highlights reasons why there are disparities in access and quality care. Nursing home closures have the potential to disproportionately affect some of the sickest, frailest, financially and socially vulnerable individuals in long-term care (Castle, 2005b). If nursing homes are 'safety net' institutions or 'care-takers of last resort' – then what happens when these facilities close (Bowblis, 2012). These three papers can help identify nursing homes that are in distress, explain why they are distressed and how that distress impacts residents.

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APPENDIX

APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL

THE UNIVERSITY OF ALABAMA AT BIRMINGHAM
Institutional Review Board for Human Use

DATE: March 3, 2017

MEMORANDUM

TO: Justin Caleb Lord
Principal Investigator

FROM: Cari Oliver, CIP
Assistant Director
Institutional Review Board for Human Use (IRB)

RE: Request for Determination – Not Human Subjects Research
IRB Protocol **N170214006 - Organizational Failure - Causes and Consequences: An Examination of the Nursing Home Industry**

A member of the Office of the IRB has reviewed your Application for Not Human Subjects Research Designation for above referenced proposal.

The reviewer has determined that this proposal is **not** subject to FDA regulations and is **not** Human Subjects Research. Note that any changes to the project should be resubmitted to the Office of the IRB for determination.

470 Administration Building
701 20th Street South
205.934.3789
Fax 205.934.1301
irb@uab.edu

The University of
Alabama at Birmingham
Mailing Address:
AB 470
1720 2ND AVE S
BIRMINGHAM AL 35294-0104