Increased demand for primary care NPs after ACA

by

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Chapter 1

1.1 Background

Healthcare spending in the United States is soaring. At $9,892 per capita in 2017, the nation's spending on health care was 145 percent above the median spend among the industrialized member countries of the Organization for Economic Cooperation (OECD). Despite having the highest spend, in 2015 the US had 19 percent fewer practicing physicians per 1,000 than the OECD median and of practicing physicians, the absolute lowest percentage of general practitioners among all OECD countries [2]. General practitioners include those practicing in general and family medicine, general internal medicine, geriatrics, and general pediatrics, but do not include hospitalists. They are the nation's front line for providing primary care services. [22].

National demand for primary care physicians is projected to exceed supply by over 23,000 full-time equivalents (FTEs) by the year 2025 assuming current trends of workforce participation, health care delivery and utilization continue [22]. This shortfall is expected to be most severe among Medicaid beneficiaries [3].

Contributing to the shortage on the supply side is an imbalance in clinician supply as higher numbers of new clinicians are choosing to specialize [30]. Median compensation for primary care physicians is significantly lower than for those who enter a specialty which is part of what is luring new physicians away from general medicine [4]. Further weakening the nation's primary care supply, fewer physicians are choosing to accept public insurance due to lower reimbursement rates and the higher administrative burden associated with Medicaid [7, 6]. Private insurer prices are much

higher. While private insurer prices vary widely by hospital and individual insurer, they average out to approximately 50 percent above Medicare payment rates and for Medicaid, this differential was even more stark before the ACA went into effect with primary care payment rates averaging much less at approximately 59 percent of the Medicare fee levels [4].

Rampant price growth in the private sector is largely to blame for the rising differential between prices paid by private and public insurers. Through mergers and consolidation, hospitals and physician groups have been gaining leverage in negotiating with private insurers for higher payment rates. As this divergence grows over time, the profitability of caring for a privately insured patient will incentivize physicians to prioritize privately insured patients and either institute long wait times for Medicaid patients or decline to participate in the program altogether[4].

While supply continues to stagnate, between 2000 and 2020, the U.S. population is expected to grow by 18 percent resulting in an additional fifty million people who will require healthcare and the aging of the baby boomer generation is expected to intensify demand for healthcare services with a higher prevalence of chronic conditions [31].

The Affordable Care Act (PPACA) of 2010 mandated that all states expand Medicaid eligibility to all non-elderly adults with household incomes up to 138 percent. This measure was struck down in 2012 by the Supreme Court, making expansion optional to each individual state. As of July 2016, 30 states and D.C. opted to expand their Medicaid programs. In March 2013, just before the first open enrollment period, the uninsured rate among non-elderly adults was 17.6 percent and by March 2015 it fell to 10.1 percent [18]. Between 2013 and 2015, the number of uninsured adults fell by over 15 million [18]. The fall in the overall uninsured rate was substantially larger in states that expanded Medicaid than in those that did not. In states that expanded Medicaid, the uninsured rate decreased by 52.5 percent and in states that did not expand, the decrease was only 30.6 percent [18].

Studies have shown a significant increase in coverage among the targeted population of low-income childless adults [25, 5] and the highest gains were seen among

those without a college degree, non-whites, young adults, unmarried individuals, and those without children in the home [5]. The rise in newly covered individuals improved access to primary care for many as shown by increases in outpatient visits, fewer who skipped medications due to cost, increased screening for diabetes delivered by primary care providers and fewer emergency department visits [26].

The ACA also required non-grandfathered private insurance plans to provide preventive care services without any cost sharing in the form of deductibles, copayments or co-insurance. In addition to improving access for the newly insured, this could potentially enable many to seek primary health care services that they previously could not afford due to the high cost of their deductibles. An individual is considered to be underinsured if their out-of-pocket costs excluding premiums over the 12 months prior are equal to 10 percent or more of household income. In 2010, 44 percent of adults ages 19-64 were either uninsured or underinsured. A significant proportion of these at-risk adults had incomes below 250 percent of the federal poverty level [24]. Being either uninsured or underinsured is associated with difficulty paying medical bills as well as delaying or forgoing preventive care such as cancer screenings due to cost [24]. Obstacles to accessing primary care may also explain elevated rates of emergency department (ED) visits among Medicaid patients and the uninsured as many turn to the ED as their only source of care [8]. There may also be a higher likelihood of trauma induced ED visits due to the challenge of securing preventive care and ongoing management for chronic conditions.

Thus contributing to the surge in demand for primary health care is pent up demand from individuals who had previously delayed or could not afford necessary screenings or preventive care. Newly covered individuals who were previously uninsured were more likely to seek health care services after the ACA thus reflecting a sudden and more temporary surge in service utilization [9].

Increased demand for primary care resulting from improved coverage was estimated to require an additional 7,200 primary care providers or 2.5 percent of the 2013 baseline supply [15]. In the same year, an estimated seven million people lived in areas where the expected increase in demand was greater than 10 percent of the

baseline [15]. To address the physician shortage, the ACA also contained several provisions intended to boost the supply side of the primary care market. To encourage acceptance of new Medicaid patients among providers, Medicaid reimbursement rates for primary care were temporarily increased to match those of Medicare. This would have had a varying impact given the wide distribution of the Medicaid to Medicare reimbursement ratio across states prior. States with the lowest Medicaid to Medicare ratios in 2008 such as New Jersey at 37 percent and California at 47 percent also had the lowest Medicaid patient acceptance rates [7] thus showing the potential to increase acceptance through this policy lever.

Ideally, there would not be a physician shortage and every person would have access to a physician for their primary care needs regardless of their geographic location or demographics. One solution to the shortage problem is to empower nurse practitioners to help fill the gaps, or to restructure the delivery of care to emphasize a teamwork approach in coordination of care and chronic disease management strengthening the role of nurse practitioners and reallocating the focus of physicians to cases requiring more intensive care. Nurse practitioners (NP) also known as advanced practice registered nurses (APRN) are nurses that are usually trained to provide full primary care and qualified with a Master's of Science degree. In 2013, there were 216,580 primary care physicians active in the labor force. There were 57,330 NPs but that number is expected to grow to 110,540 full-time equivalents (FTEs) by 2025 whereas the primary care physician workforce is only expected to grow by 22,880 FTEs over the same period [22].

While NPs can practice independently as primary care providers in many states, their scope of practice is more limited in other states either by mandates for physician oversight, transition to practice periods, restrictions on their authority to prescribe medications or by lower rates of reimbursement relative to physicians. The National Council of State Boards of Nursing defines independence as practicing with "no requirement for a written collaborative agreement, no supervision, [and] no conditions to practice."

In its report on supply and demand, the HRSA highlights the potential to ef-

fectively mitigate primary care provider shortages by allowing NPs and physician assistants to practice to the fullest extent of the their training [22] and in 2010, full practice status became the recommended model in the Institute of Medicine's Future of Nursing Report and the National Council for State Boards of Nursing's Model Nursing Practice Act and Administrative Rules [6, 7]. In 2013 before the ACA Medicaid expansions went into effect, 17 states and the District of Columbia had full scope of practice policies in place.

The ACA contained several provisions to increase the supply of NPs providing primary care, including scholarships and loans promoting entry into the workforce and training opportunities that create gateways into primary care. One such gateway is via the Health Centers Program authorized in Public Health Service Act Section 330 and administered by the Health Resources and Services Administration. Health Centers are a vital source of outpatient care for the uninsured, Medicaid patients, those located in medically underserved areas, participants of high-deductible health plans and low income patients with chronic illnesses. In order to ensure access, services are offered via a sliding scale payment structure. It has been shown that Health Center patients on Medicaid have lower utilization of and spending on all services measured, including inpatient and other outpatient care, compared to non-health centers. Health Center Medicaid patients also have lower utilization of costly hospital emergency department related services [20]. In 2017, 16 percent of Medicaid patients were served by Health Centers while Health Center Medicaid revenue represented only 1.7 percent of total Medicaid Expenditures thus making Health Centers a very cost-effective source of health care for Medicaid patients [21].

Medicaid is the largest source of health center funding accounting for 44 percent of total revenue [14]. From 2010 to 2017, Medicaid revenue increased by 97 percent whereas on a per patient basis, it only grew 11 percent. This differential reflects the increase in patient volume due to the Medicaid Expansion [23]. The next largest source is federal grant funding under Section 330. The ACA established the Community Health Center Fund to supplement program funding from the annual appropriations process and directed 11 billion dollars in mandatory appropriations over fiscal years

2011 through 2015 [32]. This cumulative increase from its key sources of revenue enabled the Health Centers program and individual health centers to expand capacity and services. Over 2010 through 2017, the number of health center sites increased by 59 percent to 11,056 sites, the number of patients served increased by 40 percent to 27.2 million, and total staff increased by 70 percent to 223,840 FTEs [23].

In 2013, 40 percent of Health Center funding came from Medicaid patient revenue whereas only 18 percent of this funding came from the second largest source, Section 330 grants. Therefore it is likely that Health Centers in Medicaid expansion states fared more favorably than those in non-expansion states. Just two years after the start of the expansion in 2015, Medicaid revenue comprised 49 percent of total health center revenue in expansion states while among non-expansion states, it was only 29 percent of the total [23]. With a higher proportion of funding derived from Medicaid, I estimate that a larger share of health center expansion in capacity and services occurred in Medicaid expansion states.

There are several reasons why many NPs may be responsive to an increase in demand for their services in outpatient settings. Physician or nurse-managed clinics offer regular day time working hours that may be more attractive than taking on irregular shifts in hospitals even with financial incentive. In addition, working in a health care clinic setting is likely to entail more routine work with appointments scheduled ahead of time giving NPs the opportunity to prepare in contrast to the intense shift work and emergency care they provide in hospitals that can create a distressing environment especially in combination with long, irregular hours [1]. This preference is likely to differ depending on one's family situation and household income. For example, one study found that among nurse qualification holders who have children (not only NPs), not having a partner decreased the likelihood of working as a nurse whereas with a partner, the likehood of working as a nurse increased with decreasing partner's income [13].

Using the 2013 Medicaid Expansion, I examine the effect of a positive demand shock for primary care clinicians on the labor supply of NPs in outpatient settings. I expect that the surge in demand for primary care practitioners from the combination

of an increase in newly covered individuals and expansion of health center sites would have led to an increase in the proportion of nurse practitioners working in outpatient settings.

1.2 Design and Statistical Analysis

I examine the effect of the 2014 expansion on the labor supply of nurse practitioners in primary care settings. The resulting surge in newly covered individuals from the 2014 expansion allows me to use the policy as a plausibly exogenous increase in the demand for primary care providers and estimate the effects this may have had on the nurse practitioner labor market.

Regressional analysis and tabulations are executed in Stata/SE 16.0 [28]. Some data calculations and graphs were generated using Python [11].

1.2.1 Data

For analysis, I used the single-year Public Use Microdata Sample (PUMS) which contains a sample of actual responses to the American Community Survey (ACS). The ACS was developed by the U.S. Census Bureau and surveys approximately 3 million persons each year. The single year PUMS files contain survey units from approximately one percent of the United States population.

The smallest geographical unit is the Public Use Microdata Area (PUMA) which are contiguous areas dividing each state along state lines. While each PUMA contains at least 100,000 persons, they vary in population density. Since the ACS does not include an urban or rural area indicator, I merged the ACS PUMA data with the MET2013 dataset from IPUMS USA which identifies metro areas of residence using the 2013 definitions for metropolitan statistical areas (MSAs) from the U.S. Office of Management and Budget (OMB). Specifically, this dataset provides MSA codes and MSA titles with all of their corresponding PUMA codes (that is PUMAS within their zones) along with the percentage of each MSA's population residing in each PUMA. Since MSAs do not follow PUMA lines, many fall within multiple PUMAs and similarly multiple PUMAs fall within multiple MSAs. With the goal of categorizing PUMAs as either urban or non-urban, using Python, I reduce the dataset to a unique set of PUMA codes by keeping the PUMA that has the highest population among MSAs. The PUMAS designated as urban are those in which at least 50 percent of the

PUMA population belong to the MSA. For the years 2010 and 2011, PUMAs were classified based on the Census 2000 but starting in 2012, they were reassigned based on the 2010 Census data. Therefore I separately merge the MSA-PUMA crosswalk based on the Census 2000 with the ACS for those surveyed in 2010 and 2011 and the crosswalk of PUMAs based on the 2010 Census were merged with ACS survey years 2012 through 2017.

1.2.2 Model and Validation

I use a difference-in-differences model with fixed effects to examine how the ACA Medicaid expansion affected NP employment in outpatient facilities. Even though the outcome under examination is binary, I chose not to use a model based on maximum likelihood such as logit or probit citing results obtained by Greene 2004 that the MLE tends to show a large finite sample bias and underestimated asymptotic variances in discrete choice models in the presence of fixed effects which is beyond the scope of this paper [12].

In the absence of a simple random sampling experiment in which randomly chosen PUMAs might have been subjected to the Medicaid Expansion and ACA mandates, validity of the difference in differences model rests on the assumption that in the absence of the ACA, the both expansion and non-expansion states would have exhibited similar trends over the time period. I test the parallel trends assumption by graphing the dependent variable over time for both groups in Figure 1.2.2. From 2010 to 2012, the proportion of nurses employed in outpatient settings declined significantly in both expansion and non-expansion states whereas in 2014, the trend seems to diverge with a sudden rise in the proportion or NPs working in outpatients settings among the expansion states.

I focus on labor supply of NPs under 35 years of age because this group exhibits more job mobility and higher turnover rates in the nursing field and can thus provide more variation during the time period under study [17, 29]. Focusing only on the subpopulation of NPs in areas most likely to be exposed to the ACA expansion, I narrow the dataset to PUMAS containing elevated proportions of low income and

uninsured individuals. Following Decker [7] I examine PUMAs in which at least 15 percent of households have an income to federal poverty line ratio of 250 percent or less. I analyze the following model:

$$Outpt_{ist} = \beta_0 + \beta_1 Expan_s * EffectYear_t + \eta X_{ist} + \phi Dem_{PUMA} + \delta State_s + \tau Year_t + \varepsilon \tag{1.1}$$

The outcome variable is an indicator for whether NP i worked in an outpatient setting in state s and year t. The coefficient β_1 on the interaction variable indicates whether person i lived in an expansion state in the year the policy went into effect captures the effect among individuals living in states that expanded Medicaid at the beginning 2014 without a work waiver. A β_1 greater than one would indicate that the primary care demand shock resulting from the Medicaid Expansions made employment in an outpatient setting more likely for a given NP in an expansion state after 2014. The states designated in the treatment set are Arizona, California, Colorado, Delaware, Hawaii, Idaho, Illinois, Iowa, Kentucky, Maryland, Michigan, Minnesota, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Dakota, Ohio, Oregon, Rhode Island, Vermont and West Virginia. I excluded California, Connecticut, the District of Columbia, Massachusetts and Washington because these states had 1115 waivers federally approved to expand Medicaid eligibility before January 2014. While New Jersey also filed a waiver in 2011, it only expanded eligibility to those with household incomes of less than 23 percent of the federal poverty level [10].

X is the set of nurse characteristics, mainly gender and an indicator for whether NP i was a single parent. At the PUMA level, I include an indicator for urban and a set of PUMA level population statistics that I calculated in python separately capturing the proportion of the population that is hispanic, black, and between the ages of 35 and 50 as the sub-populations that are most likely to have the highest exposure to the policy and pent up demand for primary care services. I include a set of state fixed effects to ensure that the estimated effects of the ACA policies cannot be attributed to unmeasured time-invariant differences between states such as number of nursing schools in different areas of the country that may influence an NP's decision

to work in an outpatient setting. I also include a set of year fixed effects controlling for the effects of the ACA that may coincide with trends occurring across all PUMAS during the same time period.

The PUMS Dataset provides a set of person and household weights as well as a set of replicate weights which account for the increased sampling error due to its multi-stage design. To estimate coefficients I use the person weights and standard errors are calculated using both person weights and replicate weights employing a successive difference replicate (SDR) method. This is consistent with guidance from the Census Bureau that the SDR method using replicate weights generally produces more accurate estimates than using the alternative generalized variance function (GVF) method which employs design factors rather than replicate weights. Therefore, while the population under study is a subset of the full PUMS dataset, with an understanding of the survey design, I am able to leverage Stata's specialized survey functionality which uses an algorithm that employs all cases to calculate standard errors with higher accuracy.

1.2.3 Limitations

Unfortunately, the ACS does not include information on population density by PUMA in its single year files and it has been shown that there are considerable differences between urban and rural areas both in terms of population and healthcare industry characteristics and ACA outcomes. Hospitals in rural areas tend to be smaller with 47 percent having 25 or fewer beds while 41 percent of urban hospitals have 200 or more. The rural workforce also tends to be less specialized [19]. Rural populations had a higher uptake in Medicaid coverage resulting from the expansion [27], and similarly rural hospitals had higher increases in Medicaid revenue than urban hospitals [16]. The differential impact may signal a similar distribution in the impact on demand for primary care. There was also a steeper decrease in the proportion of costs for uncompensated care among the latter. [16].

To minimize the potential bias this would expose, I overcome this absence of data by merging the crosswalk dataset of MSAs and PUMAs from 2010. While I consider

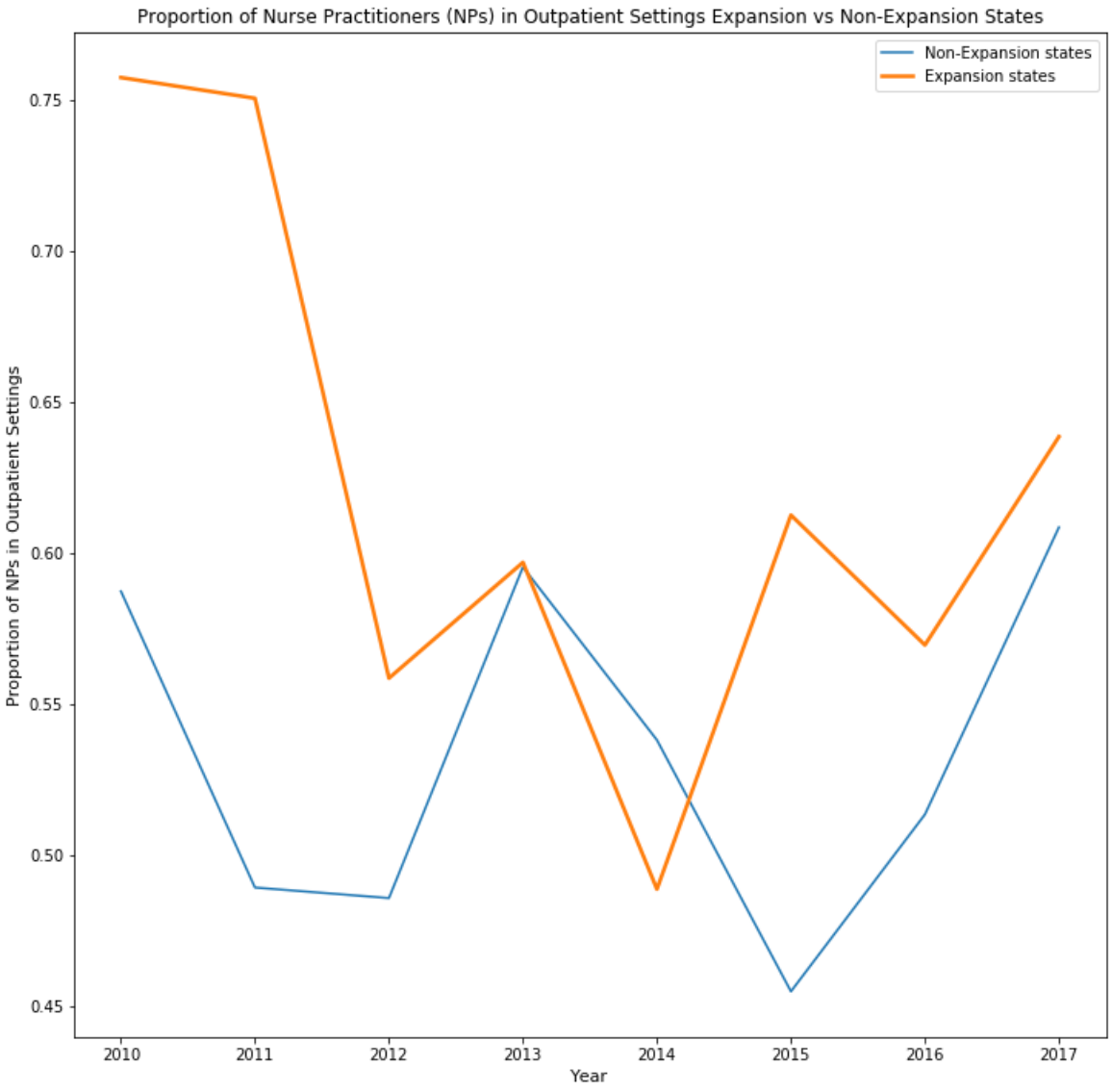

Figure 1-1: Line chart depicting proportion of NPs. Based on weighted estimates calculated from ACS 2010-2017

this to be an imperfect measure as it does not specifically identify urban or rural clusters or areas, it likely captures a lot of the variation.

A source of bias in my model that must be acknowledged is due to the lack of variation in scope of practice restrictions across the states that did not expand Medicaid enrollment among which only one allowed NPs to practice as independent primary care providers (also referred to as full scope of practice) and that is Wyoming which is also the least populous state in the United States and thus offers little variation to the set of nonexpansion states. As a robustness check on my model, I also run the full model using only states that do not have full scope of practice. This excludes Alaska, Arizona, Colorado, Hawaii, Idaho, Iowa, Maine, Montana, Nevada, New Hampshire, New Mexico, North Dakota, Oregon, Rhode Island, Vermont, Washington and Wyoming.

1.2.4 Results

A summary of the regression results is presented in table 1.1. In the first column, the variable indicating whether or not a nurse works in an outpatient setting is linearly regressed on all main design variables and all included states regardless of full scope of practice status. Based on this model, it is highly suggestive that the ACA Medicaid expansion significantly increased the number of nurses working in outpatient settings and fewer working in hospitals.

The second column summarizes the model results excluding all states allowing full scope of practice. While the results are suggest there may have been an upward effect on NPs working in outpatient clinics, this coefficient was not significant in my model and I could not reject the null hypothesis at the 10 percent significance level (the actual p-value was 0.198). This may be indicative of bias in my first model caused by the variation in scope of practice restrictions across states. It may also suggest that nurses in states that allow nurses to practice independently are perhaps more liberated from economic and political barriers and thus in a more favorable position to better respond to market forces calling for their supply where their services are needed most.

Table 1.1: Effect of ACA on Labor Supply of Nurses in Outpatient Clinics

Working in outpatient clinic		
	(1)	(2)
PolicyYear$_t$ X Expansion$_s$	0.153**	0.103
	(0.076)	(.080)
PolicyYear$_t$	-0.058	-.074
	(0.090)	(.088)
Expansion$_s$	-0.294	-0.253
	(0.189)	(0.187)
Nurse Characteristics	Y	Y
State Fixed Effects	Y	Y
PUMA Characteristics	Y	Y
Year Fixed Effects	Y	Y
Scope of Practice Laws	Mixed	Not full
Observations	25,045,556	25,045,392
Subpopulation No. Observations	1,236	956
R-squared	0.092	.075

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

1.3 Discussion

A shift in NP employment toward health centers and other outpatient settings could have many economic implications. Hospitals located in areas that contain a limited number of hospitals may employ a large fraction of the supply of nurses in their local market and thus wield considerable market power in the setting of wages for nurses. With more power over the supply of their key input, hospitals may also have less of an incentive to ensure favorable work conditions.

Many studies have concluded nurse labor supply tends to be inelastic along the intensive margin [**?**]. That is, when not accounting for entry and exit from the labor force. More recently, it has also been shown that the elasticity may be much higher when accounting for the extensive margin due to entry and exit from the labor force [13]. Within firm inelasticity is also a direct measure for a given firm's market power over its labor supply. Since hospitals may employ a significant proportion of available nurses, they may have the power to exert considerable market power over nurses. Wage setting control. Increasingly for NPs entering a new environment of increased acceptability and demand for their services as primary care providers, there is considerable potential to diminish this market power.

NEXT POTENTIAL STEPS: define more specifically how I created the outpatient in the data and methods section, create table of summary statistics for expansion vs nonexpansion and/or outpatient vs. hospital and discuss it. I would like to a separate analysis on wage changes in outpatient employment and further comment on the impact Health Center employment growth may have on hospital market power (and potential monopsony).

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