ESSAYS ON HEALTH CARE POLICIES: MARKET CONDITIONS, QUALITY OF CARE, AND MEDICAID PARTICIPATION

by

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Every ambition needs priceless sacrifices, behind the ambitions; there are passionate parents, who believed in it, and a wonderful caring wife who supported it.

Every achievement involves great risks, behind the achievement; a brother, a sister and a friend who cheered for it.

To those who sacrificed and cheered for my ambition and my achievement; This dissertation is dedicated to you.

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ABSTRACT

Despite the many benefits of federal and state regulation to the society, regulations may be counterproductive to economic development objectives across the United States. The purpose of this dissertation is to inform policymakers of the impact of CON law on market conditions and share the results of policies imposed on a sector of health care, specifically the nursing home industry. The certificate-of-need requirements in the nursing home industry represent a challenging set of regulations for potential firms as well as the already existing nursing homes in a given market. Many scholars believed that the CON Regulation limits competition and prevents the growth of the nursing home industry through a decrease in the number of beds. In studying the effects of this regulation, I examined the outcome of the Certificate of need (CON) regulations on the nursing home industry from different perspectives.

The first chapter examines the factors that influence the number of nursing homes, occupancy rates, and the occurrence of over-bedding. The study shows that the Certificate-of-Need laws imposed some restriction on the number of nursing homes. The data was extracted from the Centers for Medicare and Medicaid Services including types of nursing homes in CON states and non-CON states. The sample covered 2334 counties or 75 percent of all counties in the contiguous states for 2012, 2013, and 2014. Precisely, the findings show that the Certificate-of-Need regulation is associated with a lower number of nursing homes, while no impact is shown for the case of occupancy rates. However, CON laws were slightly reducing the over-bedding occurrence.

The second chapter shows the impact of CON laws on quality of care in the nursing homes industry. The quality dilemma resulted in a massive empirical literature investigating the quality differences between the nursing homes by comparing ownership types. The existing work highlighted the empirical studies are inconsistent, where previous literature depends exclusively on dummy variables rather than quantifiable measures of quality to capture the effects of cost-control regulations. Using a variety of data sources and different model specifications that account for endogeneity. The study investigates the impact of implementing the certificate-of-need laws on the quality of service in for-profit nursing homes. The findings of this study suggest that nursing homes in the CON states tend to reduce their costs by hiring less skilled nurses and through scheduling fewer hours for LPNs and more hours for CNAs.

The third chapter focuses on the grey area of the effect of operational characteristics and service provider's type on the participation of the nursing homes into Medicaid. To investigate how Medicaid Participation varies across all types of ownership and within all markets. The logistic regression model is used to find the determining factors of participation. In this analysis, many indicators were incorporated, and they were stemming from health factors, ownership types, and performance-based characteristics. The findings of this study suggest that for-profit nursing homes, specifically individually owned nursing homes, tend to have higher a probability of participation in Medicaid than any other type of ownership. From the operational perspective, a one-unit increase in nurse staffing hours was found to be associated with an increase in the probability of becoming a Medicaid participant by 2.3 percentage points.

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LIST OF ABBREVIATIONS

2SLS   Two-Stage Least Squares

ACS   American Community Survey

CDF   Cumulative Distribution Function

CFP   Conditions for Participation

CHPSA   Comprehensive Health Planning and Services Act

CMS   Centers for Medicare and Medicaid Services

CNA   Certified Nurse Assistant

CON   Certificate-of-Needs

CT   Computed Tomography

EHR   Electronic Health Records

ETR   Entry-Threshold-Ratio

FMAP   Federal Medical Assistance Percentages

FP   For-Profit

ICF   Intermediate Care Facility

LLC   Limited Liability Company

LPN   Licensed Practitioner Nurse

LRA	Logistic Regression Analysis
MR	Mental Retardation
NB	Negative Binomial
NFP	Not-For-Profit
NMES	National Medical Expenditure Survey
NNHS	National Nursing Home Survey
OR	Probability Ratio
PET	Positron Emission Tomography
PT	Physical Therapist
QM	Quality Measurement
RAI	Residents Assessments Instruments
RN	Registered Nurse
SNF	Skilled Nursing Facility

CHAPTER I

THE EFFECT OF THE CERTIFICATE-OF-NEED REGULATIONS ON MARKET CONDITIONS: EVIDENCE FROM THE NURSING HOME INDUSTRY

1. Introduction

Federal and state regulations are daunting challenges in many industries. A 2014 report by the National Association of Manufacturers estimated that federal regulations cost American businesses an estimated $2.028 trillion in 2012 (Crain and Crain, 2014). A prior report by the Small Business Administration had estimated the annual costs of regulation at about $1.75 trillion in 2008 (Heinzerling and Ackerman, 2012). Despite the many benefits of federal and state regulation to the society, the numbers above could mean that regulations may be counterproductive to economic development objectives across the United States.

Two opposing views exist, arguing for higher regulation or against it. On one hand, greater regulation can be perceived as a value-enhancing tool. Proponents of this view maintain that regulation is a necessary tool that helps to boost quality service provision by the affected firms (Shapiro, 1989). On the other hand, greater regulation can be seen as an unnecessary barrier to market entry. This study seeks to tease out the effects of regulation on market size, occupancy rates and the impact of certificate-of-need laws on the occurrence of over-bedding.

In this investigation, I utilize a sample of firms from the healthcare industry, specifically nursing homes, in which they provide homogenous services across the industry. States have used CON to shape the nursing home market for almost 30 years. The introduction of certificate-of-need (CON) came mainly to limit the excessive growth of medical facilities and limit over-

investments. CON laws were adopted to contain costs and distribute accessibility by requiring the regulatory approval of the regional agencies before the establishment of a new health care provider or the expansion of an existing health care facility or service.[1] The act of 1974 allows states implementing CON programs to obtain federal funds that were made available through the U.S. Public Health Service. These programs were established with the objective of guaranteeing a rational allocation of healthcare resources and preventing the misdistribution of healthcare funds.

To investigate how regulations, affect competition and market conditions, I am applying the count data model, precisely, the negative binomial model for the number of nursing homes as an outcome variable. In it, I am incorporating county demographics, which include population over the ages of 65 to 84 years old, and the population of individuals over the age of 85 years old. In addition, I am controlling for other independent variables, for instance, number of certified beds in each county to control for the size of the nursing home industry in each market. This study deviates from prior research in a number of respects. First, I investigate the number of nursing homes from a national perspective, representing 75 % of the counties in the U.S market and 70% of the total number of nursing homes. Second, the paper makes a deliberate attempt to investigate the causes of high occupancy rates. I also look at the case of over-bedding from different perspectives in order to gain a deeper understanding of the effects of different variables including (CON) on this outcome variable. This study is especially important today because it informs the current national debate on the effect of regulation on market conditions.

I found that CON laws and some other demographical factors affect the number of nursing home. For instance, retirement income tends to show a negative impact on the number of nursing.

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[1] The National Health Planning and Resources Development Act (PL 93-641) of 1974 prompted the CON programs (U.S. Congress, 1974).

While other factors like health insurance coverage and population of individuals between the ages of 65 to 84 years old were associated with higher incident rate ratios of (1.007) and (1.03) respectively. As for occupancy rates, and the variable for the number of certified beds in a given county is decreasing the occupancy rates by (0.02) percent for every additional certified bed. However, the presence of CON regulation is increasing the occupancy rates by (0.5) percent.

This study is structured as follows: Section II presents the regulatory background of the CON-regulation in the health care industry and the previous literature covering the effect of regulation on markets. Section III, outlines the methodology, the data, and the econometrics. Section IV, reports the results of the negative binomial regressions for the number of nursing home, occupancy rates, and the results of the logit model for over-bedding. Section V, covers the discussion of the findings. Finally, the conclusion is presented in Section VI.

2. Regulatory Background and Literature Review

CON states require nursing homes to meet some explicit requirements before they can be allowed to set up their facilities, or make further additions to the existing capacity. The regulations are founded on the notion that unregulated competition will produce unnecessary supply of health services, which may run counter to public interest.[2] CON regulations were also meant to prevent duplication of services and overbuilding of healthcare facilities. Regulators were of the opinion that such over-investment in capital expenditures at any nursing home facility could lead to price inflation, which comes as a result of very low occupancy rates.[3] Therefore, CON regulations allow enough numbers of firms that meet the actual capacity of the market or the necessary demand,

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[2] These regulations were originally put into action in the U.S. as part of the National Health Planning and Resources Development Act in 1974.
[3] In order for these facilities to meet their fixed costs, they would need to raise their prices, which would negatively affect the consumers of healthcare.

based on their targeted population (i.e. the population over the age of 65 years old). Consequently, the approval of new requests for new nursing homes or improvements of an existing facility will primarily depend on the need of the proposed market in relation to the demographics of that county at a given state. Planning agencies determine the number of firms and beds necessary in a specific market through the evaluation of the existing facilities and resources, in arriving at a fair judgment of what is needed. Whenever the state-planning agency finds a matching need, the approval ought to be granted to the proposed project.

Overall, healthcare spending had grown at an annual rate of 3.7% in the 1940s and 1950s, but in the 1960s, it rose at a rate of 5.8% (Blumstein and Slaon, 1978). This rapid increase in the healthcare costs prompted the federal government to intervene and enact regulations to curb costs. Although other types of regulation had been enacted in an attempt to regulate the healthcare industry, for example, the (CHPSA) of 1966, and the National Health Planning and Resources Development Act (NHPRDA) of 1974 that mandated all states to create CON requirements to authorize the establishment or expansion of health care facilities. Dissatisfaction followed the implementation of the CON legislation, with many lawmakers asserting that the CON requirements were serving as barriers to competitive dynamics. In 1987, Congress repealed the CON laws. Some states subsequently dropped their CON regulations. As shown in Figure 1, there are currently about 37 states that still maintain CON regulations. Figure 1 shows the CON and non-CON states across the U.S.

The 37 CON-states limit entry or expansions through the CON program. States without the certificate-of-need tend to be a bit more relaxed in their restrictions on market entry. Conceivably, CON laws may lower the number of nursing homes, which may not be sufficient to hold enough capacity to meet the demand of senior citizens. CON laws are meant to regulate a broad range of

services within the healthcare industry in all 37 states.[4] Table 1 shows the number of healthcare services that are regulated by CON.[5] Figure 2 shows the ranking of the most restrictive states based on the number of healthcare services that are regulated in those states.[6]

Most of the CON participating states have very similar approaches in the application of CON with some minor variation in the percentages of the maximum capacities allowed for every age category. However, the common standard of minimum occupancy rate is set to be above 90% for most states. CON laws restrict nursing homes from "over-bedding" or exceeding the maximum occupancy rate formulated by the state. The Tennessee Department of health, for instance, reports the need for nursing home beds for each county in the state of Tennessee using the following (*Need)* formula, which is a population-based equation:

*Need= .05 * population under 65 + .12 * population (65-74) + .60 * population (75-84) + .15 * population 85 and over*[7]

In this formula, all age groups are categorized and assigned different weights, with the highest weight being that of individuals between the age of 75 and the age of 85 years old, which is weighted at 60 percent.

The population of senior citizens is rapidly growing within the U.S. In 2000, seniors comprised 12 percent of the U.S. population. By 2030, that number is expected to rise to 19 percent

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[4] Thirty-seven states including the District of Columbia have the certificate-of-need laws, while fourteen states do not implement the certificate-of-need law.
[5] Arizona is a non-CON state when it comes to nursing homes, but it implements CON laws only on ambulance services.
[6] As an example, the state of Tennessee regulates more than 20 services including nursing homes. This is more than the national average of 14 health care services. It is ranked as the seventh most restrictive state.
[7] The population-based formula is stated at the certificate of needs (CON) of Tennessee's nursing homes handbook. https://www.tn.gov/health/article/certificate-of-need.

or 72 million Americans over the age of 65 (Thompson et al., 2013). In the midst of oversight, states use several methodologies to govern the number of nursing homes and most of which are based on the existing bed-to-population ratio. Despite a rapidly growing aging population, states participating in the CON programs often find a lack of "need" for more nursing home beds, but do not often provide enough validation for their findings.

The previous literature regarding nursing home regulation has mostly been based on Scanlon's (1980) model. Scanlon assumes that CON policy leads to a binding bed constraint on the market of nursing home, which might limit Medicaid-funded patients' access to nursing homes. Bernanke and Gertler (1989) and Nyman (1988a; 1988b; 1988c) investigated the effect of CON on quality of nursing homes and find that changes in Medicaid reimbursement rates may decrease quality in nursing homes. Grabowski (2001) finds that a decline in growth and expansion of nursing homes over time resulted in high occupancy rates, and led to extended waiting times for Medicaid recipients. Other research has inspected the outcome of CON policies on the change in growth of bed supply and the number of residents in nursing home facilities throughout the United States. For instance, using state-level data, Harrington et al. (1997) found that the existence of a CON policy effectively reduced the growth in nursing home beds in all states. Hirth et al., (2017) suggest that nursing home chains tend to focus more on expanding access to new markets within a non-CON state than to increasing market power within a smaller local market.

3. The Data, the Variables, and the Empirical Methodology

I have extracted the data for the following three years; 2012, 2013 and 2014. The total number of counties in the continental states is 3144 counties; however, in this study I have only included the contiguous states. The source of the demographic data of all contiguous states is extracted from the United States Census Bureau provided by the American Community Survey for the

corresponding years. Although for-profit nursing homes tend to be the dominant type in my sample, I am including all three categories of nursing homes in this investigation to capture the impact on all nursing homes within a given county. Table 1 presents a summary of all nursing homes types; the total number of all types of nursing homes in 3144 counties is 15,592 nursing home, which is around 69% of all nursing homes in the U.S. In addition, for-profit nursing homes have the highest share of beds, accounting for 71.4% of all beds in the U.S. The share of residents in for-profit nursing homes reached 71% of all nursing home residents in the contiguous states (both CON and non-CON). The total number of beds is around 1.6 million beds for 1.3 million residents. After dropping the non-contiguous states, the total number of counties in the contiguous states is 2334, which represents 74.2% of all counties in the contiguous states. Additionally, Table 1 shows all the 13 subcategories of nursing homes including their corresponding number of beds, number of residents, and the number of nursing homes for each subcategory.

The information about the "Certificate-of-Need" law was collected from the National Conference of State Legislators, which shows the historical timeline of all CON, and non-CON states. Due to the constant changes in this list, I only included the years from 2012 to 2014, in which the list of CON states and non-CON states tends to be stable during those years and matched the purpose of this study. The third source of my data is from Medicaid and Medicare data centers.[8] The firm level variables were then consolidated at the county level in order to provide an overall county measure for each variable. These data sources are considered very reliable sources to study the effect of regulation on the conditions of nursing homes markets.

Furthermore, I have utilized the demographics information from ACS and used the average for the corresponding three years. As I mentioned before, there are three categories of ownership:

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[8] CMS data are a firm-level data showing the number of beds, residents, and type of ownership.

for-profit nursing homes, governmental nursing homes, and non-profit nursing homes. "For-profit" ownership is dominant among all three types. Hypothetically, markets are defined as "the set of buyers and sellers whose interactions shape prices" (Stigler and Sherwin 1985). In my study, a county represents a single market.[9] Table 3 outline the summary statistics for some of the covariates and the outcome variables in a comparative form between CON counties and non-CON counties. The mean number of certified beds in CONs appeared higher than the mean number of certified beds in non-CONs by 11 beds. The non-CON counties tend to have higher property value assessments and a higher total population than CON counties. The old population is also higher in non-CON counties; however, the per capita income is almost identical to per capita income in CONs. The retirement income in both cases is the similar with 21,987 U.S. Dollars for the CON counties and 22,553 for the non-CONs. In addition, family income shows similar means for both case, where CON counties have a mean of 79,774 U.S. Dollars and the non-CON has a mean of 82,631 Dollars. As for the outcome variables, the mean of the number of nursing homes in CON counties is around 23 nursing home facilities, while in the case of non-CON the mean is around 50 nursing homes. The total number of nursing homes in CON states 9,295 nursing homes, and 5,320 nursing homes of the case of non-CON counties. In the case of occupancy rates, both CON counties and non-CON counties have their occupancy rates at 81 percent.

3.1 The Variables

In this study, I am using county-level data within all the contiguous states.[10] I have used property value assessments as a proxy for fixed cost. In order to capture the size of the market I had to include the number of certified beds. Moreover, the independent variable "women in the labor force" captures the number of nurses and staffing in the market. My model presents the number of

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[9] Again, I am not observing the prices and marginal costs.
[10] I am excluding Alaska, Hawaii, Puerto Rico, Guam and U.S Virgin Islands.

nursing homes (*N*) in county (*i*) which is a function of population of individuals over the age of 65 years to 84 years old, number of beds, and other market characteristics. The number of nursing homes, occupancy rates, and over-bedding occurrences per county are my dependent variables in my study. As I have mentioned earlier in the paper, I have collected the demographic information from American Community Survey, while the nursing homes data is extracted form CMS. The definitions of the independent variable are presented in the following:

1. Natural log of total population: theoretically, when population is large, demand is expected to rise. Conversely, a smaller total population may indicate that such market to have a lower rate of profitably to sustain a competitive market in the long-run, which may result in lower number of nursing homes and may lead to high occupancy rates.[11] Therefore, I anticipate this independent variable to have a significant effect on the market conditions.

2. Certificate-of-need: this dummy variable will take the value of one if the state is implementing CON laws and a value of zero, otherwise. I am strongly anticipating an effect of this independent variable on the market size and occupancy rates altogether.

3. Natural log of property value per capita: This independent variable defines the fixed cost. It is anticipated that the coefficient of this independent variable to have some significant effect on the number of nursing homes. A higher fixed cost could be a barrier to growth, leading to lower likelihoods of market growth.

4. Natural log of mean family income: higher family income is expected to lead to a healthier population and longer life expectancy. Families with high income tend to look after their seniors and spend more on care providers. Thus, I anticipate finding an effect of family income on the market.

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[11] The total population might not be very representative of the actual size of a market, but an indication of targeted population.

5.   The percentage of the population between 65 and 84 years old: This is the most important independent variable in my analysis. It reflects potential residents, and I am strongly expecting some significance for the coefficient of this variable.

6.   The percentage of the population over 85 years old: this is another important independent variable in this analysis, and this age group specifically is commonly associated with higher cost due to age-related disabilities and illnesses. Thus, I am expecting this independent variable to have a significant effect on the number of nursing homes, occupancy rates and over-bedding.

7.   Natural log of number of the disabled population: disability is associated with higher costs. The disability of performing simple daily activities requires more attention, therefore, more nursing hours per residents. Although, some disabilities may not be severe, or permanent, the level of disability of the patients and the percentage of residents with disabilities affect the nursing home's costs and may influence the number of nursing. For this reason, I am expecting it to find an impact of this variable on the size of the market.

8.   The rate of unemployment: in general, unemployment rate is unstable and it is highly correlated with the macroeconomic environment. However, higher rates of unemployment could mean lower per capita income; thus, I anticipate seeing the coefficient of this variable to have an effect on the number of nursing homes and occupancy rate.

9.   Health insurance coverage: Medicaid or Medicare funds most of the nursing home beds in CON-counties. This independent variable further represents the direction of whether nursing homes are driven by profit or demand. For that, I am anticipating that this independent variable to show some significant effect.

10.   The number of certified beds: number of beds is indicative of the strictness of the

regulations imposed on the market. Higher numbers of beds could indicate that a county is a more attractive for potential nursing homes and vice versa. It is therefore anticipated that the number of beds will have a significant effect on the size of markets, the rate of occupancies, and the probability of over-bedding.

11.   Women in the labor force: females chiefly dominate the nursing field, and this variable captures the number of nurses in the labor force. This variable can affect the number of nursing homes and occupancy rate at the same time. I am expecting this variable to have an impact on overall market conditions.

12.   Natural log of retirement income: this variable is incorporated to show the significance of the retirement income on the number of care providers. The basic rationale dictates that counties with high retirement income should signal for higher portions of health insurance eligibilities and more Medicare and Medicaid residents. Therefore, it would attract more nursing homes. I am expecting the coefficient of this variable to have a significant impact.

3.2 Identification Strategy

The main purpose of this study is to fit models that can predict the impact of the CON regulation along with other county characteristics on three outcome variables: the number of nursing homes, occupancy rates and over-bedding. Studying the factors that affect the dependent variables, requires knowing the limitations and the assumptions of each model. First, the simple model of the OLS model is used to find the correlations between the dependent variables of this study and the explanatory variables in the following functional form:

$$Occupancy\ Rate_i = a + CON_i + s_i + c_i + \psi_i + \varepsilon_i$$

Where y_i is the outcome variable for every case, the case of occupancy rates, and the number of nursing homes for market i. The key independent variable CON, which is a binary variable that takes the value of (1) if state i is implementing the Certificate-of-Need law and zero, otherwise. County demographic factors are represented by the vector c, while the number of the certified beds is represented by the vector s, and economic factors are represented by the vector ψ. The error term is represented by the last term ε_i.

The number of nursing as a dependent variable is not a continuous variable. It requires the use of a count data model rather than the basic OLS model. Therefore, the linear regression model would not effectively describe how the number of nursing homes is related to the independent variables mentioned earlier. In addition, the negative binomial model is compatible since the over dispersion parameter (α) is greater than zero.

There are other count data models, however, their properties and assumptions requires that the variance and the mean to be equal, which does not hold for the case of negative binomial model. The fundamental expression of the negative binomial regression is written as:

$$Pr(Number\ of\ Nursing\ Homes = y_i | \mu_i, \alpha) = \frac{\Gamma(y_i + \alpha^{-1})}{\Gamma(\alpha^{-1})\Gamma(y_i + 1)} \left(\frac{1}{1 + \alpha\mu_i}\right)^{\alpha^{-1}} \left(\frac{\alpha\mu_i}{1 + \alpha\mu_i}\right)^{y_i}$$

Where, the mean and variance are not assumed equal as shown in the following functional form:

$$var(y|x) = \mu + \alpha\mu^2$$

I am applying the same count model for occupancy rates, which will follow the same notation of the above negative binomial. To investigate the overall impact of the CON regulation on Nursing homes, it is necessary to examine the impact of the same set of independent variables on over-bedding, which a bivariate logit model would specify the outcomes in the following:

$$Overbedding_i = \begin{cases} 1 \ if \ Occupancy_i^* > 100 \\ 0 \ if \ Occupancy_i^* \leq 100 \end{cases}$$

The logit model is used for this variable to draw some conclusions on the aftermath of CON laws. The basic expression of the logit model is structured as:

$$(Y = Overbeding | X_1, \dots, X_p) = \frac{e^{a+\Sigma_{j=1}^{p}\beta X_j}}{1 + e^{a+\Sigma_{j=1}^{p}\beta X_j}}$$

Alternatively,

$$P(Y = Overbedding \ | X_1, \dots, X_p) = \frac{1}{1 + e^{-a-\Sigma_{j=1}^{p}\beta X_j}}$$

In addition, the probability for no over-bedding or a zero response is:

$$P(Y = No \ Overbedding \ | X_1, \dots, X_p) = 1 - P(Y = overbedding | X_1, \dots, X_p)$$

$$= \frac{1}{1 + e^{a+\Sigma_{j=1}^{p}\beta X_j}}$$

4. Estimation Results

4.1 The Case of Occupancy Rates

Table 4 presents the results of the OLS regression for occupancy rates as the outcome variable. All

explanatory variable showed significance expect for four variables: CON with a p-value equals 0.332, retirement income with a p-value of 0.129, population for the age cohort between 65 and 84 years old with a p-value that equals 0.207, and women in the labor force with p-value that equals 0.985. As I anticipated earlier in the paper, the variable for the number of beds shows high significance with a p-value that is less than 0.001; however, the coefficient has a negative impact on the occupancy rate. An additional bed will lead to a decrease in occupancy rates by 0.0089. In this analysis, family income shows a high significance, where an additional $1000 in family income will lead to a decline in occupancy rates by 7.49. Health insurance coverage, however, lead to a different result, with a p-value that is less than 0.001 the increase in the percentage of health insurance coverage will increase occupancy rates by 0.16. Unemployment rate also shows high significance and an additional unite increase in unemployment will lead to an increase in occupancy rates by a factor of 0.433. Next, an increase in the property value, which is the measurement of fixed cost at a given county, will lead to an increase in occupancy rates by 5.34. Moreover, the total population of the county is highly significant, and an increase in the total population leads to an increase in occupancy rates by 0.84. The population over the age of 85 tend to have the largest coefficient of all explanatory variables, where a one percent increase in the percentage of this age group population will lead to an increase by 6.43 in occupancy rates. The percentage of disability at a given county also shows significance with a p-value of 0.054. A one percent increase in the percentage of disabled individuals at a given county will increase occupancy rates by a factor of 0.12.

4.2 The Case of the Number of Nursing Homes

Table 5 presents the results of the negative binomial model for the number of nursing homes as the outcome variable. The over dispersion parameter (α) is 0.68, which is greater than zero and

holds for the assumption of over dispersion. All explanatory variables show significance in this analysis. However, if a county implements the CON regulation it will have a lower number of nursing homes by a factor of 1.5 compared to counties without the certificate-of-need. In the same rate, an additional bed will also decrease the number of nursing homes by a slight percentage of 0.1 compared to other counties without the increase in the supply of beds. Remarkably, retirement income shows statistical significance, however, an additional $1000 is associated with a decrease in the number of nursing by 54.27 percent compared to others without the additional increase in retirement income. Additionally, family income presents the same pattern of retirement income; an additional $1000 increase in family income decreases the number of nursing homes by 9.28 percent in contrast to other counties without the additional increase in family income. Next, health insurance coverage, this independent variable shows an opposite effect. An increase by one percent in health insurance coverage increase the number of nursing homes by 0.788 percent compared to other markets without any changes in health insurance coverage. As for unemployment rate, this independent variable is associated with a decline in the number of nursing homes with a slight decrease by a factor of 2.94 percent when there is an increase by one unit in the rate of unemployment compared to other counties without the unit of increase. The property value assessment decreases the number of nursing homes. An increase in property value assessment by $1000 leads to a decline in the number of nursing homes by a factor of 11.43 percent compared to other counties without this increase in the assessment value of properties.

As predicted, the incident rate ratio of the total population is 2.49 with high statistical significance. Thus, an increase in the total population leads to an increase in the number of nursing homes by 149 percent compared to other counties without any change in the total population. Next, the variable for the population of the age cohort between the age of 65 and 84 shows statistical

significance with a p-value that is less than 0.001. A one percent increase in the population of this age group will increase the number of nursing homes by 3.83 % in comparison to other counties without the same increase in the independent variable. Similarly, an additional one percent increase in the population of individuals over the age of 85 will increase the number of nursing homes by 2.24 percent compared to other counties without the additional unit of increase in the independent variable. Unlike the estimates of the occupancy rates, women in the labor force shows statistical significance for the case of the number of nursing homes. Therefore, an increase by an additional unit in this independent variable will increase the number of nursing homes by 3.65 percent compared to other counties without this additional increase in women in the labor force. Lastly, the rate of disability shows statistical significance with a p-value that is lower than 0.001. An increase by one percent in the percentage of disability decrease the number of nursing homes by 1.29 percent in comparison to those counties without the one unit increase in the percentage of individuals with disabilities.

4.3 The Occurrence of Over-bedding

This outcome variable is a binary outcome variable, which takes the value of 1 for the occurrence of over-bedding and zero, otherwise. Eleven out twelve independent variables show statistical significance. The only independent variable that is non-significant is the retirement income. Holding all other independent variables at their mean values, the predicted probability of over-bedding is lower by 2.18 percentage points for a county implementing the CON than a non-CON county, and the probability of over-bedding would decrease by 0.015 percentage points with every additional bed. Similarly, an increase by $1000 in family income is associated with a decrease in the probability of over-bedding by 5.04 percentage points. Likewise, an increase by one percent in health insurance coverage would decrease the probability of over-bedding by 0.18 percentage

points. Once again, holding all other independent variable at their mean values, the predicted probability for over-bedding decreases by 0.55 percentage points with an additional percentage in the unemployment rate, while an increase by $1000 in property value assessment would increase the probability of over-bedding by 2.57 percentage points. As for the total population, an increase in the total population by one unit increase the probability of over-bedding by 1.02 percentage points. However, a one percent increase in the population of the age group between 65 and 84 will decrease the probability of over-bedding by 0.21 percentage points, whereas a one percent increase in the population of the individuals over 85 years old would increase the probability of over-bedding by 3.1 percentage points. The variable of women in the labor force shows a slight increase in the probability of over-bedding. A one unit in the percentage of women in the labor force will lead to an increase in the probability by 0.22 percentage points. Finally, a one percent increase in the percentage of disability increase the probability of over-bedding by 0.302 percentage points.

5. Discussion

All health care policies target the improvement of three elements: costs, qualities and accessibilities. It is agreeable by most scholars and lawmakers that the desired outcome of those policies is to lower costs, improve qualities, and promote high accessibility. However, the general wisdom constitutes enhancing the three elements simultaneously would be an impossible goal. Overall, policies may enhance qualities and lower cost, but it may hurt accessibility. Therefore, I systematically examined the number of nursing homes using a negative binomial model for the number of nursing homes along with an OLS regression for occupancy rates, and a logit model for over-bedding to draw some possible explanations for the impact of CON and other independent variables on market conditions and accessibility. Although the certificate-of-need is designed to contain cost by the prevention of duplication of offered services, the results in this study suggest

CON laws may be associated with a reduction in the number of nursing by 1.5 percent compared to other counties without the CON regulations. Conceivably, the presence of CON laws was always linked to high occupancy rates in contrast to the absence of CON laws. However, in the study, CON laws variable was not statistically significant for the case of occupancy rates. Scholars most often raise the common concern of the occurrence of over-bedding in regulated markets, in which in this analysis I find this concern not valid. In fact, the estimate of the logit model suggests that counties implementing the CON regulations are having lower probabilities of the occurrence of over-bedding than counties without CON. Additionally, my findings suggest that the certificate-of-need regulations may protect the existing firms, in that they may act as barriers in some markets, which allow the existing nursing homes to maintain their market share, and further help them to obtain the sufficient occupancy rates. Eventually, they will reduce the costs per resident.

Similarly, I am studying the impact of bed supply to tease out the effects of the number of beds on the number of nursing homes, occupancy rates, and the probability of over-bedding. The findings suggest that the supply of beds slightly reduces occupancy rates with every additional bed. Nevertheless, it slightly reduces the number of nursing homes. The additional number of certified beds can increase the capacity of the already existing nursing homes, rather than icreasing the number of nursing home facilities. The increase of approved beds can decreases occupancy rate, but reduces the accessibility of new nursing homes into the market. As for the case of over-bedding, the number of certified beds is associated with a lower probability of over-bedding with every additional bed. However, some conditions of federal funding require nursing homes to meet a minimum threshold of occupancy rate. For instance, the bed-banking practice that was introduced in Wisconsin allows nursing homes that are above the minimum occupancy rates to deposit some of their beds to bed bank agencies for a 10% depository fee for a minimum duration of 18 months.

With the approval of regional health agencies, bed bankers can lend those beds to other CON markets within the state that are in need for more beds or almost reaching the over-bedding percentages. This act can influence the number of nursing homes within markets. Therefore, the bed-banking act allows markets in CON states to become less competitive without the need to issue new certified beds.

Family income tends to lower the number of nursing, occupancy rates and the probability of the occurrence of over-bedding. The rationale of this reduction dictates that with additional family income, a small proportion of families will spend more on alternative options such as home care, which can provide similar quality of care for their seniors. As for the percentage of health insurance coverage, the findings suggest that with the increase in health coverage, nursing home would be motivated to enter the market, however, this variable would also lead to a slight increase in the rates of occupancy, but it does not increase the probability of over-bedding. Some states prevent residents from going to nursing homes that have exceeded the maximum occupancy rates. As for the case of unemployment rates, the results show a small increase in occupancy rates with one percent increase in the percentage of unemployment. However, it also suggests that the increase in the percentage of unemployment could lead to a reduction in the number of nursing homes along with a reduction in the probability of over-bedding. One mediating factor that can be associated with unemployment rate, is the fact that unemployment rate can serve as a signal for lower income and high poverty rates, which lowers the number of nursing homes in markets with higher rates of unemployment. Another explanation that relates to unemployment rates relates to the fact that most seniors tend to be unemployed, but they are also covered by Medicaid or Medicare, which increases the rates of occupancy. Next, fixed cost is represented by property value assessments, and the higher the value assessment, the more expensive for a new nursing home to

enter. In the same rate, low number of nursing homes will lead to high probabilities of over-bedding.

The total population is a representation of all potential residents who are eligible for health insurance coverage in a given market. For instance, Medicaid programs cover individuals above the age of 21, who are meeting the conditions for Medicaid coverages, which allow all eligible individuals from various age groups to receive benefits of nursing home services. Therefore, an increase in the total population could also signal for more potential residents. The findings suggest with a one-unit increase in total population, the number of nursing homes and occupancy will both increase. The increase will also lead to a higher probability of over-bedding, which comes with the increase in the overall population. Additionally, potential residents differ in their age and their disabilities. Therefore, the results of the age cohorts show different effects. With one percent increase in the population of the age cohort between the age of 65 and 84 years, the number of nursing homes will also increase, but occupancy rates will decrease. This is due to the fact that this age group may not always remain within the same nursing home and they may always look for other options seeking better services. The findings of the logit model suggest lower probability of over-bedding caused by this age group. So, the previous explanation goes in line with what I have suggested earlier, where this age cohort tend to transfer more than individuals over 85 years seeking better alternatives. As for women in the labor force, this variable captures all types of workers whether they are skilled or unskilled, and it signals for the number of nurses and staff working in a given market. Thus, the number of nursing homes will increase with the increase in the percentages of women participating in the workforce. Consequently, the increase of women in the labor force could mean better ratios of nurse-to-residents, which increases occupancy rates and over-bedding at the same time. The last and final explanatory variable is the rate of individuals

with disabilities, which relates to high costs per resident leading to lower number of nursing homes and higher occupancy rates. The rate of disability increases the probability of over-bedding due to their physical immobility and longer duration of stay.

6. Conclusion

In this paper, I study the impact of regulation on the market conditions. The outcome variables and the set of the covariates explains the impact of CON from three different perspectives: over-bedding, number of nursing home, and occupancy rates. The sample size represented the industry as a whole, and across all contiguous states. This paper is intended to further inform regulators of the feasibility of CON, and whether it fits with the desired objectives for healthcare policies. The desired objective of those policies is to lower the cost, increase quality, and improve access. On average, CON regulation may be associated with concentrated markets, where the already existing nursing homes have some market power. In turn, they control, the size of the market to reduce competition. The general purpose of CON regulations makes some intuitive sense; however, when nursing homes are initially driven by demand, the CON regulation has always been linked negative effect on market competitiveness and growth. Specifically, my findings suggest that the number of certified beds can indirectly impose some restrictions on the size of the market, but doesn't highly impact the expansion of the existing nursing homes. On the contrary, the positive side of CON is appearing in the case of over-bedding with the reduction of the probability of over-bedding, which invalidate what has been suggested in the previous literature.

Overall, the lack of competition suggests a need to have an agency that matches the policy reform with market outcome. The Competitive Policy Council was the only similar agency that had ever existed, which was established in 1988, but ceased operations in 1997 when the Congress stopped funding it. There are some limitations that are worth mentioning, the study is only focusing

on three years of observations. One factor that I intend to include in a future study is the incorporation of more years of interest that will capture the impact of switching from a CON implementing state to a non-CON implementing states and vice versa. This will lead to a dynamic examination that separates the impact of the regulation from other factors. To this end, this study suggests a reevaluation of the CON law and recommends some modifications to the regulations that may motivate a monopoly power. After all, restricting markets may be linked to the behavior of already existing nursing homes toward regulations to protect their markets, which limits the CON laws from delivering what it is intended to deliver to those who are in need.

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APPENDICES

APPENDIX A: TABLES

Table 1.
The distribution of nursing home according to the ownership types

Types of Nursing Home	Number of Beds	Number of Residents	Number of Nursing Homes
For-profit corporations	970,859	781,792	8,946
For profit individual	70,957	55,999	665
For-profit Limited Lability Company	11,886	9,562	104
For profit partnership	128,560	104,278	1067
Governmental-City	7,707	5,552	84
Governmental-County	61,132	50,628	541
Governmental-City/County	10,753	8,718	99
Governmental-Federal	1,044	855	13
Governmental Hospital District	19,788	14,987	235
Governmental-State	21,109	16,851	145
Non-Profit-Church Related	55,937	48,105	599
Non-Profit-Corporation	267,156	227,597	2,780
Non-Profit-Other	27,181	22,485	314
Total	1,654,069	1,347,409	15,592

The sample includes all nursing homes in certificate-of-need states and non-certificate-of-need states. The total number of for-profit nursing homes is based on 2334 counties out of 3144 counties.

Table 2.
Health services regulated by CON regulations

Healthcare service	Participating States	Number of CON-States
Acute Hospital Beds	AL, AK, CT, DE, FL, GA, HI, IL, IA, KY, ME, MD, MI, MS, MO, NV, NH, NJ, NY, NC, RI, SC, TN, VT, VA, WA, WV, DC	28
Air Ambulance	AL, ME, MA, MI, VT, DC	5+DC
Ambulance Services, Ground	AZ	1
Burn Care	AL, HI, ME, MD, NJ, NY, NC, TN, VT, WA, DC	11
Computed Tomography (CT) Scanners	AK, CT, HI, ME, MI, MO, NY, NC, RI, VT, VA, WV, DC	13
Home Health	AL, AR, GA, HI, KY, MD, MS, MT, NJ, NY, NC, SC, TN, VT, WA, WV, DC	18
Hospice	AL, AR, CT, FL, HI, KY, MD, MS, NY, NC, OR, RI, SC, TN, VT, WA, WV, DC	18
Intermediate Care Facilities/Mental Retardation (ICF/MR)	AR, FL, GA, HI, IL, IA, KY, LA, MD, MS, MO, MT, NV, NJ, NC, OK, SC, TN, VT, VA, WV, WI	22
Nursing Homes	AL, AK, AR, CT, DE, FL, GA, HI, IL, IA, KY, LA, ME, MD, MA, MI, MS, MO, MT, NE, NH, NV, NJ, NY, NC, OH, OK, OR, RI, SC, TN, VT, VA, WA, WV, WI, DC*	36 +DC
Medical Office Buildings	VT, DC	1 +DC
Magnetic Resonance Imaging (MRI) Scanners	AK, CT, HI, KY, ME, MA, MI, MS, MO, NH, NY, NC, RI, SC, TN, VT, VA, WV, DC	18 +DC
Neo-Natal Intensive Care	AL, AK, CT, FL, GA, HI, IL, KY, ME, MD, MA, MI, NJ, NY, NC, RI, SC, TN, VT, VA, WA, WV, DC	23
Obstetrics Services	AL, AK, CT, GA, HI, IL, ME, MD, NY, RI, VT, VA, WA, WV, DC	15

Table 2 (cont.)

Healthcare service	Participating States	Number of CON-States
Open Heart Surgery	AL, AK, CT, GA, HI, IL, IA, KY, ME, MD, MA, MI, MS, NH, NJ, NY, NC, RI, SC, TN, VT, VA, WA, WV, DC	25
Organ Transplants	AL, AK, CT, FL, HI, IL, IA, KY, ME, MD, MA, MI, NJ, NY, NC, RI, VT, VA, WA, WV, DC	21
Positron Emission Tomography (PET) Scanners	AK, CT, DE, GA, HI, KY, ME, MA, MI, MS, MO, NH, NC, RI, SC, TN, VT, VA, WV, DC	20
Psychiatric Services	AL, AK, AR, CT, FL, GA, HI, IL, KY, ME, MD, MA, MI, MS, NH, NJ, NC, OK, RI, SC, TN, VT, VA, WA, WV, DC	26
Radiation Therapy	AL, AK, CT, DE, GA, HI, IA, KY, ME, MA, MI, MS, MO, NH, NY, NC, RI, SC, TN, VT, VA, WV, DC	23
Rehabilitation	AL, FL, GA, HI, IL, KY, ME, MD, MA, MS, MO, MT, NE, NH, NJ, NY, NC, RI, SC, TN, VT, VA, WA, WV, DC	25
Renal Failure/Dialysis	AL, AK, HI, IL, ME, MS, NY, NC, VT, WA, WV, DC	12
Assisted Living & Residential Care Facilities	AR, LA, MO, NC, VT	5
Subacute Services	AK, FL, HI, IL, NC, OK, RI, SC, TN, WA, WI, VT, DC	13
Substance/Drug Abuse	AL, CT, FL, GA, HI, KY, ME, MD, MA, MS, MT, NH, NC, RI, SC, TN, VT, WV, DC	19
Ultra-Sound	HI, ME, VT, DC	4

NOTE: *The total number of states that regulates nursing home facilities is 36 in addition to DC. In the case of the certificate-of-need law in Arizona, it regulates ambulance services only, for that Arizona is not categorized as a CON state in the case of nursing homes.

Table 3.
Summary statistics for some of the covariates and the outcome variables in CON and non-CON counties

Covariate	With CON	Without CON
Occupancy Rates	81%	79%
	(17.27)	(18.68)
Population	108,070	168,788
	(256,016)	(558,806)
Retirement Income	22,054	23,490
	(4,559)	(4,478)
Family Income	79,100	83,840
	(21,589)	(18,639)
Health Insured	87%	83.6%
	(4.66)	(5.80)
Unemployment Rate	6%	5.7%
	(1.49)	(1.57)
Disability	13.6%	11.7%
	(4.77)	(3.84)
Property Value	170,500	223,677
	(96,157)	(148,647)
Reimbursement Rate	60%	57%
	(7.38)	(6.04)
Population Over 85	2%	1.7%
	(0.34)	(0.38)
Number of Nursing Homes	4.223	5.38
	(7.559)	(16.046)
Women in Labor Force	58.5%	58.7%
	(3.05)	(2.95)

Notes: the numbers in parenthesis are the standard deviations.
Total number of number homes in all non-CON states is 5,320, while the total number of CON Nursing homes 9,295 facilities.

Table 4.
Results of the regression analysis for occupancy rates

Covariates	Coefficient	Standard Error	p-value	95% CI	
CON	.3150645	.3246658	0.332	-.3213216	.9514506
Number of Certified Beds	-.0089125	.0025059	0.000	-.0138244	-.0040006
Retirement Income	1.794154	1.181646	0.129	-.5220213	4.11033
Family Income	-7.49829	1.396685	0.000	-10.23597	-4.760611
Health Insurance Coverage	.1603018	.0406234	0.000	.0806748	.2399288
Unemployment Rate	.4331438	.1266205	0.001	.1849516	.681336
Property Value Assessment	5.346535	.5390771	0.000	4.289876	6.403194
County's Population	.8447762	.1473255	0.000	.5559997	1.133553
Population over 65 to 84	-.0684823	.0542234	0.207	-.174767	.0378023
Population over 85	6.432004	.538801	0.000	5.375886	7.488122
Women in the labor force	-.0010828	.0589005	0.985	-.1165352	.1143695
Disability	.1214398	.0629959	0.054	-.0020401	.2449198

Table 5.
Results of negative binomial regression for the number of nursing homes

Covariates	IRR	Standard Error	p-value	95% CI	
CON	.9850777	.0073788	0.045	.9707212	.9996465
Number of Certified Beds	.9990077	.0000493	0.000	.9989112	.9991043
Retirement Income	.4573069	.0148791	0.000	.4290547	.4874194
Family Income	.907278	.0292863	0.003	.8516559	.9665328
Health Insurance Coverage	1.007888	.0009881	0.000	1.005953	1.009827
Unemployment Rate	.9706852	.0031251	0.000	.9645794	.9768298
Property Value Assessment	.8857216	.0097972	0.000	.866726	.9051335
County's Population	2.495701	.0090548	0.000	2.478017	2.513511
Population over 65 to 84	1.038265	.0015373	0.000	1.035257	1.041283
Population over 85	1.022483	.0134228	0.090	.9965104	1.049133
Women in the labor force	1.03653	.0014392	0.000	1.033713	1.039355
Disability	.9871653	.0019421	0.000	.9833662	.990979

NOTE: Nursing home is the outcome variable in this analysis.

Table 6.

Result of the logit model for over-bedding

Covariates	Marginal Effect	Standard Error	p-value	95% CI	
CON	-.0218604	.0052055	0.000	-.032063	-.0116578
Number of Certified Beds	-.0001521	.0000431	0.000	-.0002365	-.000067
Retirement Income	.0129297	.0200997	0.520	-.026465	.0523243
Family Income	-.0504125	.0224917	0.025	-.0944954	-.0063297
Health Insurance Coverage	-.0018754	.0006421	0.003	-.0031338	-.0006169
Unemployment Rate	-.0055529	.0021403	0.009	-.0097477	-.001358
Property Value Assessment	.025723	.00836	0.001	.0093378	.0421083
County's Population	.0100021	.0023872	0.002	.0053232	.0146811
Population over 65 to 84	-.0020269	.0008933	0.023	-.0037777	-.0002762
Population over 85	.0306048	.0087308	0.000	.0134927	.0477169
Women in the labor force	.0022282	.0009566	0.020	.0003533	.0041032
Disability	.0030209	.0009815	0.002	.0010973	.0049445
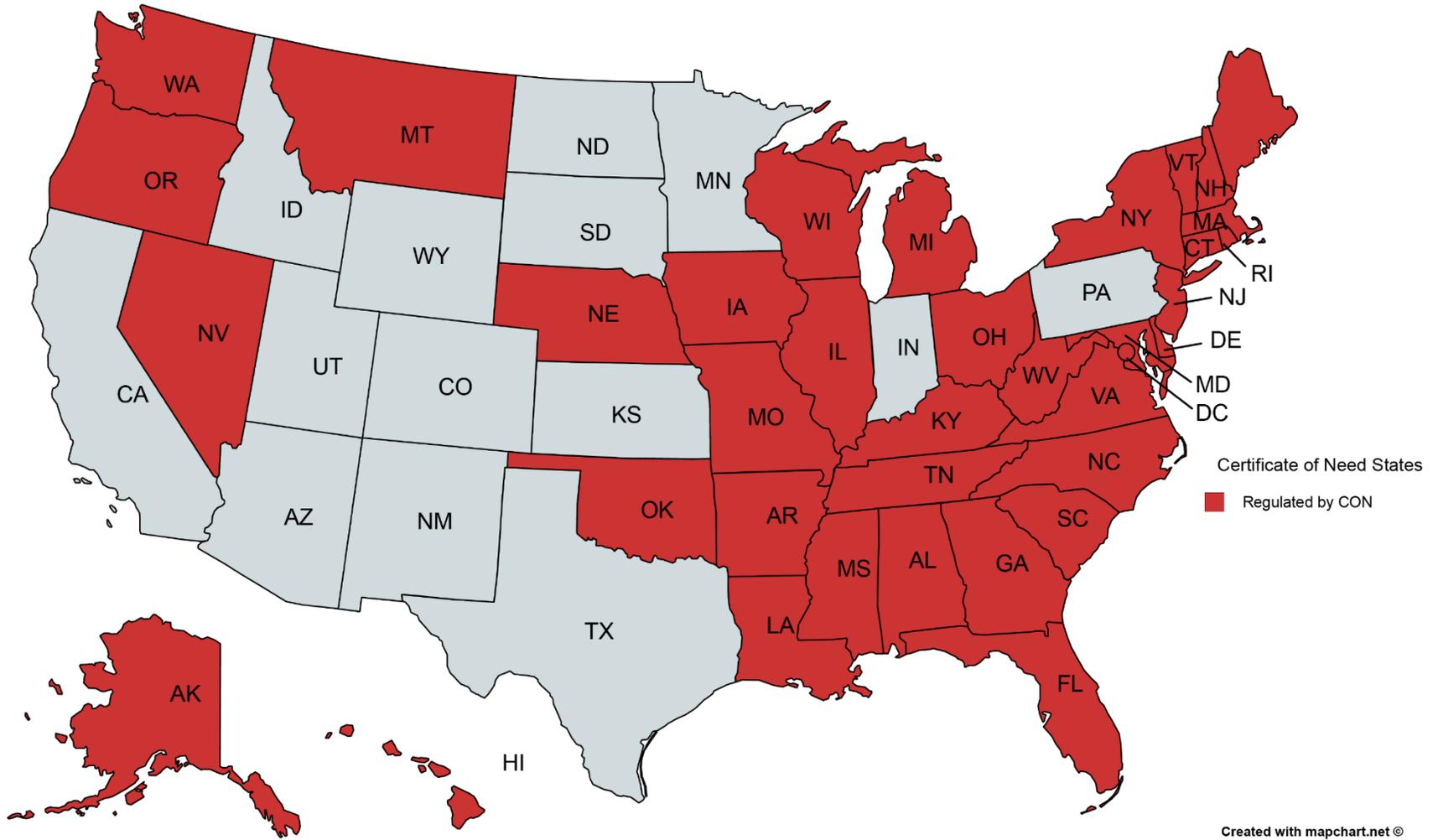
Figure 1

CON states vs. Non-CON states
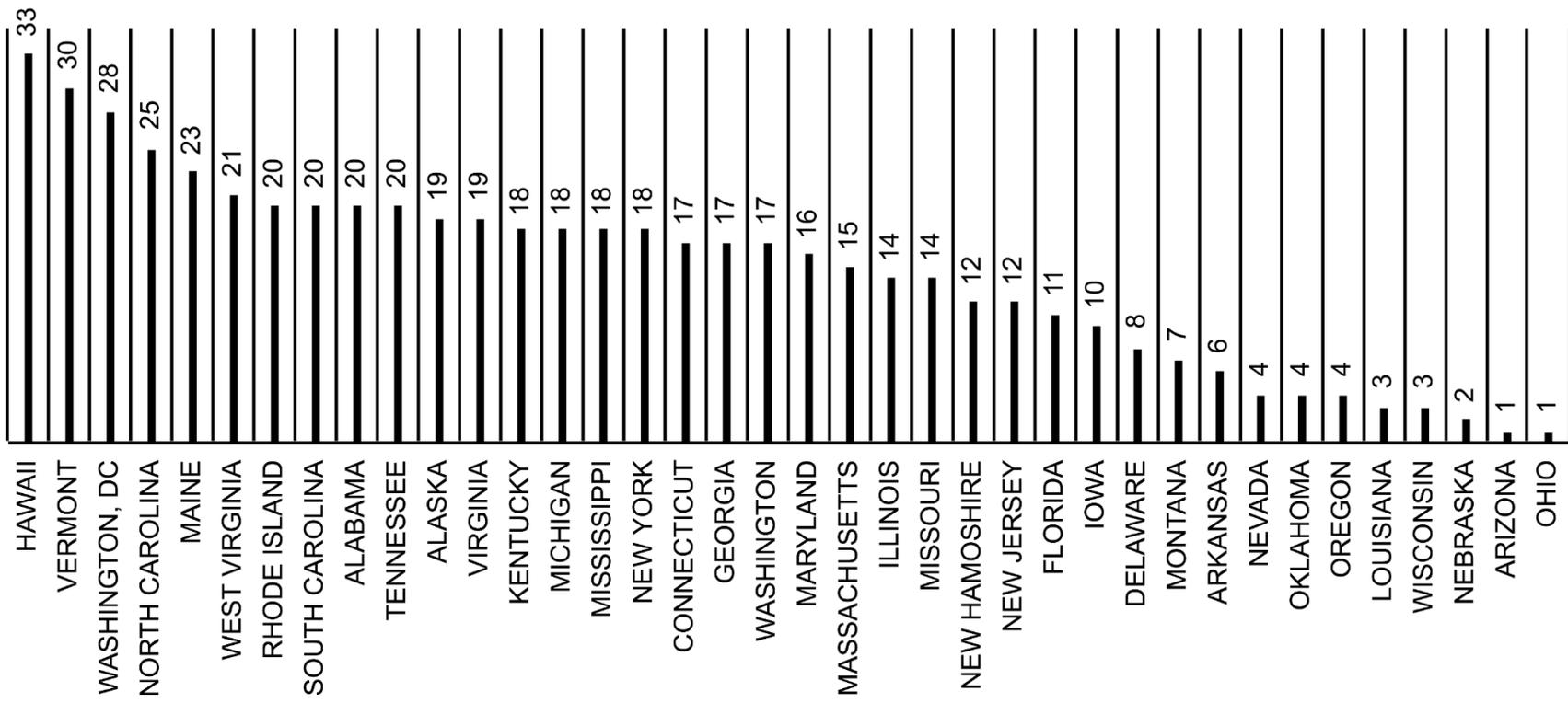
Figure 2

Ranking of restrictiveness of states based on the number of healthcare services regulated by CON

CHAPTER II

DO CERTIFICATE-OF-NEED REGULATIONS LEAD TO LOWER
QUALITIES? CON LAWS AND QUALITY OF CARE IN THE
NURSING HOME INDUSTRY

1. Introduction

In the past twenty-five years, the increasing cost of nursing home care has been a concern for all

municipalities as well as states' legislators since nursing homes have contributed to a growing

Medicaid expenditure of post-acute care.[1] Furthermore, the cost of long-term care remained to

grow overwhelmingly, capturing an enormous size of Medicaid expenditures.[2] Despite the

increasing cost, the nursing home industry has been considered as an alternative housing for

seniors, and long-term care option for older Americans (Hawes, et al., 2003). Thus, legislators are

faced with escalating pressure to increase the capacity of nursing homes and other health services

(Kitchener, et al., 2005; Miller, et al., 2002). Consequently, the increasing cost of nursing home

care forced many states to implement Certificate of Need (CON) laws in the late 1980s.

The introduction of the quality issue was brought to scholars' attention through cases of

abuse, mistreatment, and an overall "lack of concern" in the care of nursing home residents.

Vladeck (1980) published the first study that displayed the clear distinction of the framework of

quality measures in the nursing home industry, which captures the problems of quality occurring

throughout the industry (Vladeck, 1980). He implied that the types of establishments, types of

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[1] As an example, the share of total Medicare spending on skilled nursing care facility increased from one percent to three percent, and the share of total Medicare spending on home health care increased from two percent to three percent.
[2] Between 1994 and 2009, the average expenditure for long-term care has doubled for most analysis (Chandra, et al., 2013)

nurses, safety compliances, and many other variables need to be controlled for to measure the effectiveness of the CON policy, the implication of which is the focus of this study.

The hypothesis of the study is that fewer supply of certified beds in nursing homes leads to excess demand, in turn, it decreases the level of quality of care. According to Nyman (1989), nursing homes in counties with a tighter bed supply regulation have lower approval rate of expansions and more Medicaid violations than those counties with a surplus bed supply. Our analysis shows that CON policy makers are forced to the trade-off between the sizes of the industry and the quality of the service. The primary motive of this paper is to examine the effect of the presence of CON policy, and determine what factors might play a major role in the trade-off between quality and cost. The dominant type of ownership in the industry of long-term care is mainly for-profit nursing homes. Therefore, we only include the for-profit nursing homes in our analysis. Another reason for restricting our analysis to for-profit nursing homes exclusively is to eliminate the concern of inefficiencies occurring from the usage of labor hours as indicators of the measurements of quality. To elaborate, more labor hours worked may not necessarily represent a higher level of quality, especially in the non-profit nursing homes with a lower number of qualified and well-trained nurses, leading to inefficiencies and higher rates of dissatisfaction. We find that nursing homes in CON states tend to be less motivated to behave in higher standards to accommodate all patients to be well served.

The study is structured as follows: Section II presents some background regarding the establishment of the certificate of need regulation, while Section III provides a detailed literature review examining quality in the nursing homes industry. Section IV outlines the methodology, data, and variables incorporated in the study. Section V discusses the summary statistics. Section

VI presents the estimated results. Section VII, presents the robustness check, and two-stage least squares. Section VIII covers the summary and conclusion.

2. Background and Literature Review

This paper investigates the changes of Certificate of Need (CON) on the quality of care in the nursing home care. The CON regulation is mainly driven by the cost control factor, which leads nursing homes to behave according to the constraints imposed on the market by the state legislators. CON attempts to control nursing home costs by limiting the supply of beds with capacity limitations and entry barriers. This law was mainly intended to manage the growth of nursing homes and expansion of services to control costs. States without the certificate of need tend to be a bit more relaxed on their restrictions of a new market entrant or the development of an existing facility. Conceivably, CON restrictions limit the number of nursing homes providers, which may not be sufficient to hold enough capacity to meet excess demand by the senior citizens.

The CON regulations allow enough number of firms that meet the actual capacity of the market or the necessary demand, based on their targeted population (i.e. the population over the age of 65 years old). Therefore, the approval of new requests for new nursing homes or improvements of an existing facility will primarily depend on the need of the proposed market in relation to the demographics of that county in a given state. Planning agencies determine the number of firms and beds necessary in a specific market through an evaluation of the existing facilities and resources, once they arrive at a fair judgment of the actual supply needed. Whenever the state planning agency finds a matching need, the approval can be granted to begin the requested project.

Besides the federal policy changes, many states reacted to the increasing cost of long-term care by regulating the number of nursing home and services. Many states resorted to a strict cost reduction approach toward all health care providers (Hillman et al., 1999). The most significant primary law that is mainly driven by cost-control strategy known as the certificate-of-need (CON) program, which necessitates the approval of the state regulatory officials for either the establishment of a new health facility, or the growth of an existing service provider whether it is physical structural expansion or increasing their scope of services.[3] Moreover, the development of the nursing home industry has overlapped with the intense changes in the market for nursing home care (Bishop, 1999).

Conceivably, the most commonly accepted Donabedian (1988) published one of the most significant studies that focused on measuring the quality of health care. Three different classifications of quality standards were defined: structure of nursing homes, the process of the services, and clinical outcomes (Donabedian, 1988).[4] Some examples of this sort of measurement incorporates the physical features of the facility, classifications of the nurses, and the managerial staffing at a given facility (Spector & Takada, 1991). The second measurement looks at the assessment of the process, which measures the natures and magnitudes of services offered to patients in compliance with the accepted principles of proper care for particular conditions. According to Donabedian (1988), the three-part approach to quality measurement does not depend on one aspect "a good structure increases the likelihood of proper process and suitable process enhances the probability of a good outcome. Staff-to-resident ratios and costs are two examples of

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[3] The idea of enforcing a supply control is based on Roemer's Law; following the belief that utilization and supply are positively correlated, meaning when utilization rises, supply increases, regardless of the actual population's need (Roemer, 1961; Wiener, et al., 1999).

[4] These quality standards were initially established for the analysis of medical care services and have been broadly used in the studies on nursing homes. Structural assessment explores the characteristics of the location in which the care is being provided.

variables that have been used as predictors of quality. Higher staff-to-resident ratios are often considered as an indicator of high quality in some studies (Birnbaum, et al., 1981; Nyman, 1988a), and are used as a predictor of lower mortality rates in another (Linn, Gurel, & Linn, 1977). Likewise, expenditures on nursing home care are also used as indicators of higher quality, i.e. higher costs imply a quality premium. As a result, no agreement exists on a comprehensive set of the measures of quality that can be used as a substitute for structure, or process measures of care in the nursing homes (Shaughnessy & Kramer, 1990).

Currently, the literature does not provide a clear investigation of the differences in quality between those states without CON policies and other states that have implemented the CON policy. In one study that examines the impact of competition on nursing home quality, the statewide occurrence of this policy results in a lower level of quality of care (Zinn, 1994). A cost-control policy is viewed as a barrier to entry and a suppressant to competition offering no incentive to provide better quality of service. , Zinn (1994) used data from the 1987 Medicare and Medicaid Automated Certification Survey (MMAC) and stage least squares (2SLS) method. He argued that the restrictions imposed on nursing home construction lead to lower RN staffing and a higher percentage of residents being underserved, thus resulting in lower quality of service while controlling for market concentration, demographics, and Medicaid policies as well as resident and facility characteristics (Aaronson, et al., 1994). Using 1983 data from Wisconsin, OLS was used to estimate the relationship between excess demand and nursing home expenditures (Nyman, 1988a). In this study, nursing home costs serve as a proxy for quality. Utilizing the same data set and employing OLS as well as 2SLS, Nyman (1989) finds that nursing homes in counties with a tighter bed supply regulation have lower growth approval rates and more Medicaid violations than those counties without restrictions where there is a surplus in the bed supply (Nyman, 1989). To

account for endogeneity issue, but using 1980 New York state-level data, two studies estimate a reduced-form equation of the effect of a change in reimbursement rate on quality (Gertler, 1985; Gertler, 1989; Gertler & Waldman, 1992). However, those studies have not used any direct or proxy measures for CON. Additionally, New York applied a cost-plus method to project the states' reimbursement rates. The utilized data were from a time when New York was under CON regulation and was facing some excess demand conditions. Gretler (1989) used three input measures of quality: hundreds of hours of nursing labor, hundreds of hours of other labor hours, and a supply quantity index (Gertler, 1989). Both types of working hours are adjusted for efficiency variations across the nursing homes to exclude the concern that a nursing home spending more labor hours on care may not necessarily mean the home is of higher quality; perhaps the nursing home is simply more inefficient. While controlling for residents, facilities, economic condition, demographics, and market characteristics, the results show that an increase in the Medicaid reimbursement rate improves access for Medicaid residents, but lowers quality. Similarly, Gretler and Waldman presented the same result using total Medicaid expenditures as the measure of quality (Gertler & Waldman, 1992). Cohen and Spencer (1996) used the 1987 Institutional Population Component of the National Medical Expenditure Survey to assess the effect of the Medicaid reimbursement rate on quality. The effect of the Medicaid reimbursement rate on staff intensity is estimated, the effect of staff intensity on resident outcomes is examined. The intensity of staff working hours results in better outcomes (Cohen & Spector, 1996). Strahan (1996) distinguished quality using three proxies by three structural measures adjusted for case-mix: registered nurses (RNs) per 100 residents, licensed practical nurses (LPNs) per 100 residents, and total nursing staff per 100 residents. Other explanatory variables consist of the county-level number of empty beds per 1,000 individuals aged 75 and over. These variables were used as a

measure of market tightness to represent excess demand. The statewide average level of Medicaid reimbursement rates and a vector of facility characteristics, a vector of supply and demand factors, and several policy variables were also incorporated.

Some studies used health outcome measures as proxies for quality (Grabowski, 2001b; Grabowski & Hirth, 2003; Zhang & Grabowski, 2004). The structural measures used the number of RNs and professional and non-professional staffing levels and qualifications (Grabowski, 2001b). The process measures observe the rates of drug inaccuracy incidents, the level of physical mobility limitations, the usage of catheters and feeding tubes, and the number of nursing home deficiency citations (Grabowski, 2001a, 2001b). Using 1995-96 data on all U.S. Medicaid-certified nursing homes, Grabowski's results show that an increase in the Medicaid reimbursement rate leads to a significant, but a small increase in nursing home quality. Additionally, replicating Gertler's (1989) reduced form model to incorporate all nursing homes in the state of New York between 1995 and 1996 period. The OLS results show a relationship between reimbursement rates and quality. An increase in the Medicaid reimbursement rate improves quality. These results are different from the results obtained by Nyman (1989). Grabowski (2001a, 2001b) relates this to the fact that occupancy rates of nursing homes and an unobserved measure of excess demand have been changing over the period between the earlier studies and his studies. Strathan (1997) used several waves of the National Nursing Home Survey (NNHS) to tracked the decline in national occupancy rate which was dropping from 92.9 percent in 1977, 91.8 percent in 1985, to 87.4 percent in 1995. This variation in the size of the market may signify a change in the occurrence of excess demand conditions, which might serve as an explanation to the variations in the results between earlier Nyman studies (Nyman, 1985; 1988a; 1988b; 1988c; 1989; Nyman, et al., 1990) and Grabowski's.

3. Data, Variables, and Methodology

In this cross-sectional study, we have used the average of a triangulation of data sources covering three years including 2012, 2013 and 2014. The total number of counties in the contiguous states is 3144 counties. However, in this study, we have only included the contiguous states within the mainland only. For the same corresponding years, the source of the county-level demographic data of all contiguous states is extracted from the American Community Survey, which is surveyed by the United States Census Bureau and monitored by the United States Federal Statistical System. The political party affiliation is a state-level data that is collected from Pew Research Center. The second source of data that relates to the reimbursement rates based on the Federal Medical Assistance Percentages (FMAP) for the fiscal years of 2012, 2013, and 2014. The Department of health determines the amount of fund available for states' medical insurance using the FMAP. Those rates were extracted from the Office of the Assisted Secretary for Planning and Evaluation, which is under the supervision of the U.S. Department of Health and Human Services. The third official source of nursing homes dataset is provided by the Centers for Medicaid and Medicare services which is known as the nursing home Compare website, including more than 15,000 certified nursing homes nationwide. This source contains all deficiencies reported by inspection teams because of non-compliance with the state requirements. It also includes the cycle of the additional inspections, penalties, ownership type, counts of fines, the total dollar amount of fines, payment denials, providers' characteristics (number of beds per nursing home and number of residents per nursing home), staff rating and number of hours worked by staff, and health and fire safety.

Economic theory suggests a positive correlation between quality and in case of demand elasticity. Chiswick (1975) finds a high price elasticity of the demand for nursing homes (-2.2).

Therefore, we include the variables that affect demand as well as the quality of nursing home service in this analysis. The basic model controls for a wide set of covariates that account for health factors, economic factors, state policy factor, socio-demographic factors, and other related quality factors such as the essential measures of quality. The basic equation is:

$$y_i = a + CON_i + s_i + h_i + c_i + p_i + \varepsilon_i$$

Where y_i is the outcome variable, quality measurements for nursing home i. The key independent variable CON is a binary variable that equals one if the state i is implementing the Certificate-of-Need law and zero, otherwise. Socio-demographic factors are represented by the vector s, health factors are included in the vector h, and economic factors are represented by the vector c while p represents the state policy variation. The error term is represented by the last term ε_i.

3.1. Socio-demographic Factors

 The population over 85 years old can affect the demand for nursing home service as they increase the demand for long-term service (Scanlon, 1980). The percentage of the population over eighty-five is calculated by dividing the population over 85 by the average population and multiplied by a hundred. Other significant variables that we have incorporated are the natural log of the average population in each county and racial background, which is the population of white, black, and others. Nevertheless, minority tend to serve their elderly at home due to sociocultural variations (Murtaugh, Kemper, & Spillman, 1990).

In the case of women participating in the labor force, Chiswick (1975) finds a positive association between women participating in the labor force and the demand for nursing homes, since unemployed women are more likely to provide the in-home service to their own family elderlies and reduce the need for a nursing home service (Chiswick, 1975). A covariate that

represents disability is also included in the reduced form equation. It is calculated as the percentage of the disabled individuals within the county in the averaged population. States that have more disabled individuals may increase the demand for nursing home and reduce the quality of the service (Greene & Ondrich, 1990).

3.2. Health Factors

One of the most prompting factors is occupancy rate. Occupancy rate is calculated by dividing the number of residents in certified bed by the number of bed available in each nursing home. Feasibly, a higher occupancy rate indicates greater demand and that may allure the provider to reduce the cost to attract more patients. A reduction in the cost will leave a negative impact on quality. The percentage of individuals with health insurance indicates a healthier population and that may reduce the demand for nursing homes in the short-run by serving healthier lifestyle solutions for the elders and delay the need for long-term care. Though healthy individuals are expected to live longer, the need for a nursing home service persists in the long run.

3.3. Economic Factors

This study includes the natural log of the mean retirement income. Distinctively, individuals with higher retirement income may have the greater financial capability to be admitted to a private service provider. Consequently, this type of self-funded entrees may replace Medicaid patients by private patients, is expected to have a positive impact on the quality. Another vital factor is the natural log of the mean family income. Chiswick (1975) suggests that the demand for the nursing home is positively associated with the higher income, while Headen (1990) finds a shred of evidence that population with higher income seek to have a service that is more convenient and

the demand increases for in-home service (Headen, 1990). Chiswick (1975) stated that an analysis of the substitution between institutional and non-institutional care is also needed.

The higher unemployment rates may reduce the demand for nursing homes and affect the quality of the service provided. Moreover, the natural log of the median property value for each county is also included as a variable under the economic factors. Furthermore, the property value may affect the entry of new service providers and influence the expansion an existing the facilities. Higher property values are expected to deter new entrants and reduce the competition, which in return reduce the level of quality. On the other side, higher property value indicates a higher level of income and a greater demand for a higher quality service.

3.4. State Policies

Reimbursement rates vary from state to another. Medicaid reimbursement rates may increase the supply of nursing homes by attracting new entrants or expanding the existing service providers as long as the reimbursement rate is above the marginal cost of the service (Nyman, 1985). Medicaid reimbursement rates is used by legislators to regulate the number of bed vacancies. Yet, it increases the opportunity cost of attracting private patients due to the increase in the reimbursement rate.

3.5. Quality Measurements

Other research used changes in the residents' health to measure the quality of care such as unplanned weight gains or losses, incontinence, and bedsores. We suggest that changes in the residents' health could be affected by other factors, which bias the results. Almost 40 to 50 percent of all nursing homes' admissions are comprised of short stay, which does not allow sufficient time for those changes in the residents' health to be observed. Another limitation for reporting assessment is the lack of consumers' utility for public reporting. Research outside the nursing

home industry indicates that condensing complex medical information in a way that is comprehensible to nonprofessional audiences is not easy (Hibbard, et al., 1996).

3.5.1. Health Survey Scores

This includes the total weighted health survey score, which is performed by healthcare professionals such as registered nurses, dieticians, and social workers. This survey examines the cleanliness of a facility, the appropriateness of staffing, and the satisfaction rate of the sample of residents in every nursing home. The survey scores are shared with consumers as a tool to assist them in the evaluation of their future nursing home. The methodology of the scoring depends on meeting the requirements within the period of 9 to 15 months.

3.5.2. Working Hours of Nurses

The Centers for Medicare and Medicaid use the payrolls submitted by the participating nursing homes. However, they do not rely solely on the reported payroll hours submitted by nursing homes. For that, the Centers for Medicare and Medicaid classify the working hours into three types, differing based on calculations. The reported working hours are included in the submitted payrolls, which are reported by the nursing home. The expected working hours are based on the estimated average minutes for each nursing category produced by the CMS.

The basic rule of estimating the total expected working hours begins with the multiplication of minutes of each nurse type by the number of residents in the nursing facility, leading to the total of expected working hours for each nurse category. The state average of working hours is the mean of the all reported hours submitted to CMS for every state. The adjusted working hours per resident per day for each nursing category is calculated using the following formula:

*Adjusted Working Hours = (Reported Working Hours / Expected Working Hours) * State Average Working Hours * Adjusting Rate*

The last factor is the adjusting rate, which is incorporated in the below equation to confirm that the mean of adjusted working hours is equal to the mean of reported working hours.[5]

3.5.3. Health Inspections

All certified nursing homes must meet over a hundred regulatory standards intended to protect residents. Examples of these measures include appropriate management of medications, the safety of residents from physical and mental abuse, and the nature of food storing and preparation. The health inspection team is composed of qualified personnel, including at least one registered nurse. There are routine annual inspections, but additional inspections may be performed more than once depending on the outcomes of the annual investigations.

The supervisory standards are the main guidelines for the inspection team to follow while examining many characteristics of the daily practice at the nursing home including the level of care given to residents, the procedures of care, the interactions between staff and residents, and the overall atmosphere of the nursing home. The inspector's team will also evaluate the residents' medical records, interview a sample of residents including family members, and examines the qualifications of the nurses and the managerial staff. Respectively, a nursing home that provides services to people with Medicare or Medicaid is obligated to make the scores of its last inspection accessible for the public use. These inspectors evaluate the nursing home to confirm meeting the minimum requirements. If a nursing home does not have any deficiencies, it means that it has only

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[5] In our analysis, we include the rating of the staffing and nurses, which captures the differences of the level of care by the residents' level of severity. For instance, a nursing home that hosts residents with a higher level of chronic disease is expected to have staffing and nurses with higher skills to match the needs of those residents.

convened the minimum standards at the time of the inspection. However, Inspections do not identify nursing homes that give outstanding care.

3.5.4. Health Complaints

We are using the average of health deficiencies in addition to the average of health complaints, and the natural log of the total dollar amount of fines resulting from non-compliance. Some of those complaints are self-reported due to the lack of proper care of residents, especially those residents with chronic diseases such as arthritis, asthma, fatigue, and mobility impairment. Overall, health complaints projected little health-related quality of life. For instance, women had lower health-related quality of life than men and potentially higher degree of self-reported health complaints. (Borglin, et al., 2005). Several health claims are amenable for their prediction of low qualities of service; and for the strong impact on nursing home care. In most cases, nurses can assist in the early detection of health complaints that negatively affect the quality of life by applying more procedures that are preventive as well as a higher degree of comprehensive and systematic assessments. It also seems important to consider that older women's and men's needs for high quality of life may always differ.

The Complaint Unit falls under the state's department of health. This unit offers an efficient way of processing complaints received from the primary contact, beginning with the intake of a complaint to the investigation until claim closing. The investigation team strives to warrant a safe environment and a high quality of care provided to those recipients of care by certifying the providers of services and nursing home facilities. It guarantees that long-term care providers continuously meet Medicare/Medicaid and state requirements. Complaint investigation remains anonymous, and the identity of the resident is never disclosed. The definition of "improper care"

involves any complaints resulting from inaccurately prescribed drugs or wrongfully planned medication at a nursing home, and any inappropriate treatments offered to residents. It also includes early discharging of a resident from a hospital to the nursing home after performing a needed surgery, or inadequate discharging procedure.

4. Summary Statistics

Summary statistics in Table 1 shows that the implementation of CON has limited the supply of nursing home. Consequently, the patient to bed ratio appeared greater in CON states. Table 1 indicates that CON states have a relatively higher occupancy rate, 81% compared to 79% in non-CON states. The number of population is substantially small in the CON states. Nevertheless, there are more health-insured individuals in the CON states. The percentage of health-insured individuals is 3.5 percentage points higher in CON states. The overall economic conditions in the CON states are relatively more severe than of the non-CON states. Furthermore, retirement and family incomes are also comparatively smaller in the CON state than in the non-CON states. Retirement income in the CON states is less by 6%, and household income is less by 5.6% compared to the non-CON states. Another significant discrepancy emerged from the property values in the CON states, which tend to be substantially lower by 24% than the non-CON states, while the unemployment rate is only higher by 0.3 percentage points in the CON states. Table 1 shows the aged and disabled population are relatively higher in the CON state, which may explain the attempt to control the cost of the nursing homes by these states through the implementation of the CON laws. The proportion of the disabled population, over the age of 65, and 85 years old indicated higher percentages in the CON states by 1.9, 1.7, and 0.3 percentage points, respectively. A higher proportion of African-Americans and a lower percentage of other race minorities live in

the CON states, which is consistent with the relatively lower income levels and higher rates of unemployment in the CON states.

Table 2 shows that quality measurements tend to be lower in the CON states. While the weighted health survey score is considerably lower in the CON states. Nevertheless, the CON states scored a marginally higher health inspection rating and a smaller number of complaints due to more regulation. Although the number of complaints was less in the CON states, the total number of fines was significantly higher, reflecting lower level of compliance with the regulation. Yet, at a lower level of quality, the nursing home industry is prone to ongoing higher amounts of fines.

5. Estimation Results

The first column of model (a) in Table 3 and 4 represents the regression with only the socioeconomic factors included in the reduced form equation. Socioeconomic factors include the percentages of the population over eighty-five, the natural log of average population in each county, race, and percentages of the disabled individuals to the average population. The second column of model (b) includes the economic factors such as the natural log of the mean retirement income, natural log of the mean family income, a county level unemployment rate, and the natural log of the median property value for each county. The third column of model (c) includes policy factors such as reimbursement rate. The fourth column of model (d) includes health factors such as occupancy rate and percentage of the population with health insurance.

The results in Table 3 show a significant reduction in the quality measurements in the for-profit nursing homes located in the CON states. Being in a CON state negatively affects the health survey score. Total weighted health survey score is reduced by 10 points in CON states. The impact

is statistically significant under 1% level of significance. The result displayed in (Table 3) provides evidence that nursing homes in the CON states control the cost by reducing the quality of service. The analysis provides evidence that nursing homes in CON states substituted the expensive labor hours provided by Licensed Practical Nurses (LPNs) with cheaper labor hours provided by Certified Nursing Assistants (CNAs). An average for-profit nursing home in a CON state reduces the daily worked hours per resident of Licensed Practical Nurse by .033 hour (approx. 2 minutes) and increases the daily worked hours per resident of Certified Nurse Assistant by .1 hour (6 minutes). The average nursing home has 90 residents, which means that an average for-profit nursing home in a CON state reduces the expensive hours worked by LPNs by 3 hours. There is no evidence that being in a CON state affected the hours worked by Registered Nurses (RNs) as the effect turns to be statistically insignificant after adding the economic factors (Table 3).

Staff rating showed a trivial increase of .1 points for a nursing home situated in a CON state, which cannot be considered as a quantifiable improvement in the quality of services provided. There is also a slight improvement in the rate of health inspections and health deficiencies. Governments' inspection teams perform their nursing home assessments on an annual basis. The teams are responsible for additional investigations for any filed complaints and reporting them as deficiencies when the claims are found valid. The improvements in the health inspection ratings and health deficiencies are economically insignificant. An Average nursing home in CON states has a higher health-inspection rate by a trivial .09 points and a lower health deficiencies rate by .18 incidents. This slight improvement could be explained by the ability of the for-profit nursing homes in CON states to meet the minimum standard that satisfies the requirement of passing the inspection. Yet, they failed to satisfy their residents since the trade-off

between quality and cost appears to deteriorate residents' score survey and reduces the hours of Licensed Practical Nurses.

Table 5 presents a list of covariates that we assume may affect the quality of service in the for-profit nursing homes in addition to all other types of ownerships located in the CON and Non-CON states. These covariates are the reimbursement rate, occupancy rate, disability rate, percentage of population over 85, and the percentage of women participating in the labor force.

Table 5 dictates that the reimbursement rate is positively associated with the quality of care in the CON states, while there is no evidence of a correlation between the reimbursement rate and quality of care in the non-CON states. This could be due to the size of a greater market share of the Medicaid patients in the CON states, allowing a greater impact of the reimbursement rate on the quality of care. The effect is higher on the for-profit nursing home compared to all other types of ownership.

As expected, the occupancy rate is negatively affecting the quality of service of the nursing home industry as a whole, including all types of ownerships, whether it is located at a CON or a non-CON state. On the contrary, the percentage of disability shows no effect on the quality measurements. As for the percentage of population over 85, which reduced the quality of service of the nursing homes located in the CON and non-CON states, which also affected all types of ownerships of nursing homes. This reduction is primarily caused by the population over the age of 85 years old, which lead to the higher demand for services at a heavily regulated state and understaffed nursing homes. Therefore, the effects seemed higher in the CON states, where the expansion of services is limited, and the supply of nursing homes is restricted.

The percentage of women in the labor force is negatively associated with the quality of care of nursing homes in the CON states. A decrease in the quality may be caused by higher demand,

which provides evidence of a positive correlation between the percentage of women in the labor force and the demand for nursing home care.

6. Robustness Check

The results in Table 6 is a replica of Table 3 results, yet without excluding the other types of nursing homes that are non-profit and governmental. The results are consistent with the findings in Table 3. Being in a CON state leads to a reduction of 5.6 points in the health survey score for all types of nursing homes, compared to a reduction of 10 points for the for-profit nursing home. The decline in the hours worked by the LPNs is similar to the decrease in LPNs worked hours in for-profit nursing homes. An average nursing home in a CON state reduces the daily worked hours per resident of Licensed Practical Nurse by .032 hour (approx. 2 minutes) and increase the daily worked hours per resident of Certified Nurse Assistant by .12 hour (7.2 minutes). The slight improvement in health inspection rating and health deficiencies turned to be statistically insignificant when the non-profit and governmental nursing homes were included in the analysis. The number of fines is not affected by whether the nursing home is in CON state or non-CON state. The last column of Table 6 is a replica of the analysis of the full model (Column d) but after excluding the for-profit nursing homes from the sample. The results came comparable to the analysis for the full sample; however, non-profit nursing homes did not reduce the hours worked by LPN, as reducing the cost is not a priority for non-profit organizations where the profit is not the main drive.

6.1. Two-Stage Least Squares

There was a concern that state's decision regarding implementing CON is not independent of the quality of nursing homes care, which may bias the results. Two-Stage Least Squares (2SLS)

regression is used to check the robustness of the results. Republican affiliation is used as an instrumental variable for the CON states. Party affiliation by state data for the year of 2014 is collected from the Pew Research Center. The instrumental variable passed both the relevancy and the exogeneity tests. The coefficient of the Republican Party affiliation is statistically significant when it serves as an explanatory variable for the implementation of the CON law (F-stat = 48), which indicates that the IV is not weak and has desirable asymptotic properties. Thus, IV estimates are unbiased. An increase of 1 percentage point of the Republican affiliation of the state leads to an increase of .5 percentage point of the likelihood of implementing the CON (p-value < .05). The instrument is uncorrelated with the residual of the main equation (p-value > 0.1), which makes it exogenous to the outcome variables. Table 7 displays the results of the Instrumental Variable (IV) model for the for-profit nursing homes and all other types of nursing homes. The IV model renders comparable results to the OLS model. We also conducted a Hausman test for exogeneity, which showed that the CON results were not biased. Thus, the CON variable could be treated as exogenous.

7. Conclusion

In this paper, we pursued an unconventional approach to analyzing nursing homes quality of service under either the presence of an antitrust law or the absence of such regulation. The estimated model enables us to answer some of the questions that previous studies has not tackled. In particular, the model enables us to identify which outcome variable; quality measurements for nursing home quantify the extent of rationing. We also examined the relationship between the law and service outcomes and quality of care. Compared with previous studies Nyman (1985); (1988a); (1988b); Nyman, et al., (1990); Grabowski (2001b); Grabowski & Hirth, (2003), and Zhang & Grabowski, (2004), the reduced-form model in this study controls for the providers' characteristics

including the high occupancy rates, which is a more common phenomenon in the CON counties. However, it is not clear if the lack of CON represented by the capacity and nursing home growth constraints would necessarily improve social welfare because providing extra nursing home care can dramatically increase Medicaid expenditures. In particular, our study assumes that nursing home quality to be endogenous in the short run due to health inspections and deficiencies. Although we believe this assumption is reasonable for our research purpose, which is to develop an empirical framework to quantify the extent of rationing at a given point of time, it is certainly a limitation if one is interested in understanding the long run equilibrium.

This study finds evidence that the implementation of CON laws may impact the quality of nursing home care by a significant reduction in the patients' satisfaction and a reduction in working hours by more skilled nurses. An average nursing home in a CON state has a reduction of 10 points in the health survey score and a reduction in the LPN worked hours by 3 hours per day compared to a nursing home that is located in a non-CON state. Lin (2012) has taken an important step towards this research direction by developing a dynamic oligopoly structural model. However, such a model is very computationally intensive and not amenable to empirical estimation. Future research may combine our quality model with a dynamic supply side model of quality choice, for assessing the long-term impact of government regulations.

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APPENDICES

APPENDIX A: TABLES

Table 1.
Summary statistics for some of the important covariates

Covariate	With CON	Without CON
Occupancy Rates	81%	79%
	(17.27)	(18.68)
Population	108,070	168,788
	(256,016)	(558,806)
Retirement Income	22,054	23,490
	(4,559)	(4,478)
Family Income	79,100	83,840
	(21,589)	(18,639)
Health Insured	87%	83.6%
	(4.66)	(5.80)
Unemployment Rate	6%	5.7%
	(1.49)	(1.57)
Disability	13.6%	11.7%
	(4.77)	(3.84)
Property Value	170,500	223,677
	(96,157)	(148,647)
Reimbursement Rate	60%	57%
	(7.38)	(6.04)
Population Over 65	15%	13.3%
	(5.17)	(4.86)
Population Over 85	2%	1.7%
	(0.34)	(0.38)
White	75.7%	75%
	(8.88)	(9.6)

Table 1 (cont.)

Covariate	With CON	Without CON
Black	15%	7.7%
	(8.66)	(3.25)
Other Minorities	9.3%	17.5%
	(5.05)	(10.15)
Women in Labor Force	58.5%	58.7%
	(3.05)	(2.95)

Notes: the numbers in parenthesis are the standard errors

Table 2.
Summary statistics for the quality Measurements

	With CON	Without CON
Health Survey Scores	51.61	81.35
	(65.09)	(84.26)
RN	0.53	0.53
	(0.23)	(0.26)
CNA	2.39	2.42
	(0.56)	(0.63)
LPN	1.06	1.08
	(0.41)	(0.45)
Nurse	3.84	3.88
	(0.74)	(0.83)
RN Rating	3.26	3.21
	(1.18)	(2.27)
Staffing Rating	3.04	3.02
	(1.09)	(1.19)
Health Inspection Rating	2.72	2.63
	(1.28)	(1.27)
Health Complaints	1.81	2.43
	(2.49)	(3.29)
Total Number of Fines	10,281	6,702
	(47,892)	(26,506)

Notes: RN is adjusted RN staffing hours per resident per day. CAN is adjusted CNA staffing hours per resident per day. LPN is adjusted LPN staffing hours per resident per day. Nurse is adjusted total nurse staffing hours per resident per day.

Table 3.
Regression estimates of certificate of need (CON) on quality
measurement variables

	Coefficient	Standard Error
Health Survey Scores	-9.9346***	(2.2814)
RN	-0.0076	(0.073)
CNA	0.1033***	(0.0180)
LPN	-0.0329**	(0.0131)
RN Rating	-0.0116	(0.0360)
Staffing Rating	0.1070***	(0.0345)
Health Inspection Rating	0.0942**	(0.0411)
Health Deficiencies	-0.1797**	(0.0885)
Fines	0.0194	(0.1014)

NOTES. —The model includes the socioeconomic factors, the economic factors, state policies variables, and health factors.
*$p<.05$, ** $p<.01$, ***$p<.001$

Table 4.
Reported coefficients for some of the covariates that were used in the analyses

	With Occupancy Rate	Without Occupancy Rate
CON	-9.9346***	-9.1545***
	(2.2814)	(2.2881)
Reimbursement rate	.5859***	.6093***
	(.2217)	(.2226)
Occupancy Rate	-.3916***	
	(.0485)	
Disability	.3856*	.3689
	(.2271)	(.2279)
Over 85	-12.5606***	-15.5287***
	(3.2271)	(3.2185)
Women in Labor Force	.5126	.4979
	(.4471)	(.4488)
Retirement Income	22.5958***	22.2422***
	(6.5564)	(6.5815)
Unemployment Rate	-2.1708***	-2.3181***
	(.6854)	(.6878)
Property Value	-35.1083***	-37.7846***
	(3.3853)	(3.3819)
Health Insurance	-.5313**	-.6007***
	(.2284)	(.2291)

NOTES. — The analysis is a replica to the Model (d) Table 3 (full model). Health Insurance is the percentage of the population that have health insurance. *$p<.05$, ** $p<.01$, ***$p<.001$

Table 5.
Reported coefficients for some of the covariates

	CON States			Non-CON States		
	For-Profit Nursing Homes					
	Health Survey	LPN	CNA	Health Survey	LPN	CNA
Reimbursement Rate	0.9705***	-0.0009	0.0123***	1.6358***	0.0014	-0.0044
	(0.2481)	(0.0015)	(0.0021)	(0.5951)	(0.0030)	(0.0042)
Occupancy Rates	-0.4024***	-0.0019***	-0.0018***	-0.4214***	-0.0040***	-0.0013
	(0.0537)	(0.0003)	(0.0004)	(0.1008)	(0.0006)	(0.0008)
Disability	0.1654	0.0013	-0.0001	0.6886	-0.0032	-0.0059
	(0.2299)	(0.0014)	(0.0019)	(0.5878)	(0.0029)	(0.0042)
Over 85	-15.8027***	-0.0423*	0.4540***	-0.8494	-0.1101**	-0.1912***
	(3.6964)	(0.0228)	(0.0306)	(8.4303)	(0.0432)	(0.0604)
Women in Labor Force	-0.3315	-0.0317***	-0.0260***	5.2862***	0.0034	-0.0074
	(0.5029)	(0.0031)	(0.0042)	(1.3651)	(0.0070)	(0.0098)
	Other types of Nursing Homes					
Reimbursement Rate	1.0002***	0.0012	0.0102***	0.5642	-0.0019	-0.0055*
	(0.1831)	(0.0015)	(0.0020)	(0.3535)	(0.0021)	(0.0029)
Occupancy Rates	-0.3885***	-0.0025***	-0.0029***	-0.3685***	-0.0027***	0.0015***
	(0.0413)	(0.0003)	(0.0005)	(0.0641)	(0.0004)	(0.0006)
Disability	0.0946	-0.0005	0.0003	0.2369	-0.0027	-0.0052*
	(0.1393)	(0.0011)	(0.0015)	(0.3215)	(0.0019)	(0.0027)
Over 85	-13.6926***	-.0423*	.3157***	-10.9694**	-0.1306***	-0.1233***
	(2.7442)	(0.0219)	(0.0305)	(5.255)	(0.0315)	(0.0439)
Women in Labor Force	-.02749	-0.0290***	-0.0171***	2.3467***	-0.0036	-0.0031
	(0.3721)	(0.0029)	(0.0041)	(0.8082)	(0.0048)	(0.0067)

*p<.05, ** p<.01, ***p<.001

Table 6.
Regression estimates of certificate of need (CON) on quality measurement variables for all types of nursing homes and non-profit

	For-Profit		Only Non-Profit	
	Coefficient	Standard Error	Coefficient	Standard Error
Health Survey Scores	-5.5782***	(1.4841)	-4.1054**	(1.9244)
RN	-0.0083	(0.0063)	0.0120	(0.0108)
CNA	0.1196***	(0.0149)	0.2037***	(0.0246)
LPN	-0.0317***	(0.0105)	-0.0142	(0.0176)
RN Rating	-0.0635**	(0.0249)	-0.0316	(0.0348)
Staffing Rating	0.0557**	(0.0246)	0.1337***	(0.0346)
Health Inspection Rating	0.0261	(0.0285)	0.0315	(0.0402)
Health Deficiencies	-0.0178	(0.0569)	0.0236	(0.0713)
Fines	-0.0512	(0.0753)	-0.1238	(0.1151)

*$p<.05$, ** $p<.01$, ***$p<.001$

Table7.
Two-stage least squares estimates for for-profit and all types of nursing homes

CON	For-Profit	All Types Nursing Home Nursing Home
Health Survey	-19.6992***	-14.8774***
	(4.1250)	(4.7405)
RN	-0.0104	-0.0093
	(0.0133)	(0.0203)
CNA	.3123***	.2622***
	(.0326)	(.0271)
LPN	-0.0877***	-0.1011***
	(0.0206)	(0.0265)
RN Rating	0.1551	-0.0932**
	(.1285)	(.0445)
Staff Rating	0.2069**	0.0735*
	(0.0999)	(0.0456)
Health Inspection Rating	0.4875***	0.1021
	(.1195)	(.1284)
Health Deficiencies	0.3731	-0.0335
	(0.2543)	(0.0638)
Fines	0.0602	-0.1150
	(0.3736)	(0.2652)

*p<.05, ** p<.01, ***p<.001

CHAPTER III

DO NURSING HOMES PARTICIPATE DIFFERENTLY? THE EFFECT OF OPERATIONAL CHARACTERISTICS AND TYPES OF OWNERSHIP ON MEDICAID PARTICIPATION

1. Introduction

Federal programs like Medicaid and Medicare are offering the coverage for services provided by approved participating facilities, which support the ultimate goal of improving managed care and optimizing the growth of the industry. The coverage of services is primarily conditional on meeting the requirements of participation for nursing home. Therefore, the existing differences between the types of ownership constitute that their operational characteristics may also lead to varying eligibilities (Commodore et al., 2009). This study focuses on the participation of the facilities, rather than the enrollment of residents. Most of the current literature has shown a great deal of attention on the aspect of participation of residents in Medicare, or Medicaid without controlling for the variations in the participation of nursing home facilities.

One of the major debates in the nursing homes research circle is the predominant focus on the variation in performance and quality across nursing home facilities. This concern widely addressed to determine the impact of for-profit nursing homes and non-for-profit nursing homes on the outcome of the residents (O'Neill et al., 2003). Others like Grabowski and Stevenson (2008) found that nursing homes converting from nonprofit to for-profit are suffering from deterioration of their overall performance, while the opposite conversion led to progressive results.[1] However,

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[1] Grabowski and Stevenson examined the effect of ownership conversion on the overall performance of nursing homes using an online Survey, Certification and Reporting system data from 1993 to 2004.

Hirth, et al., (2000) examined the mobility of residents in Maine and New York and found several barriers to resident's mobility, which appeared to be mainly related to health limitations. Thus, the primary motivation of this study is to analyze the impact of the interrelationships between organizational characteristics, operational activities, and quality characteristics of nursing homes on Medicaid participation by including all types of ownerships. Ownership characteristics consist of three categories of ownership: for-profit facilities, not-for-profit facilities, and governmental facilities. There are also subcategories for each type, which I include in my analysis; for instance, for-profit includes individually owned nursing homes, LLCs; Partnership, and Corporation. Whereas, not-for-profit nursing homes includes nursing homes that are church-related, corporations, and humanitarian organizations nursing homes, and other not-for-profit nursing homes that are not related to churches, but affiliated with other religious groups. The last category of ownership types that I am including in this analysis is the governmental nursing homes. The subcategories of these types capture facilities that are governed by the city only, city and county, county alone, state government, and federal government. As for the operational characteristics, they are represented by the reported inspections of daily practices which are preformed three times annually by the regional health assessors. In addition, I am including other characteristics that represents the size and quality of nursing homes facilities such as: the number of residents, quality rating, number of hours worked by every category of nurses, number of fines, and payment denials.

Sommers et al., (2012) and Zammuto, (1984) are among the few studies that were explicitly focusing on the establishment of a comprehensive investigation on Medicaid enrollments of residents and the justifications for the variations in health care institutions. Specifically, Sommers et al. (2012) found that the nationwide percentage of Medicaid enrollees reached 63 percent of

eligible adults. Nevertheless, the CMS guidelines for participation tend to be very situational.[2] In this study, I focus on Medicaid participation as the outcome variable using the logistic regression analysis. My findings show an increase by five percentage points in the probability of Medicaid participant for the case of the for-profit facilities that are individually owned as compared to corporation. In addition, my findings show a reduction in the probability of Medicaid participation by 15.29 percentage points for for-profit LLCs, and a decrease by about eleven percentage points for the case of for-profit partnerships in contrast to for-profit corporations. Moreover, if the owner was some government agency or entity, there are some significant reductions in probability of Medicaid Participation depending on the governing body such as: city/county, county, hospital district, and state. In all four cases, the marginal effects of being a Medicaid participant were reduced as compared with for-profit corporation type. Specifically, ownership by the city experienced a reduction in the probability of participating by six percentage points, and in the case of county ownership it is associated with a lower probability of participation, which is reduced by a factor of 23 percentage points. Additionally, the non-profit type of ownership is also associated with reductions in the probability of Medicaid participation whether they are church related nursing homes, or any other subcategory of not-for-profit nursing home.

This study is structured as follows. Section II presents some background regarding the conditions of Medicaid participation, while Section III provides the detailed literature review examining the role of ownership and operational characteristics in the nursing homes industry. Section IV outlines the data, methodology, and variables incorporated in this study. Section V

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[2] Those guidelines are assisting nursing homes in meeting the recommended duties and protecting the rights of residents, but do not guarantee participation or grant the nursing home facility the final decision (Center for Medicare & Medicaid Services, 2004)

discusses the results of the bivariate statistics, correlations, and the results of the logistic model. Section VI summarizes and draws conclusion based on the findings.

2. Background on Medicaid and Conditions for Participation

Generally, all services provided for Medicaid residents are covered only if the service provider is qualified to be a Medicaid participant. Thus, the recent congressional mandate requires Residents Assessment Instrument (RAI) to be performed on all nursing homes that have been providing inpatient medical care services to measure the overall quality of care of the providers. The assessment examines the compatibility with the conditions of participation to federal funding under Medicare or Medicaid and for the primary goal of enabling improvements of health care planning (Hutchinson et al., 2010). Regularly, inspections are performed annually, where operations from the admission of residents to other settings of care are examined. Therefore, service providers must always meet the necessary condition-for-participating (CFP).[3] Many operational characteristics and the daily practices at the nursing home are examined including: the level of care offered to residents, the procedures of care, the interactions between staff and residents, and the overall atmosphere of the nursing home. The outcomes of the examinations are reported to CMS. The CFP of nursing homes only focuses on the operation of services, qualification of staff, and quality of care offered by the nursing homes to residents. On the contrary, there are other conditions for participation made specifically to examine the eligibility of current and prospective residents. CFP for residents widely differ from CFP of nursing home facilities. The CFP inspect the status of residents focusing on the admissibility of residents to Medicaid

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[3] The conditions-for-participation (CFP) manuals are supervisory standards that serve as the main guidelines for the inspection team. The inspection team evaluates the services provided by nursing homes following those standards.

coverage. The eligibility of residents relies on the health assessments of the resident, income eligibility of the applicant, and evaluations of assets owned by the resident.

The total number of Medicaid covered residents as of 2014 was around 1.5 million. Most of those residents are seniors and four out of five residents are above the age of 65 years old. Figure 1 shows the percentage of Medicaid participating nursing homes facilities by state. Eleven states have nursing home participations that exceed 67 percent, while thirteen other states have participations between 62 percent and 66 percent. The shares of Medicaid participants for the other 14 states were between 58 and 61 percent, and the remaining 13 states were less than 58 percent. Most of the residents are Medicaid participants. Thus, the need for nursing homes, or long-term care, in general, continues to grow due to increased life expectancy, which leads to high shares of aging population needing care. This also means that one in three individuals turning 65 year old will need long-term care at some point in their lives. Unfortunately, the typical annual cost of those services does not seem to be decreasing, but rather continues to increase as long the share of the aging population is also rising.[4] Thus, costs are increasing at a faster rate than the growth of the industry itself.[5]

All certified nursing homes must meet all conditions-for-participation which are intended to protect residents. Examples of these measures include appropriate management of medications, the safety of residents from physical and mental abuse, the nature of food storing, and meeting the fire department guidelines. Respectively, states assign inspection agencies to conduct investigations on every federally funded health care services. The essential purpose of those

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[4] The average annual cost of $80,000, which is approximately three times the annual income of most seniors (Johnson and Park, 2011).

[5] As of 2014, around 48 million individuals or 15% of the US population were over the age of 65 and the total number of seniors is expected to grow even more (Ortman, et al., 2014).

agencies is to ensure compliance with the federal conditions in these nursing homes. Participation is not mandatory and nursing homes voluntarily apply for participation in order to become covered by Medicaid, or Medicare. Nursing homes must always satisfy all the routine annual inspections and all future additional checks that may apply to redress any violations. In the case of compliance with the primary conditions for participation, the inspections are reported to CMS and evaluated by CMS personnel. The approval of participation secures the federal funding and provide the coverages for services offered by certified nursing homes.[6]

3. Literature Review

The mainstream empirical studies such as Gertler, (1992), Cohen and Dubay, (1990) analyzed the association between the nature of ownerships and healthcare outcomes. Most of those studies were essentially controlling for the effect of ownership status by using a dummy variable for type of ownership, but they excluded governmental nursing homes. This oversight can bias inferences about the effects of ownership types. Since the performance of for-profits, governmental, and non-profit nursing homes differs extensively, the coefficient of the ownership variable will also be biased. Kenneth Arrow's (1963) seminal study analyzed the organizational differences and various forms of operational differences in health care services. Conversely, O'Brien et al. (1983) assume that the performance of nursing homes is indistinguishable across non-profit and for-profit facilities and ignores the governmental types. Davis (1991) argues that the evidence is inconclusive in regard to whether non-profit facilities or for-profit facilities have higher quality measures which may also signal for high participation rates. More work in the literature by Holtmann and Ullman,

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[6] Overall, Medicaid tends to be the primary payer for the nursing homes, where Medicaid covers 6 in 10 residents. In 2014, around $55 billion was paid for long-term care, and accounting for 70% of the spending.

(1991), and Harrington et al., (2001) found mixed evidence on this particular issue without the inclusion of subcategories of ownership.

The affiliation to a particular ownership type may lead to different conclusions when it comes to the patient's outcomes. Therefore, it would be rational to witness some variations in the eligibility of nursing home. Other previous studies indicated some correlations between the organizational structure and the number of violations, the outcome inspections, and the number of payment denials. However, the most common theme tends to focus on for-profit nursing homes. For-profit nursing homes account for two-thirds of the total market share (Grabowski and Stevenson, 2008). Nonetheless, no empirical study evaluates whether governmental, non-profit, or for-profit nursing homes are the having high rates of participation in federal funding programs. Unfortunately, most of the existing literature tends to treat each type of ownership in isolation from other categories, which may also function differently due to their affiliation to different structures and various procedures. Thus, the variation in participation rates among nursing homes within the same category of ownership type cannot serve as a valid verification without the inclusion of all other forms of ownership (Hirth, 1999). A few number of empirical work integrated the operational measures of all ownership types.[7] Hirth (1999) used data from the 1985 National Nursing Home Survey (NNHS). The study indicated that, on average, there are some disparities between the private-pay price at a non-profit nursing home and the private-pay price at a for-profit facility, but no impact of price itself on the primary payer (Hirth,1993). The data that Hirth (1999) stated that the non-profit facility has 31% private-pay residents while a for-profit home has 21% private-pay residents. Moreover, Hirth (1999) estimated the effect of ownership on

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[7] Klien and leffler (1981) indicated some evidence on the impact of ownership types on prices, and several studies found that non-profit nursing homes are more likely to have higher price than others, signaling for higher qualities.

measures of staffing skill mix, which accounts for registered nurse hours divided by total hours, and found that non-profit ownership was associated with high qualities. Another study Spector et al. (1998) used the 1987 National Medical Expenditure Survey (NMES). The study estimated the effect of non-profit status on various measures of quality including mortality, infections, bedsores, hospitalizations and functional disabilities and found that non-profit homes provide a higher quality of care than for-profit nursing homes. However, these scholars did not investigate the impact on Medicaid participation.[8]

O'Neill et al. (2003) examined the relationship between profits and quality of care in California using the Online Survey Certification and Reporting System and other statistical reports for 1998 and 1999. They included the deficiencies and facility size as a measure of quality. The study highlighted the negative correlations between organizational structure and the performance of nursing homes. Remarkably, they found profits above a certain profit threshold were highly associated with a higher number of incidents and deficiencies. From the cost structure perspective, McKay (1991) examined a population of Texas nursing homes in 1983, and the differences in their cost structures across all types of ownership. The results indicated some differences in costs among organizational forms when other mediating factors influencing costs were held constant. The findings suggested that for-profit chain homes have lower average costs than independently owned homes. Therefore, average costs tend to be differing between the types of ownership. Fottler, et al., (1981) found a negative association between profits and deficiencies which was linked to the variation in the nature ownership structure of nursing homes. The findings from the stratified

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[8] Cooper, & Ross, (1984) suggested the use of a full information model to enhance prices and coverages.

analysis in O'Neil et al. (2003) showed that for-profit nursing homes were performing inefficiently on other quality measures compared to the non-profit nursing homes.

Alternatively, the significance of non-profit establishments in the healthcare sector has produced a massive empirical literature inspecting some operational factors between non-profit and for-profit nursing homes. Harrington, et al., (2001) suggested that the increase in non-profit market share might dramatically improve performance. In response, better performance may lead to high levels of qualities which should also lead to high rates of participation. However, the relationship between ownership characteristics and quality does not reflect participation rates for all other categories of nursing homes. For example, those areas with a strong liking for non-profit nursing home, may be precisely those regions that adopt "tax laws" or regulatory measures preferring the non-profits than others (Schlesinger, et al., 1996). Although there are some other studies have found that higher qualities in the not-for-profit nursing homes, it is unclear whether these higher qualities reflect higher participation rate, or encourage non-profit nursing homes to participate more than other ownership categories. For instance, Gottesman, (1974) showed in his findings that nonprofit church-related homes have been known to serve a more socially advantaged population who have community persons actively interested in them. Frank,& Salkever (1994) stated that with the availability of information on quality, it will eliminates the "trust signal" advantage for the non-profit nursing homes. Finally, Lee, et al., (1983), Zinn, et al., (1992), Gray, (1993), and Sloan, (2000), highlighted the importance of considering pooling the data across all ownership categories when estimating nursing home's outcomes.

4. Data and Methodology, and Variables

To address all the potential issues, I am using a logistic model for the estimation of the impact of operational characteristics, primary payers, and ownership types on the plausibility of participation in Medicaid. In this cross-sectional study, I have included the contiguous states within the mainland only. The year of interest in this study is 2014, with the demographics that includes all the contiguous states, which are extracted from the American Community Survey (ACS). The ACS is surveyed by the United States Census Bureau and monitored by the United States Federal Statistical System. The second source of nursing homes dataset is provided by the Centers for Medicaid and Medicare services (CMS.gov), which is known as the Nursing Home Compare website. The CMS includes more than 15,000 certified nursing homes nationwide.[9] However, they do not rely solely on the information submitted by those nursing homes. More importantly, I have included the payer's type to control for the primary payer. This variable will capture the effect of Medicare coverage and other private payers, which I am expecting to have a major significance in my analysis.[10]

Economic theory suggests that for-profit nursing homes will produce socially efficient products (Newhouse, 1970) in which regulators will not be misled and can easily evaluate services provided prior to coverage.[11] There are many grounds to believe that this is not the case in this industry of nursing homes. Participation decisions in its nature tend to be non-technical. However,

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[9] This source contains all deficiencies reported by the inspection teams because of incompliance with the state requirements. It also includes the cycle of the additional inspections, penalties, ownership type, counts of fines, the total dollar amount of fines, payment denials, providers' characteristics (number of beds per nursing home and number of residents per nursing home), staff rating, number of hours worked by staff, and health and fire safety.

[10] The White Paper published by the National Committee for Quality Assurance (2013) shows that Medicare only covers limited post-acute care and many services covered by Medicaid are not covered by Medicare, or may not be always affordable for private coverages.

[11] Efficient nursing homes are more motivated to be in compliance and they would always redress violations to meet condition for participation.

the conditions for participation is what seems to be the complicated riddle. Patients in this case neither are the decisions makers nor are always able to evaluate the services (Norton, 2000). Brilliantly, there are relatively few nursing home-to-nursing home transfers in this industry, which omits factor of the resident drain.[12]

I have performed an initial set of bivariate analyses on these data, along with associated descriptive statistics, to build the logistic regression model which is the focus of this study. The emphasis of these analyses is on the predictors of being a Medicaid participant. The analysis is conducted for the nursing home unit of analysis, as well as the county level of analysis, which includes the variables that affect demand as well as the ownership types and operational characteristics that can be influencing the probability of participation. The logistic regression model (LR) assumes that the outcome variable is categorical. The predictions will be made for participating or not participating. In another word, the rejection of CMS or the approval of CMS. The model of logistic regression would be more suitable and have more realistic representations for the categorical outcome variable in this case.

There are some assumptions for the logistic regression analysis (LRA). LRA is based on probabilities that are associated with the Medicaid participation. The set of independent variables account for the predictors of the outcome variable. These predictors provide additional information of the health factors, economic factors, cycles of inspection, and other quality factors may determine Medicaid Participation. The conditional probability is specified as of *P (Y=Participate| X1,...,Xp)*. Thus, it is expected that "participation" depends on combinations of values of the predictors. In particular, the inverse transformation is the logistic function written as:

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[12] Hirth, Banaszak-Holl, & McCarthy (2000) assessed the time pattern of nursing home-to-nursing home transfer and found lower rates of transfers between nursing homes in Maine and New York.

$$P(Y = Participate|X_1, \ldots, X_p) = \frac{e^{a+\Sigma_{j=1}^{p} \beta X_j}}{1 + e^{a+\Sigma_{j=1}^{p} \beta X_j}}$$

Alternatively,

$$P(Y = Participate|X_1, \ldots, X_p) = \frac{1}{1 + e^{-a-\Sigma_{j=1}^{p} \beta X_j}}$$

And the probability for not participating or a 0 response is:

$$P(Y = Nonparticipation|X_1, \ldots, X_p) = 1 - P(Y = Participation|X_1, \ldots, X_p)$$

$$= \frac{1}{1 + e^{a+\Sigma_{j=1}^{p} \beta X_j}}$$

Other predictors like high unemployment rates may increase the probability of nursing homes to become a Medicaid participant. Moreover, high unemployment rates can be used as a predictor for high probability of coverages. In this analysis, I am also including Medicare participants to control for nursing homes that are already covered by other primary payers. This variable is expected to have an impact on probability of participation in Medicaid.[13]

5. Results

5.1. Bivariate Statistics

In this study, I have conducted a series of bivariate analyses on these data, including Pearson's chi-square analyses along with independent-samples t-tests. First, Table 1 summarizes the results of the chi-square analyses conducted focusing on the nursing home as a unit of analysis. The

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[13] Similarly, the private payers are also included in this analysis to capture the effect of alternative private payers on the approval of CMS.

analyses focus on the relationship between the measures included in this table. As shown, significant associations were detected between Medicaid participants and ownership type, provider type, whether the provider resides in a hospital, whether the location is a continuing care retirement community, resident/family council, and even the presence, or absence of automatic sprinkler systems.

Table 2 summarizes the results of the independent-samples t-tests conducted on the data, concentrating on whether there are any significant mean differences in the variables incorporated in the t-test table on the basis of Medicaid participation. As shown in Table 2, the statistical significance was indicated with respect to the following variables: the number of certified beds, the number of residents, QM rating, reported LPN hours, reported RN hours, reported licensed hours, reported total hours, reported PT hours, expected LPN hours, expected RN hours, expected total hours, total survey score, facility reported incidents, substantiated complaints, number of fines, total fines, and the number of payment denials. Additionally, cycles 1-3, are those inspections that are performed annually. The following measures in those cycles were found to achieve statistical significance: total health deficiencies, standard deficiencies, complaint deficiencies, deficiency score, health revisits, and total health score. The following variables were also analyzed: the number of certified beds, the number of residents, the number of fines, and total penalties. All significant cycle 1-3 variables were found to have significantly higher mean values in cases where there was no Medicaid participation. Additionally, the mean values of QM Rating, as well as all significant variables relating to reported and expected hours were found to be significantly higher in cases where no Medicaid participation was present.

Table 3 summarizes the results of the independent-samples t-tests conducted on the county as a unit of analysis. As shown, significant mean differences based on Medicaid participation were

found for the following variables: total population change, positive population change, negative old population change, mean family income, percent health insurance coverage, and unemployment rate.

The means are significantly higher for the case of Medicaid participating facilities. In this analysis, I included negative change in old population, percent with health insurance coverage, and unemployment rate. Additionally, a significantly higher mean was found in cases with no Medicaid participation for: total population change, positive population change, and mean family income.

5.1 Correlations

Following this, series of Pearson's correlations were performed for the significant predictors purposed for inclusion in the logistic regression model to determine the extent of potential multicollinearity. As an indicator of potential multicollinearity, correlations greater than .80 were used. Extremely high correlation was observed between the number of certified beds and the number of residents. Five other measures were found to be very highly correlated, indicating the potential for a serious multicollinearity to be present among the variables included in the logistic regression model. These five correlations consisted of the following variable pairs: reported RN hours and reported licensed hours, reported licensed hours and reported total hours, expected LPN hours and expected RN hours, expected LPN hours and expected total hours, expected RN hours and expected total hours, total health deficiencies and standard deficiencies, deficiency score and total health score, total health deficiencies and standard deficiencies, deficiency score and total survey score, total health score and total survey score, deficiency score and total health score, and total health deficiencies and standard deficiencies, deficiency score and total health score in cycle 3. The results of these Pearson's correlations were then used to construct the logistic regression

model by excluding one variable out of every pair in which correlations were found to be high enough to present potential problems with multicollinearity. As for other correlations conducted between the independent variables measured on the county-level unit of analysis, they were found to be high enough to indicate potential problems with multicollinearity. These include the correlations conducted between total population change and positive population change, and those conducted between mean family income in dollars and total per capita income.

5.2 Logistic Regression

Table 4 presents the results of the logistic regression analysis focusing on the nursing home as a unit of analysis. The results are reported in marginal effect and as discussed previously, this logistic regression model was built by starting with all those predictors which were found to achieve statistical significance in the bivariate analyses conducted, and then excluding variables out of the pairs of variables which were found to have very high correlations and which would have produced an unacceptable level of multicollinearity the regression model.

Concerning the probability of Medicaid participation was found to be increased by a factor of 4.3 percentage point for facilities that are owned by an individual as compared with the for-profit ownership by a corporation. However, the probability of Medicaid participation was reduced by a factor of 1.52 percentage points with regard to LLCs, and reduced by a factor of 1.06 percentage points for partnerships. Next, in cases where the owner was some government agency or entity, significant comparisons were found for the following: city/county, county, hospital district, and state. In all four cases, the probabilities of a Medicaid participation were reduced as compared with the comparison category of the for-profit ownership. Specifically, for ownership by the city/county the probability of a Medicaid participation was reduced by a factor of 23.05 percentage points, while for the county ownership was the probability of Medicaid participation

was reduced by a factor of 27.1. Additionally, for ownership by the hospital district was associated with a low probability of Medicaid participation, which was also reduced by a factor of 51.3. The state ownership was associated with a reduced probability of Medicaid participation by a factor of 21.5.

As for the non-profit ownership, in cases of church-related ownership, the probability of having a Medicaid participation was found to be reduced by a factor of 7.7. For the not-for-profit corporation ownership, the probability was reduced by a factor of 6.9. For provider type, in the case of private primary payer (private/other), it was found to have much higher probability of Medicaid participation which was increased by a factor of 10.1 as compared to the case of Medicare.

Following this, I checked for the statistical significance of whether the provider resides in the hospital, whether it is a continuing care community, and whether it is a special focus facility. In cases where the provider resides in the hospital, the probability of having a Medicaid participation increased by a factor of 4.8, while in cases of continuing care communities, the probability reduced by a factor of 6.8, while with regard to special focus facilities, the probability was increased by a factor of 13.5. As for the resident/family status, resident cases were found to have probability of having a Medicaid participation was reduced by a factor of 5.5 in the case of residency cases as compared to category of having both. Additionally, for each additional resident, the probability of having a Medicaid participation is increased by a factor of .09, while a one-unit increase in QM rating was associated with a decrease in the probability by a factor of 2.95. Next, for the reported hours, a one-unit increase in nurse staffing hours was found to be associated with an increase in the probability of having a Medicaid participation by a factor of 2.35, while a one-unit increase in expected total hours was associated with a decreased probability by a factor of

14.65. The following variables included in this analysis focused on cycle 1 through 3 measures. First, in the case of cycle 1, total health deficiencies and total health score were found to be statistically significant. A one-unit increase in total health deficiencies was found to be correlated with a reduced probability of having a Medicaid participation by a factor of .089, while a one-unit increase in total health score was found to be associated with a reduced probability by a factor of .023. In the second cycle, total health deficiencies, complaint deficiencies, the number of health revisits, and total health score were found to be statistically significant. In this case, a one-unit increase in total health deficiencies was associated with a reduced probability by a factor of 1.4, while a one-unit increase in complaint deficiencies was found to be associated an increase in the probability by a factor of .65. A one-unit increase in the number of health revisits was found to be associated with an increase in the probability of Medicaid participation by a factor of 2.2, and a one-unit increase in total health score was found to be associated with a decreased probability which were decreased by a factor of .0083.

For cycle 3, total health deficiencies, complaint deficiencies, the standard health survey, the number of health revisits, and total health score were found to be statistically significant. In this case, a one-unit increase in total health deficiencies was associated with a reduced probability by a factor of 1.12. A one-unit increase in complaint deficiencies was related to an increased probability by .668. A one-unit increase in the standard health survey score was associated with a reduced probability by a factor of .017, while a one-unit increase in the number of health revisits was associated an increased probability by a factor of 3.98. Finally, a one-unit increase in the total health score was associated with a reduced probability which was reduced by a factor of .008. The statistical significance was also found for substantiated complaints, the number of fines, the total amount of fines, and the number of payment denials. Thus, a one unit increase in the number of

substantiated complaints increased the probability of Medicaid participation by .73, and increased the probability by 5.9 for the case of number of fines, but reduced the probability of participating in Medicaid for the case of payment denials by a factor of 4.0.

6. Discussion

I used the logistic model to examine the predictors of participation. The findings of the study show an increased probability of participation in Medicaid for the case of nursing homes that accept private payers. The differences between Medicare and Medicaid can vary from the eligibility of the residents to the governance entity. Medicaid tend to be governed mainly by the state, where each state creates its own program. However, all the guidelines of participation are complying with the federal design and with the same mandatory benefits. Most of Medicare participants would be motivated to apply for the participation in Medicaid since Medicaid and Medicare both have similar CFP. Additionally, there is an incentive program that will provide extra benefits to eligible nursing homes once the nursing home facilities demonstrate the meaningful implementation and adoption of the Electronic Health Records (EHR). The next variable represents another debate of financial stability of the residents. In many cases, out-of-pocket paying residents would prefer publically financed enrollees for the possibility of becoming a Medicaid resident. Medicaid has broader benefit plans than many private insurances. This preference motivates nursing homes to voluntarily apply for participation in Medicaid to create an access for potential residents. Nursing homes view Medicaid as an incentive, while states and residents find it a money saving program. The hurdle is in the variation in states and their payments to providers. High income states pay more to providers, resulting in more coverage and far broader benefits.

For-profit nursing homes are argued to motivate entrepreneurship and innovation, resulting in lower costs. Generally, nursing homes set quality, output, and input at the levels where they

meet their objective. However, individual ownership of a nursing home means complete control of operational procedures than other types of ownership in which they only effectively meet the guidelines and comply with Medicaid guidelines. In the case of large chain and LLC nursing homes many face allegations for violations in billing CMS for substandard services. The fact that most of the recent incidents whether they are medication errors, or infections were mostly occurring in LLC ownership type proves that the for-profit nursing homes, excluding the individually owned, are less likely to follow the appropriate protocols and meet the standards of EHR. Thus, the probability of Medicaid participation is found to be increased by a factor of 4.7 percentage points for nursing homes that are owned by an individual as compared with other for-profit nursing homes owned by a corporation. The probability of a Medicaid participation is reduced by a factor of 15.29 percentage points in the case of LLC, and reduced by about 11 percentage points for partnership. Next, a one-unit increase in the number of health revisits was found to be associated with an increased probability by a factor of 1.15. Remarkably, in all three cycles, the number of complainants were not reducing the probability of Medicaid participation. In many cases, those complaints were self-reported due to the lack of satisfactory care of residents which is hard to validate and measure.

A one-unit increase in the number of substantiated complaints increased the probability by a factor of .740, while a one-unit increase in the number of fines was associated with an increased probability by a factor of 5.9. The total of fines was found to have a small positive impact on the likelihood of having a Medicaid participation, while a one-unit increase in the number of payment denials was associated with a reduced probability by a factor of .40. Although the investigation team strives to warrant a safe environment and a high quality of care provided to those recipients of care by certifying the providers of services and nursing home facilities, it does not guarantee

that long-term care providers continuously meet Medicare/Medicaid and state requirements. The fact that most of the complaints remain anonymous and the identity of the resident is never disclosed leads to the ambiguity of the definition of "improper" care. The inaccuracy of complains may include any complaint resulting from resident's dissatisfaction rather than inaccurately, or wrongfully planned care at a nursing home. Some complaints may also relate to "early discharging" of a resident from a hospital to the nursing home after performing a needed surgery, or inadequate discharging procedure that falls under the responsibility of the discharging healthcare unit rather than the nursing home itself. Overall, health complaints are not good indicators for health-related quality of life, or Medicaid participation. For instance, women have lower health-related quality of life than men and potentially higher degree of self-reported health complaints (Borglin, et al., 2005). In most cases, nurses can assist in the early detection of health complaints that negatively affect the quality of life by applying more preventive practice as well as a higher degree of comprehensive and precise assessments.

7. Conclusion

Much of the previous empirical literature may be flawed in the approach of solely relying on dummy variables. The previous studies focused on capturing the effects of one category of ownership type on the participation of residents in federal programs, while in this study, I am capturing the impact of all types of organizational structure on the participation of nursing home, in the Medicaid program. During the last thirty-five years, there have been many varieties of thoughts on whether the nature of ownership and the operational aspects are affecting the quality of care. There has been few studies and very little attention to the circumstance of participation of nursing homes in the federal funding programs. This chapter presents and discusses the results of analyses conducted using a series of bivariate analyses including Pearson's chi-square analyses

and independent-samples t-tests, along with associated descriptive statistics, conducted separately on the nursing homes and county units of analysis. The findings are consistent with the hypothesis that some types of ownership may enjoy higher probability of being a Medicaid participant than others. While others may not be eligible for participating and coverage for reasons that relate to the provider type, the provider residence, reported working hours, health deficiencies, health revisits, and many other factors that involve violations and payment denials may be important for participation eligibility under the Medicaid program.

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APPENDICES

APPENDIX A: TABLES

Table 1.
Chi-square analyses: nursing home unit of analysis (ownership types)

Measure	Medicaid Participation	Not Participating	Chi-Square
Ownership Type			416.9445
Ownership type (For-Profit)	46.8	22.2	
Corporation	39.5	17.9	
Individual	3.13	1.1	
Limited Liability company	0.3	0.33	
Partnership	3.92	2.86	
Ownership Type (Government)	3.27	3.99	
City	0.375	0.176	
City and County	0.304	0.338	
County	1.71	1.88	
Federal	0.004	0.004	
Hospital district	2.77	1.23	
State	0.569	0.325	
Ownership Type (Non-profit)	15.49	8.22	
Church related	2.46	1.39	
Corporation	11.57	6.24	
Other	1.46	0.60	

Note. The numbers above are the parentage of the total number of all nursing homes in United States.

Table 2.
Independent-samples t-tests: nursing home unit of analysis (operational characteristics)

	No		Yes		t (df)
Measure	Mean	SD	Mean	SD	
Number of Certified Beds	98.48	55.26	109.26	63.86	-10.66*** (11677)
Number of Residents	78.73	48.83	89.84	56.75	-12.40*** (11731)
Overall Rating	3.26	1.39	3.22	1.38	1.28 (14628)
Health Inspection Rating	2.79	1.28	2.83	1.29	-1.37 (14628)
QM Rating	3.61	1.36	3.43	1.37	7.74*** (10242)
Staffing Rating	3.22	1.21	3.26	1.11	-1.74 (9269.01)
Reported CNA Hours	3.41	1.28	3.45	1.19	-1.70 (9354)
Reported CNA Hours	2.46	.64	2.47	.67	-1.33 (10410)
Reported LPN Hours	.87	.45	.84	.40	4.86*** (9152)
Reported RN Hours	.87	.62	.83	.54	3.82*** (8860)
Reported Licensed Hours	1.74	.77	1.67	.66	5.93*** (8789)
Reported Total Hours	4.20	1.08	4.14	1.08	3.23** (10039)
Reported PT Hours	.11	.16	.10	.12	4.26*** (7823)
Expected CNA Hours	2.43	.20	2.44	.18	-1.86 (9323)
Expected LPN Hours	.67	.12	.65	.08	9.25*** (7579)

Table 2 (cont.)

	No		Yes		t (df)
Expected RN Hours	1.11	.26	1.07	.22	10.91*** (9082)
Expected Total Hours	4.22	.48	4.16	.39	7.30*** (8666)
Adjusted CNA Hours	2.49	.67	2.49	.69	-.56 (10292)
Adjusted LPN Hours	1.08	.48	1.07	.50	1.44 (10402)
Adjusted RN Hours	.58	.32	.58	.29	.59 (9286)
Adjusted Total Hours	4.03	.93	4.02	.99	.39 (10515)
Cycle 1					
Total Health Deficiencies	8.50	6.74	6.35	5.74	19.20*** (8884)
Standard Deficiencies	7.10	5.34	5.21	4.60	21.39*** (8968)
Complaint Deficiencies	2.16	4.07	1.64	3.20	7.86*** (8336)
Deficiency Score	70.19	102.91	46.55	72.27	14.52*** (7679)
Health Revisits Scores	.94	.38	.88	.43	8.29*** (11327)
Total Health Score	73.31	110.60	49.24	86.37	13.43*** (8294)
Cycle 2					
Total Health Deficiencies	8.44	6.56	6.28	5.68	19.73*** (9004)
Standard Deficiencies	7.01	5.30	4.97	4.38	23.40***(8668)
Complaint Deficiencies	2.16	4.09	1.77	3.30	5.81*** (8521)

Table 2 (cont.)

	No		Yes		t (df)
Deficiency Score	68.69	102.21	48.27	84.10	12.17*** (8640)
Health Revisits Scores	3.14	23.58	2.80	24.14	.81 (14628)
Total Health Score	71.83	112.88	51.07	97.13	11.07*** (8961)
Cycle 3					
Total Health Deficiencies	8.25	6.73	6.32	5.61	17.33*** (8589)
Standard Deficiencies	6.87	5.40	5.09	4.40	20.00*** (8446)
Complaint Deficiencies	1.77	3.73	1.50	2.98	4.49*** (8312)
Deficiency Score	64.11	95.36	48.50	84.08	9.73*** (9001)
Health Revisits	.93	.37	.90	.40	5.17*** (10807)
Health Revisits Score	2.66	22.38	2.55	27.18	.23 (14482)
Total Health Score	66.77	104.56	51.05	101.15	8.68*** (9745)
Total Survey Score	71.71	78.59	5.12	63.37	16.82*** (8503)
Facility Reported Incidents	1.17	3.78	.96	2.41	3.54*** (7304)
Substantiated Complaints	3.88	6.69	3.52	6.54	3.09** (10111)
Number of Fines	.30	.71	.34	.73	-3.23** (10551)
Total Fines ($)	5112.30	22723.17	9076.18	42644.34	-7.37*** (14760)
N Payment Denials	.12	.38	.07	.30	6.92*** (8442)
N Penalties	.42	.94	.41	.88	.17 (14763)

Note. *$p<.05$, ** $p<.01$, ***$p<.001$.

Table 3.
Independent-samples t-tests: county unit of analysis

Measure	No		Yes		t-test
	Mean	SD	Mean	SD	
Nursing Homes	5.59	16.09	5.30	10.15	.51
Average Population (k)	111.72	447.432	94.13	236.19	1.16
Total Population Change	.35	1.48	.10	.97	4.77***
(+) Total Population Change	.61	1.11	.36	.72	6.26***
(-) Total Population Change	-.26	.80	-.26	.48	.15
Over 65 Population Change	3.47	4.76	3.79	3.11	-.89
(+) Old Population Change	3.97	4.76	3.79	2.72	1.10
(-) Old Population Change	-.50	2.13	-.15	1.07	-4.86***
Mean Retirement Income	20.16	5.22	20.08	4.59	.45
Mean Family Income	72.75	15.35	68.10	16.37	7.50***
Eligibility for Health Insurance	109.94	443.20	92.62	231.12	1.15
Health Insurance Coverage	91.62	354.29	80.07	196.56	1.16
% of Health Insurance Coverage	84.31	6.51	85.57	4.87	-5.41***
No Health Insurance Coverage	86.99	349.35	74.99	186.18	1.24
Unemployed	5.14	23.75	4.53	13.02	.75
Unemployment Rate	4.41	2.09	5.38	1.79	-12.58***
Disability	12.33	43.35	11.72	24.97	.41

Note. *p<.05, ** p<.01, ***p<.001

Table 4.
Logistic regression analysis: nursing home level of measurement (ownership types)

Measure	dy/dx	Std. Err.	z-value	p-value	[95% Conf. Interval]	
Ownership Type (For-Profit)						
Individual	.0474272	.017355	2.73**	0.006	.013412	.0814424
Limited Liability company	-.1529586	.051308	-2.98**	0.003	-.2535205	-.0523967
Partnership	-.1063708	.0156098	-6.81***	0.000	-.1369655	-.0757761
Ownership Type (Government)						
City	-.0668436	.0518018	-1.29	0.197	-.1683734	.0346862
City and county	-.2305883	.0505243	-4.56***	0.000	-.3296142	-.1315624
County	-.2756547	.0213112	-12.93***	0.000	-.3174238	-.2338855
Federal	-.2059002	.146905	-1.40	0.161	-.4938288	.0820283
Hospital district	-.5131833	.0276169	-18.58***	0.000	-.5673114	-.4590553
State	-.2153386	.0479602	-4.49***	0.000	-.3093388	-.1213384
Ownership Type (Non-profit)						
Church related	-.0765525	.0206858	-3.70***	0.000	-.1170959	-.0360091
Corporation	-.0692936	.0113206	-6.12***	0.000	-.0914816	-.0471056
Other	-.0504843	.0281262	-1.79	0.073	-.1056106	.0046421

Note. *p<.05, ** p<.01, ***

Table 4 (cont.)
**Logistic regression analysis for nursing home level of measurement (operational characteristics)**

Measure	dy/dx	Std. Err.	z-value	p-value	[95% Conf. Interval]	
Provider Type						
Private/others	.1010308	.0273046	3.70***	0.000	.0475147	.1545468
Provider Resides in a Hospital	.0486213	.0201042	2.42*	0.016	.0092179	.0880248
Continuing Care Retirement Community	-.0685883	.0133525	-5.14***	0.000	-.0947587	-.0424179
Special Focus Facility	.1349772	.0539562	2.50*	0.012	.0292249	.2407295
Residency and Family						
Family	.0559258	.0692574	0.81	0.419	-.0798162	.1916678
None	-.0148068	.0240813	-0.61	0.539	-.0620052	.0323916
Resident	-.0192366	.0088834	-2.17*	0.030	-.0366477	-.0018255
Automatic Sprinkler Systems	.1096217	.0621314	-1.76	0.078	-.2313971	.0121536
Number of Residents	.0009841	.0000844	11.66***	0.000	.0008186	.0011495
QM Rating	-.0295876	.0027595	-10.72***	0.000	-.0349961	-.0241791
Reported Total Nurse Staffing Hours	.0235432	.0046312	5.08 ***	0.000	.0144662	.0326203
Reported Physical Therapist Staff	-.0165782	.0328755	-0.50	0.614	-.0810129	.0478565
Expected Total Nurse Staffing Hours	-.1463624	.0103627	-14.12***	0.000	-.166673	-.1260519
Cycle 1: Total Number of Health Deficiencies	-.0089393	.0010213	-8.75***	0.000	-.010941	-.0069375
Cycle 1: Number of Complaints	.0015365	.0015303	1.00	0.315	-.0014628	.0045358
Cycle 1: Number of Health Revisits	.0032148	.0101308	0.32	0.751	-.0166412	.0230707
Cycle 1: Total Health Score	-.0002023	.0000539	-3.76***	0.000	-.0003079	-.0000967

Table 4 (cont.)

Measure	dy/dx	Std. Err.	z-value	p-value	[95% Conf. Interval]	
Cycle 2: Total Number of Health Deficiencies	-.013964	.0010647	-13.12***	0.000	-.0160507	-.0118773
Cycle 2: Number of Complaints	.0065229	.0015633	4.17***	0.000	.0034589	.009587
Cycle 2: Number of Health Revisits	.0228495	.0112235	2.04*	0.042	.0008519	.0448471
Cycle 2: Total Health Score	-.0000832	.0000489	-1.70	0.089	-.0001789	.0000126
Cycle 3: Total Number of Health Deficiencies	-.0112497	.0010003	-11.25***	0.000	-.0132103	-.0092891
Cycle 3: Number of Complaints	.0068688	.0017277	3.98***	0.000	.0034826	.010255
Cycle 3: Standard Health Survey Deficiencies	-.0001701	.0000218	-7.80***	0.000	-.0002129	-.0001274
Cycle 3: Number of Health Revisits	.0398482	.0107138	3.72***	0.000	.0188495	.0608468
Cycle 3: Total Health Score	-.000082	.0000482	-1.70	0.089	-.0001764	.0000124
Number of Facility Reported Incidents	.0011687	.0014767	0.79	0.429	-.0017256	.004063
Number of Substantiated Complaints	.0073978	.0009414	7.86***	0.000	.0055527	.0092428
Number of Fines	-.0594532	.0062342	9.54***	0.000	-.0472344	-.0716721
Number of Payment Denials	-.0400193	.0130158	-3.07**	0.002	-.0655298	-.0145088

Note. $*p<.05$, $** p<.01$, $***p<.001$; $N = 14199$, LR $\chi^2(32) = 1700.62$, $p < .0001$; Pseudo $R^2 = .1180$.
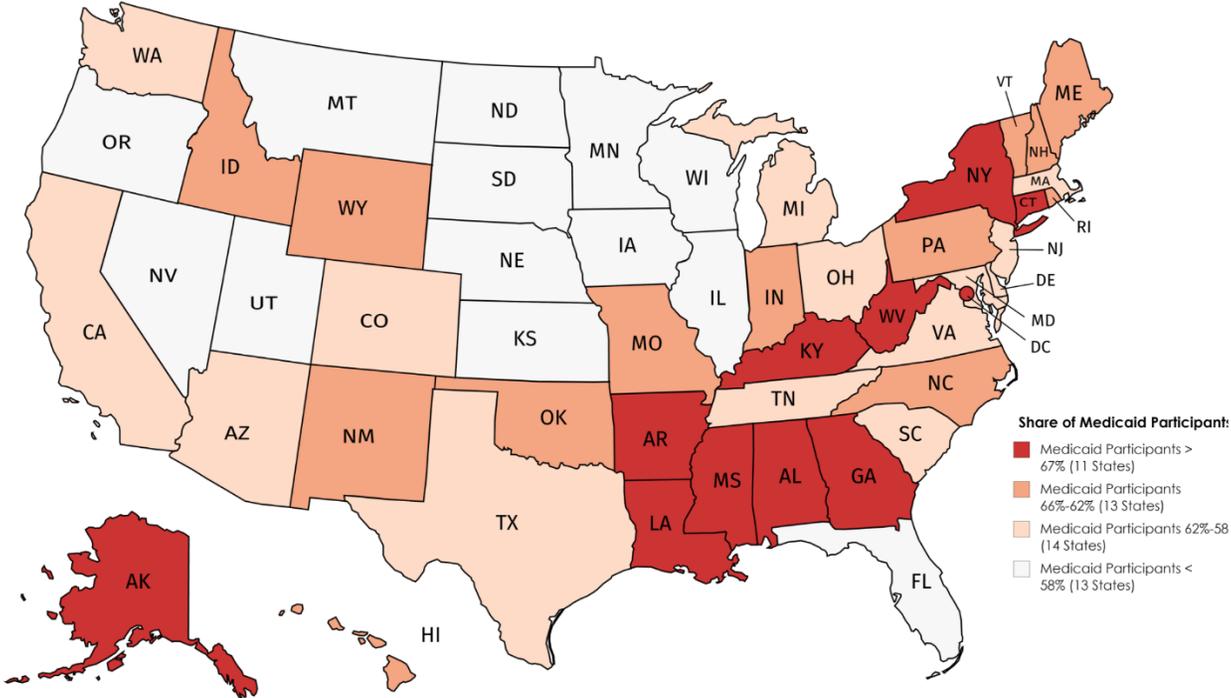
Figure 1
Share of Nursing home participants by State