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Relaxing Occupational Licensing Requirements: Analyzing Wages and Prices for a Medical Service*

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Abstract

Occupational licensing laws have been relaxed in a large number of U.S. states to give nurse practitioners the ability to perform more tasks without the supervision of medical doctors. We investigate how these regulations may affect wages and the cost of providing certain types of medical services in two ways. First, we use data from the 2002-2007 American Community Survey to study how changes in state licensing regulations have influenced the wages of nurse practitioners and physicians. Second, analyzing a large database of private health insurance claims for "well-child" exams, we estimate the effect of the regulation changes on the prices of medical services that insurance companies actually pay for the exam. We find that wages are increased by allowing nurse practitioners to do more tasks and that prices of the service we examine can be reduced by relaxing the licensing requirements.

Introduction

Occupational licensing is among the fastest-growing labor market institutions in the U.S. economy. Kleiner and Krueger (2009) estimate that the proportion of all workers covered by occupational regulations increased from about 5% in 1952 to almost 29% in 2008 (Kleiner and Krueger, 2009). With the growth of regulation, more than one occupation could have joint jurisdiction over similar services. In those cases where universally licensed occupations are both complements to and substitutes for one another in providing a service, the government determines who can do the tasks that are required for the consumer (Friedman, 1962). Recent analysis of occupational licensing has shown the influence of licensing when regulations are introduced or become more stringent (Cox and Foster (1990), Kleiner and Todd (2009), Cathles, A., Harrington D. and Krynski K.(2010). The objective of this study is to show the effect of licensing on wages and prices when regulations are diminished. Changes in occupational boundaries may affect wages and prices, but the outcomes are not well understood.

The health sector is particularly subject to occupational regulations, over 76% of health workers work in licensed occupations (Kleiner and Park, 2010).). Occupational regulations in the health sector go beyond the conventional licensing restrictions that form the centerpiece of most microeconomic models of occupational regulations. In addition to licensure, it is common for regulations to i) limit the scope of practice of particular occupational groups, ii) require a formal supervisory relationship between members of two different occupational groups, and iii) limit the ability of some occupational groups to be reimbursed directly by health insurance companies. Simple supply and demand analysis suggests that these regulations could lead to health service markets with higher wages, higher service prices, and a less diverse range of options for receiving a particular service. These effects could reduce access to health services among some segments of the population. The health sector in 2009 accounted for about 18% of GDP and expenditures on provider services are about 21% of total expenditures on health services in the United States (Centers for Medicare and Medicaid Services, 2010). If regulations have even small effects on wages and prices then the aggregate cost of the regulations could be very large.

In the health sector, it is not uncommon for two or more occupational groups to consist of members with an overlapping set of skills and productive capacities. In some cases, it is natural to think of pairs of occupational groups in which one group is trained to perform a subset of the services that may also be performed by another more highly trained group. Dentists and Dental Hygienists may have this relationship, for example. But the subset analogy breaks down in a large number of cases. Medical Doctors (MDs) with different subspecialisations may have overlapping competencies without one group possessing a skill set that encompasses the skill set of the other group. And the situation is more complicated when there is variation in the context of service provision that is important to consumers. Advanced Practice Nurses – Nurse Practitioners (NPs), Physician's Assistants (PAs), Midwives, and Nurse Anesthesiologists (NAs) – may provide services that are very similar to those provided by MDs but with a greater emphasis on factors such as convenience, personal attention, or specialization that are important to some patients. In situations like these, the members of different occupational groups may operate as both substitutes and compliments in markets for a particular service. In these situations, government regulations that limit the independence and scope of practice of different occupational groups may cause economic harm by limiting the ability of the market to provide a flexible array of health service options.

In this study, we analyze the effects of regulations that apply to Nurse Practitioners (NPs). NPs are registered nurses (RNs) who have acquired more advanced education and clinical training than is required by standard nursing license regulations. The typical NP receives additional training through a masters or PhD degree programs (Harper and Johnson, 1998; Dueker et al, 2005). Such programs train NPs to diagnose and treat common illnesses and injuries, manage chronic illnesses, prescribe medications, and provide counseling. In most states, voluntary certification programs are in place and NPs do not require an additional license beyond the RN designation. Since the creation of the first NP program at the University of Colorado in 1965, NPs have become an increasingly important part of the health service delivery system. The American Academy of Nurse Practitioners (AANP) reports in 2011 that there were approximately 140,000 practicing NPs, 96% of whom are women. An AANP survey found that the average salary among NPs was about $91,000 and that about 48% of NPs work in family practice. Across different situations the services of an NP may function as both a complement and a substitute for the services of other medical professionals such as Nurses (RNs) and Medical Doctors (MDs). NPs face a variety of occupational regulations that have varied across states and over time. Three important regulations for NPs are those that involve limitations on prescription authority, independent practice, and independent reimbursement.

Our analysis examines how these regulations have affected the wages of NPs and MDs using data from the American Community Survey (ACS). We also study how these regulations have affected the prices of health services using private insurance claims data. We focus our analysis of the insurance claims data on claims for well care visits for children under the age of 17. Child well care exams represent a credible test case for studying price effects of occupational regulations that affect NPs because such exams are widely consumed, involve a standard/homogeneous set of services, and are often provided by either a pediatrician or family practice MD or a Nurse Practitioner. Thus the market for well-baby visits is likely to be directly affected by regulations that affect Nurse Practitioners.

The purpose of our study is to examine the influence of the relaxation of occupational licensing requirements on wages of nurse practitioners and doctors and on the prices of a standard medical service of well-baby examinations. In the first section of our analysis we provide some background of the licensure of nurses, nurse practitioners, and doctors. Next we state what previous studies that have examined by showing that occupations can be both complements and substitutes in the delivery of certain medical services. Next we explain the sources of our legal data, labor market information, and the price data. For the labor market information data we define the variables used in the American Community Survey (ACS) used to examine wage determination of both NPs and MDs. We describe our basic identification strategies and consider several threats to the internal validity of the estimates. Our empirical work shows that occupational regulations related to advanced practice nurses influence the wages of NPs by about 2 to 10 percent and also are associated with an increase in wages for physicians. We also find that the regulations increase the price of well-baby visits by 3 to 16 percent. These findings suggest that these state licensing practices may affect overall medical prices.

Nursing and Medical Doctor Licensure

Nursing licensure developed initially as certification or titling by the state. By 1923, all 48 states had permissive licensure legislation which required certain qualifications in order to use the title of nurse (Comer, 2007). New York enacted the first mandatory licensure legislation for nurses in 1947. Currently, all states require that nurses be licensed in their practice state. The terms registered nurse and licensed practical (vocational) nurse are now legally protected titles.

No one can call themselves a nurse without passing a licensing examination and meeting the requirements set by each individual state.

Physicians were licensed much earlier than nurses. First physician licensing laws in the 1870s were passed by the states in order to stem what was viewed by physicians as uncontrolled access to the market. By 1881 half of the states had physician licensure. However, enforcement became serious in the 1890s (Baker, 1984). Unlicensed medical practice was to be punished by fine or imprisonment. An American Medical Association (AMA) sponsored Flexner report (1910) gave the AMA control of medical education and regulation of physicians and auxiliary workers. As a consequence exams beyond graduation from medical school are required in order to practice as a physician. Generally physicians also control what non physicians can do to deliver medical services under state law or administrative rules.

The regulations we are concerned with in this paper apply to a third occupational group called nurse practitioners (NPs). A NP holds an RN license but also has education and training that goes beyond nursing licensure requirements. The first nurse practitioner graduate program opened at the University of Colorado in 1965. Today there are about 325 NP programs offered at universities across the United States, and there are about 140,000 practicing NPs. NPs receive training to provide a range of health services, including the diagnosis and treatment of a variety of common acute and chronic conditions, the prescription of treatments including medication and medical devices, and the counseling and education of patients. Currently there are no licensure requirements for NPs. National and state level certification regimes are in place and the American Academy of Nurse Practitioners estimates that 97% of practicing NPs maintain national certification. Although licensure beyond the RN designation is not required, state governments regulate NPs in a variety of other ways. In this paper we are mainly concerned with regulations that affect the ability of NPs to practice independently and to provide a flexible array of health services to their clients. We mainly work with regulations that limit the ability of NPs to prescribe medications that are controlled substances and with regulations that limit the ability of NPs to practice without the supervision of a medical doctor.

Prior Analysis of Occupational Regulations in the Health Sector

Earlier studies have identified the issue of the potential complementarity and substitution of regulated occupations that provide similar services. There may be incentives for members of an occupation to allow more individuals into the occupation. For example, when a patient first visits a nurse and is then referred to a medical doctor, the two specialists are complements in the production of service function (Persico, 2011). However, for simple procedures, doctors and nurses also can be substitutes if the nurse can provide the service in place of a doctor. Evidence of this was shown by occupational regulations that apply to dentists and dental hygienists were significant in influencing the earnings of both occupational groups (Kleiner and Park, 2009). These regulations also influenced the prices of a set of basic dental services, with prices being lower in states that allowed hygienists to have greater autonomy (Marier and Wing, 2011).

More recently studies in other medical specialties such as occupational therapy and physical therapy have shown the importance of laws and administrative procedures for the employment and earnings of each of the occupations given that they are both complements and substitutes in service delivery (Cai and Kleiner, 2012). In his examination of the impact of scope of practice laws for registered nurses (RNs) and physician assistants (PAs) on consumers, Stange (2011) focuses on the changes on access, costs, and patterns of care and utilization for a broad population-based sample. Our study develops an analysis beyond Stange (2011) by examining the role of these laws on wages of advance practice nurses and their complementary service providers, namely physicians, and focusing on the role of the regulations on the price of the homogenous service of well-baby exams.

Data

Measures of Licensing Requirements

We collected information on state statutes regulating nurses from *The Nurse Practitioner*'s "Annual Legislative Update" for 1999-2010. We focused on the statues regarding legal authority to practice and the authority to prescribe medications that are considered controlled substances. These classes of regulations take a variety of forms. For example, restrictions on title protection, governing board structure, and scope of practice are common ways to regulate a NPs authority to practice. And regulations that limit prescription authority to licensed MDs, or require a licensed MD to supervise the prescription activities of a NP are common ways that states regulate the prescription authority of NPs.

NPs are probably affected by other forms of regulation as well. However, we think that the appeal of an NP to consumers seems to involve access to basic medical care at convenient times and locations that are often hard for traditional providers like MDs to deliver. Thus, licensing regulations that limit this flexibility by making it more costly for NPs to practice independently and to provide treatments (which often involve controlled medications) to patients are likely to either reduce the availability of NPs to consumers or make NPs a less attractive option despite their availability and lower wages.

In the United States the trend over the last 10 years has been toward greater autonomy for NPs. In Figure 1 we show how prescription authority regulations that apply to NPs have changed over time. Panel A shows that in 2000, nine states did not allow NPs to prescribe controlled medications of any kind. By 2011 only two states did not allow NPs to prescribe medication under any circumstances. Similarly, panel B shows a growth in the number of states that allow NPs to independently prescribe controlled substances. Clearly NPs have been gaining greater autonomy in providing services to patients. Panel C shows that some of the most common changes in regulations come from the growth of regulations in which NPs are allowed to prescribe controlled medications but are required to be supervised by a licensed MD. It seems natural to view the regulations in panel C as an intermediate step or partial deregulation of the prescription authority environment.

In Table 1 we show the states that changed their licensing requirements during the period 2000 through 2011 and separately from 2005 through 2011, which is the period where we have most of our price data on service delivery. There were 13 states that loosened their licensing requirements from 2000 to 2011 to allow more tasks for NPs. In contrast there were only 4 of the 13 states that significantly changed their licensing requirements from 2005 through 2010, and they included Colorado, Kentucky, Maryland, and Missouri. There does not appear to be any significant regional bias to the changers in both time periods that are shown in the Table.

Data on Labor Market Outcomes

Based on the organization of medical service delivery, we hypothesize that physicians would gain if they have greater control of services provided to patients, we test the influence of the regulations on both MDs and NPs. We pooled data from the 2002-2007 American Community Survey (ACS) to construct samples of NPs and MDs. And then we estimated the effect of the regulations in a standard Mincer model human capital framework. The ACS does not separately identify NPs therefore we devised a sample selection method that would capture practicing NPs. To create such a sample, we started by limiting the sample to ACS respondents with occupational codes that correspond to registered nurses or registered practical/vocational nurses. This gave us a total of 161,963 observations. From this sample, we retained only those nurses who held a Masters degree, a professional degree, or a PhD. This reduced the sample to 19,827 observations. After imposing additional selections based on the completeness of data on earnings, hours worked, and some key covariates we were left with a Nurse Practitioner sample of 14,151 observations. Appendix A provides a full description of the sample selection criteria we applied to obtain the sample for our analysis. Descriptive statistics from the ACS samples we used are in Table 2. Hourly earnings average about $ 25.00 in 2002 dollars per hour for our sample of NPs.[1] This amount is less than one-half the hourly earnings for Physicians. The basic data show that more than two-thirds of all nurse practitioners are women and that only 7 percent are black. Regarding state regulation, the table shows that 51 percent are in states that allow for an independent practice. Moreover, 27 percent are in states that allow for independence and they have the ability to write prescriptions for controlled substances. These legal provisions may allow nurses to substitute for physicians in providing basic services or be complements and then drive up the demand for medical services and the prices for the service.

Data on Prices for a Medical Service

The NP regulations could affect the prevailing prices of health services by altering the supply of health services and by changing the mix of providers available in the market for health services. As discussed above, some health services may be provided by both an NP and by a more traditional provider such as an MD. And in many cases the services of an NP can be

[1] While not shown, as a basis of comparison and for quality control, we also checked basic means and standard deviation of the variables in analysis using the CPS Merged Outgoing Rotation Group (MORG) data for registered nurses. For example, average hourly earnings for nurses were $24.77 in 2002 dollars.
The American Academy of Nurse Practitioners (AANP) reports that in 2011 the average annual salary for a practicing NP salary was around $90,000. Assuming a standard 2,000 hours of work per year, this implies an hourly wage of around $45 in 2011, which is about $36 in 2002 dollars. The $10 discrepancy here could imply that our sample includes some lower paid non-NP nurses and so the earnings estimates are biased downward. It could also arise because real wages for NPs have increased over time or because the AANP has over sampled NPs with higher incomes.

viewed as both a substitute and a complement to the services of an MD. Because we do not expect the price effects to be very large in per-unit terms, we planned to focus on a medical service that is commonly provided and that is often provided by both MDs and NPs. We also wanted to find a health service that was relatively standardized in delivery so that we did not detect price differences that arose mainly because we were inadvertently pooling complicated and uncomplicated cases. After consultations with colleagues in the School of Nursing at the University of Rochester, we decided that insurance claims for child well care exams seemed to be plausible test cases. These exams are widely consumed by families in the United States, they involve a standard set of tests and evaluations, and they are routinely provided by both family practice physicians and NPs. These exams seem like a strong test for the role of occupational regulations on the price of health services.

Our analysis is based on a large database of private insurance claims that is maintained by a non-profit organization – Fair Health, Inc. – which is tasked with providing independent estimates of the distribution of health services reimbursement rates across the United States. Previous incarnations of the database were maintained by Ingenix Corp and estimates of price distributions from the database are widely used by insurance companies and providers to determine appropriate reimbursement rates for health services. As discussed above, we extracted insurance claims with Current Procedural Terminology (CPT) codes that are used to identify claims as well care visits for children. Specifically, we extracted claims with CPT codes 99381-99384 and 99391-99394. Each insurance claim contains information on the type of claim, the geographical location of the office where the service was provided, the "billed charge" that was submitted by the provider, and the "allowed amount" that the insurance company ultimately paid the provider after allowing for negotiated discounts and the details of insurance plans. We analyze the allowed amount because it is closest to the transaction price of the health services. Table 3 reports the sample sizes for each type of insurance claim in our analysis and also shows the mean, median, and standard deviation of the allowed charge for each type of claim. In total there are almost 30 million claims for these 8 health service categories over 2005 to 2010. The table shows that the price of a well care visits increases somewhat with the age of the child and that prices are higher for new patient visits than for established patient visits. In general, the well care visits that are the focus of our paper have cost about \$80 - \$100 and have a standard deviation across all claims of around \$30.

The FairHealth database consists of individual insurance claims provided by a large set of “contributing insurance companies” who operate in markets across the United States. Each contributing company agrees to submit a complete and unadulterated dataset of the insurance claims it processed over a calendar year. The number of contributing companies varies somewhat over time. The structure of the insurance industry in the United States means that these companies may be affiliated with a larger parent company and so it may not be reasonable to think of each contributor as an independent company.

Despite the incredible volume of claims in the database, it is important to note that the claims are not the result of a formal random sampling process they are instead the product of a the decisions of individual health insurance firms to join the network of firms that contribute to the data: these decisions may mean that contributing firms are different from non-contributing firms in unknown ways. We think it is unlikely that firms select into the network of FairHealth contributors on the basis of the distribution of prices they pay for well care visits.

To examine and evaluate the representativeness of the database, we compared the data from the FairHealth database to claims data from the Thomson-Reuters’ MarketScan Research

Database. The MarketScan data is similar in construction to the FairHealth data but it consists of claims from self-insured employers rather than from independent health insurance companies. MarketScan is widely used in the academic literature.[2] We have Fair Health data for 2005-2010 but for MarketScan we only have information for 2007 and so we limit our comparisons to claims for 2007.

Figure 2 shows kernel density estimates of the distribution of prices established patient well care visits for children ages 0-1 (99391), 1-4 (99392), 5-11 (99393), and 12-17 (99394). The green lines show the distribution of prices in the FairHealth database and the orange lines show the distribution of prices in the MarketScan database. In both cases, we analyzed the allowed amount data. The figures show that a remarkable similarity in the distribution of the prices across the two sources of data. Prices are slightly higher in the Fair Health data; on average the price of a child well care visit is about $10 more in the FairHealth data than in the MarketScan data. The two data sets lead to very similar inferences about the distribution of prices for well-baby care. These differences are statistically significant based on simple t-tests and also based on Kolmogorov-Smirnov tests for the equality of the two distributions. But this is not at all surprising given the extremely large sample sizes in both data sets: even small differences are precisely measured with millions of observations. Overall, we think that the FairHealth data and MarketScan data would lead to similar inferences about the influence of changes in regulations on the prices of these services.

Our analysis of the price data was always conducted at some level of aggregation rather than at the actual claim level. We conducted a state level analysis by computing mean and

[2] Thomson-Reuters maintain a bibliography of the scientific publications that make use of the MarketScan database. The bibliography contains entries for publications in a variety of fields including economics, health services research, medicine, nursing, statistics, and physiology. The bibliography is available online at http://interest.healthcare.thomsonreuters.com/content/DownloadLibrary-Pharma.

median prices in state x year x product code cells. And we also conducted some analyses of prices within selected Metropolitan Statistical Areas (MSAs) by classifying claims using the zipcode of the provider location. We generally reduced the influence of outliers (which are likely data entry errors) by topcoding the price data at $1,000 and removing prices that were missing or negative. We kept 99.8% of the data.

Empirical Results

Regulation and Wage Determination

To examine the role of the changes in regulation on wages and prices, we estimated a fixed effects version of the standard Mincermodel. The basic earnings equations can be written as follows:

$$\text{(3)} \qquad \ln\left(Earnings_{ist}^{P/N}\right) = \alpha + \beta \boldsymbol{R}_{st} + \gamma \boldsymbol{X}_{ist} + \delta_s + \eta_t + \varepsilon_{ist},$$

where $Earnings_{it}$ is the hourly earnings of physicians (P) or nurse (N) i in state s at time period t; $\boldsymbol{R}_{st}$ is the regulation that is in place for person i's state s in time period t; the vector $\boldsymbol{X}_{ist}$ includes covariates measuring the characteristics of each person; δ_s and η_t are state and year fixed effects, respectively; and ε_{ist} is the error term.

The model is a basic fixed effects model that can also be viewed as a generalization of the conventional two-group two period difference-in-difference model. The results of estimates are presented in Table 4[3]. The main results, which include individual covariates, and state and year fixed effects, are presented in Columns 3, 6, and 8. Column 3 suggests that the ability to practice independently increases the wages of NPs by approximately two percent. The estimates in column 6 imply that the ability to both practice independently and prescribe controlled medications increase the wages of NPs by about 10 percent. In column 8 we allow the effects of

[3] We also included time-varying state-level controls such as the state median household income but found that they have no explanatory power. Consequently, we do not show the results in this paper.

independent practice and prescription authority to enter the model separately and we find that the two effects added together continue to have an effect of around 10%. These estimates are statistically significantly different from zero in the models that include state and year fixed effects but not in models that do not include these fixed effects.[4] The standard errors for these models were computed using a Huber-White covariance matrix that allowed for clustering at the state level.

Table 5 shows the influence of having more flexible licensing requirements on the earnings of physicians in the ACS data. As noted earlier the issue of whether physicians and nurses are substitutes or compliments is an empirical issue. The estimates suggest that there is no significant difference in physicians' hourly earnings when nurses are allowed to work independently of physicians (Column 3). However, we do find evidence that physician earnings increase by about 12% when NPs are allowed to both prescribe controlled substances and practice independently (Columns 6 and 8). One interpretation of our results is that when a patient visits an NP and is later referred to a medical doctor, these two specialists are complements in the production of service function and both may gain because regulatory statutes are more relaxed to allow nurses to do more tasks for the patient.

Regulation and Prices

Simple economic theory suggests that occupational regulations that encumber NPs should lead to higher equilibrium prices of for health services provided by NPs. One interpretation is that regulations limit the supply of health services and this drives up prices. Hedonic mechanisms could also lead to higher prices. For instance, if NPs are able to provide health services at more convenient times and locations or with a more appealing personal relationship

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[4] In Appendix B, we present results from a similar model using the CPS MORG data. Unfortunately, there were only one-eighth as many observations, and for many smaller states there were few nurse practitioners or none in the data set leading to insignificant results. Consequently, our results for these estimates using the CPS are less reliable.

with patients then these product attributes could be reflected in prices. Regulations that reduce the ability of NPs to compete on these margins is likely to make these service attributes less available in the market place and will minimize the valuable role of NPs in the market. Finally, regulations can simply increase the cost structure of an NP led practice. For instance, if regulations require some type of costly supervisory relationship between NPs and MDs then these monitoring costs are could drive up prices. Regulations that prohibit insurance companies from directly reimbursing NPs should increase administrative costs for NPs and may reduce the service convenience for patients. Both of these factors could drive up prices. The basic model for price determination mirrors the model we used for wage determination and is specified as follows:

$$(4) \qquad Price_{st} = \alpha + \beta \boldsymbol{R}_{st} + \rho \boldsymbol{Z}_{st} + \delta_s + \eta_t + \varepsilon_{ist}.$$

In the equation, $Price_{st}$ is the median allowed price in state s at time t; $\boldsymbol{R}_{st}$ is the licensing regulation in state s in time period t; the vector $\boldsymbol{Z}_{st}$ includes covariates measuring the characteristics of each state; δ_s and η_t are state and year fixed effects, respectively; and ε_{ist} is the error term. We coded the regulation variables to emphasize the relative independence granted to NPs in different states and time periods along two margins: prescription authority and independent practice authority. The reference case for our regressions describes a state and time period in which NPs are allowed to operate an independent practice without the supervision of a physician and also are allowed to prescribe controlled medications without the supervision of a physician. Then we specify two summary regulated situations. In the first case – Direct Supervision, Limited Prescription Authority – means that in a given state and time period, an NP was required to practice under the supervision of a physician but also was allowed to prescribe controlled medications under the supervision of a physician. The second case – Direct

Supervision, No Prescription Authority – describes the situation in which regulations require an NP to practice under the supervision of a physician and also do not allow an NP to prescribe controlled medications under any circumstances. This three way specification leaves out the logical possibility that a state could allow an NP to work without supervision, but prohibit her from prescribing medication independently. This case did not occur in our data.

Estimates of the state price effects using a variety of fixed effects model specifications are shown in Table 6. The estimates of the price effects show that more restrictive requirements for NPs increased prices for well care examinations. The intermediate level of regulation – Direct Supervison, Limited Prescription Authority – increases prices by about $6. The stronger level of regulation – Direct Supervision, No Prescription Authority – increases prices by about $16. Since the typical price of a well care visit is around $100 these are substantial price effects in percentage terms.

Robustness Checks

To check the robustness and sensitivity of the estimated price effects to alternative interpretations of the results, we conducted three different types of analysis. One concern is that state x time specific changes in the demand for health services could lead to biased results and also could be associated with regulatory changes. To examine this possibility we collected insurance claims data for a set of 7 very basic dental procedures: teeth cleaning, fluoride treatment, local anesthesia, nitrous oxide, sealant application, amalgam restoration, and x-rays. We reasoned that these dental services, which are widely consumed by children and have prices that are similar to child well care exams, should also be affected by the general demand for child health services in a given state and year. Importantly, the markets for these dental services should not be affected by regulations that apply to NPs since NPs and MDs do not provide these dental services. We aggregated the dental claims data into state x year x procedure code cells and combined them with the data on the child well care visits. Then we estimated triple differenced regressions in which the dental data served as a control group for the well care data. The results are presented in table 7. We present the results including a full set of state, year, and year x state fixed effects. The estimated regulatory effects are the difference in the estimated effect of the regulations on the well care visits, which should be affected by the regulations, and the dental visits, which should not be affected by the regulations. In the most complete model, which includes the fixed effects as well as a vector of time-varying state covariates, we find that the intermediate level of regulation increases the price of well care visits by about $5.52 and the more stringent regulation increases prices by about $4.05. The results are statistically significantly different from zero. These estimates are broadly consistent with the state level results presented in table 6, although the magnitude of the stronger regulation is substantially reduced when the dental data and regulations are used as a control group. The number of observations is halved in the estimates which include all the covariates. The regulation and price data has information from the year 2005-2010, but the covariates spanned 2008-2010.

Several researchers have shown that nominal standard error estimates often are too small in the generalized Difference-in-Difference style of regression models that we have employed in this paper. Moulton (1990) made this point salient in economics. Since then Bertrand, Duflo, and Mullainathan (2004), Donald and Lang (2007), and Conley and Taber (2011) have raised related issues. Rosenbaum (2002, 2009), Bertrand et al (2004), and Conley and Taber (2011) have both shown that statistical tests based on permutation/randomization distributions seem to perform well even with clustered data with a relatively small number of groups. To assess the statistical robustness of our results, we conducted a series of permutation tests based on the state level models reported in table 6. In the most basic implementation of the idea, we randomly selected a set of state x year cells and defined them as “pseudo regulated markets”. Then we estimated the regression model using the placebo regulations instead of the real regulations, and stored the coefficients on the pseudo regulations. We repeated this process 500 times to build up a distribution of placebo effects. On average, the placebo laws should have no effect on prices because they are simply randomly chosen cells. But in some cases a placebo effect will happen by chance. By comparing the regulatory effect produced by the actual regulations to the empirical distribution of effect estimates produced by the placebo laws we can understand the likelihood that our effect was observed by chance without appealing to the asymptotic distribution of a given estimator. In practice, we do not know the true “law generating process” and so we experimented with constructing placebo law distributions by randomly selecting cells across all state x year x product cells and also only within years and within states. Figure 3 shows kernel density plots of the distribution of estimated coefficients on the two regulation variables included in he model. The key point is that the placebo distributions represent the sampling distribution of the estimated coefficients under the null hypothesis that the regulations have no effect on prices. The vertical line in the graph shows the effect we observed in our actual sample and it lies in the extreme tail of the placebo distribution. This is evidence that our results are not likely produced by statistical chance.

In order to further estimate and test the robustness of our price effects of regulation we specify a model in which the data is limited to zipcodes that belong to MSAs that fall on both sides of a state border that marks a change in the way that NPs are regulated. Here the idea is to account for local demand and supply conditions that are common across the MSA.

To implement this research design, we identified which zip-codes were located in a metropolitan statistical area (MSA) that straddled state borders and had differing state regulation on either side of the MSA. Thirty-five MSAs met the criteria. We aggregated these data to state x year x time period cells and used the aggregate data to estimate the following model:

$$(5) \qquad Price_{mstp} = \alpha + \beta \boldsymbol{R}_{st} + \theta_m + \mu_p + \eta_t + \varepsilon_{mstp},$$

where $Price_{mstp}$ is the allowed price for producte p at time t in state s in MSA m; $\boldsymbol{R}_{st}$ is the licensing regulation in state s in time period t; θ_m, μ_p, η_t are MSA, product, and year fixed effects, respectively; and ε_{mstp} is the error term. Table 8 gives the MSAs in our analysis that met the criteria of being on a state border where the legal restrictions differed across state boundaries. The MSA represent a wide range of areas and do not appear to be systematically different across areas of the country or size of MSA. Figure 4 shows the number of MSA that had either concordant/discordant regulation for practical nurses regarding their prescription authority**.** The results show that there is a clear movement toward states having similar statutes across MSAs.

Table 9 shows the influence of regulation on prices using our MSA analysis. The results are similar to those from the analysis that used the dental services as an untreated comparison group. We find that the intermediate level of regulation increases the price of well care visits by about \$3.60 and that the more stringent regulation increases prices by about \$5.31.

Finally, we examine if the laws were passed in states with specific underlying economic characteristics. Table 10 shows a hazard model of time to the passage of a more relaxed law based on the characteristics of the state. The estimates show that none of the standard economic characteristics in the state is associated with the passage of the law.

Conclusions

In this study we investigated how easing regulations that affect nurse practitioners may affect wages and the equilibrium prices health services. First, we used data from the 2000-2009 ACS to study how changes in state licensing regulations have affected the wages of nurse practitioners and doctors. Second, analyzing a large database of private health insurance claims for well care exams, we estimated the effect of the regulation changes on the supply prices of standard medical services. We found that more restrictive nurse practitioner regulations tended to depress the wages of nurse practitioners and also to increase the prices of medical services. We found somewhat weaker evidence that more restrictive nurse practitioner regulations also tended to depress the wages of physicians. One interpretation of this finding is that NPs and MDs are compliments in service production so that both groups earn higher wages in a less regulated environment.

We analyzed the robustness of our results using the prices of other routine health services (dental procedures) that should not be affected by nurse practitioner regulations, by conducting the analysis at the level of MSAs to account for local supply and demand conditions using MSA fixed effects, by conducting placebo law tests that are robust to dependent error structures, and by studying the timing of the introduction of state regulations to determine whether regulatory changes appear because of changes in state characteristics.

Our analysis shows how regulating the occupational groups involved in the delivery of health services can affect both equilibrium wages and prices. We find that allowing nurse practitioners to operate independently and provide prescriptions on their own is associated with a 2 to 10 percent increase in hourly wages for nurses and as much as a 14 percent increase in earnings for physicians using data from the sample in the ACS. Our estimates from Fair Health, Inc. show that changing licensing to permit more tasks by nurses lowers permitted prices by 3 to 16 percent.

The policy implications of our results suggest that for routine tasks the use of nurse practitioners may be an important way to enhance access to medical care for patients. Moreover for these routine tasks, allowing nurse practitioners to perform procedures leads to lower prices for the services we examined. The estimates from the models in this paper suggest that regulations that restrict the independence of nurse practitioners costs the economy substantial amounts of money from only a simple medically well-defined well care visit. These regulations likely affect the prices of other health services as well and it seems clear that occupational regulations may be an important factor to consider in federal or state health care policies that are intended to reduce the costs of medical care. However, there is a need for additional analysis on more medical procedures, as well as further work on the implications for patient quality of care before these results can become the focus of new public policies.

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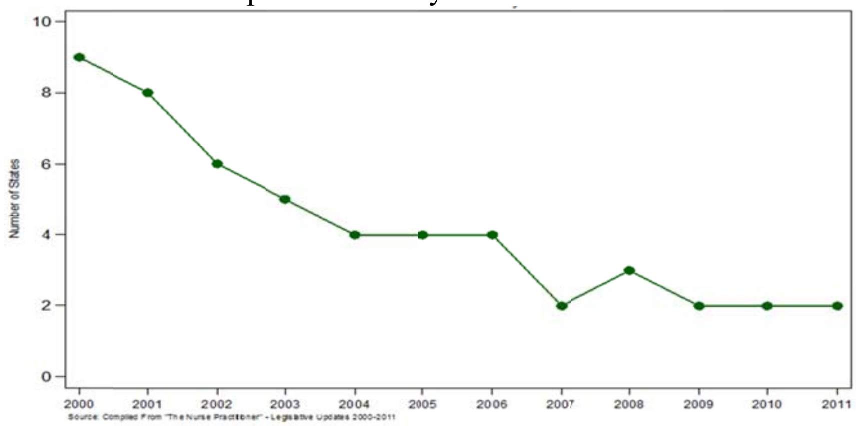
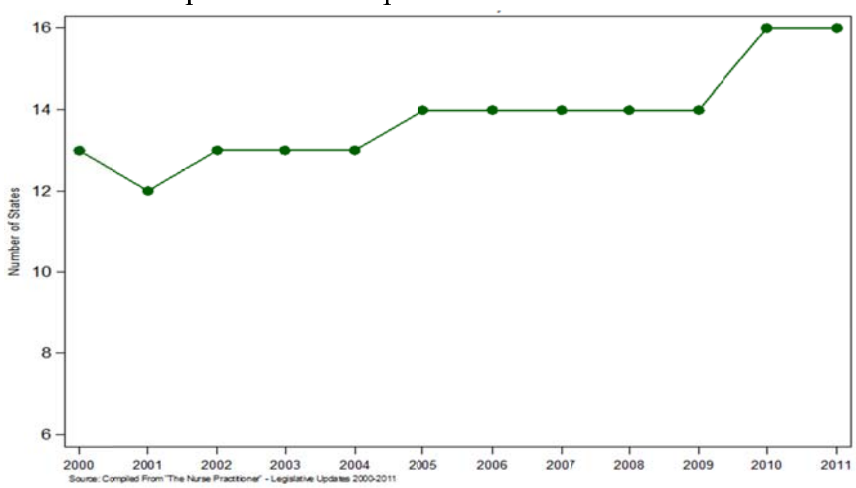
Figure 1 Growth in the Legal Requirements Allowing Nurses Greater Autonomy for Medical Tasks 2000-2011

Panel a: No Prescription Authority



Panel b: Independent Prescription of Controlled Substances



Panel c: Supervised/Delegated Prescription of Controlled Substances

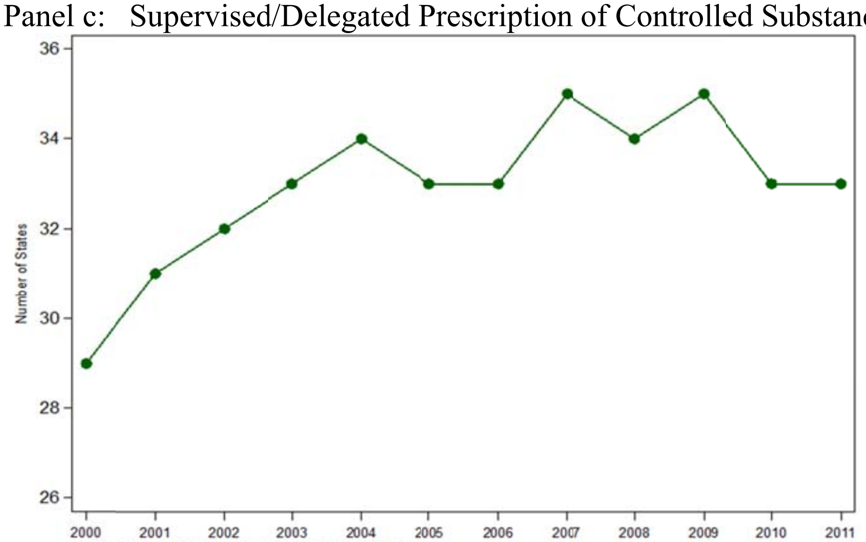


Figure 2: Well Baby Prices: Fair Health vs MarketScan

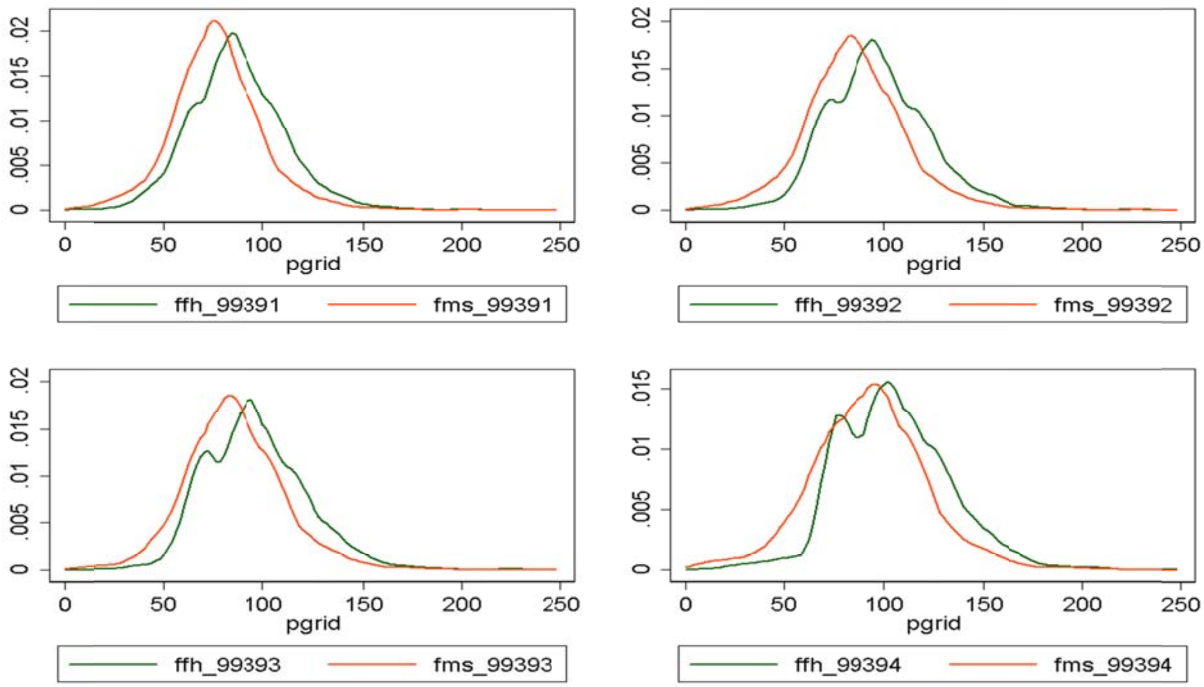
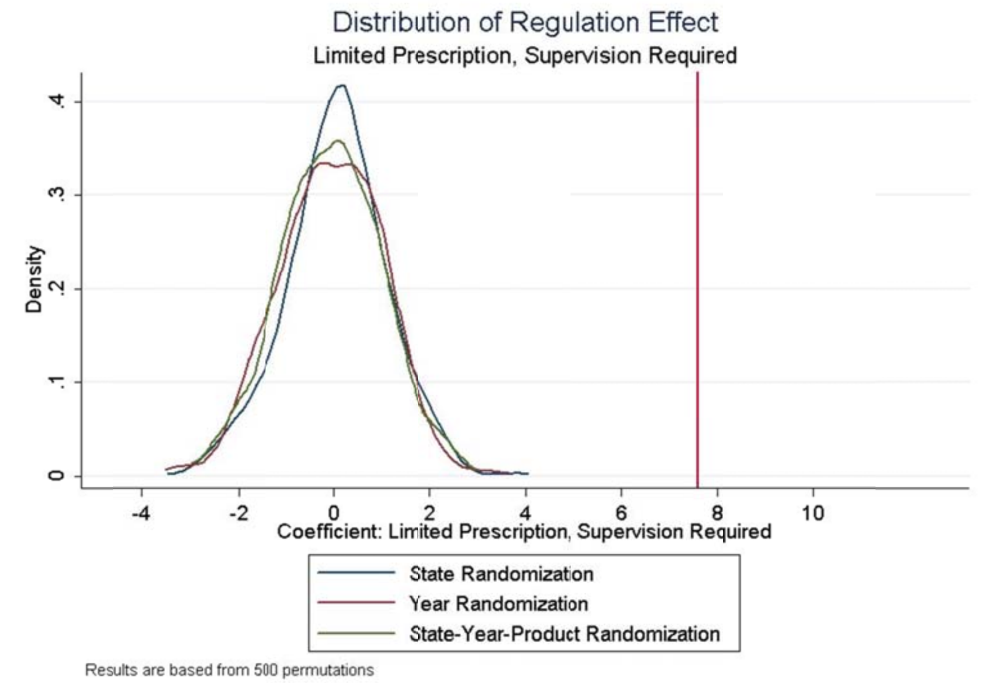


Figure 3: Falsification Tests: Permutation Based Statistical Tests



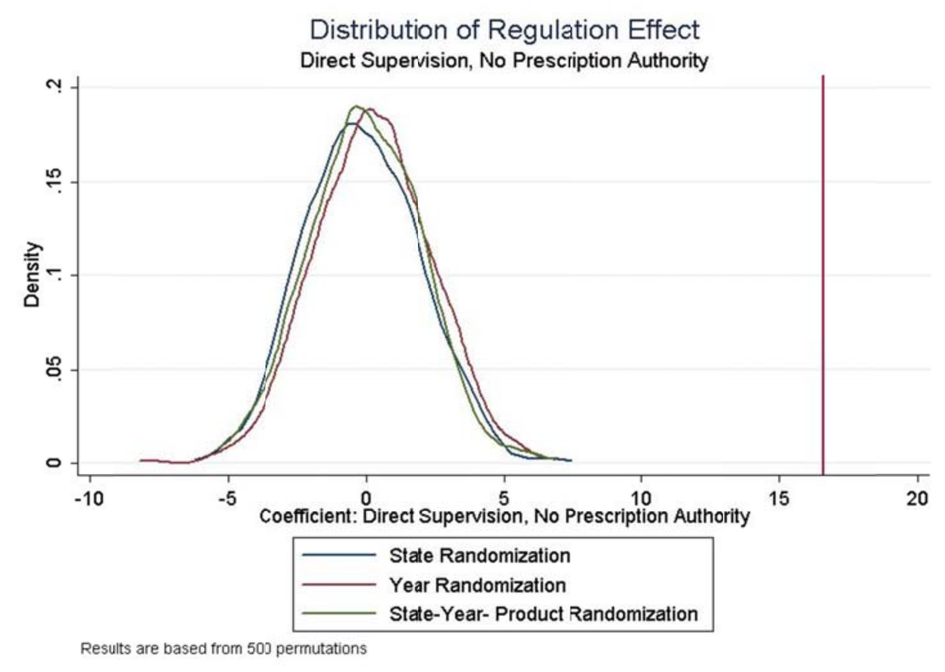


Figure 4: Number of State Borders that Have Concordant/Discordant Regulations
APN Prescription Authority

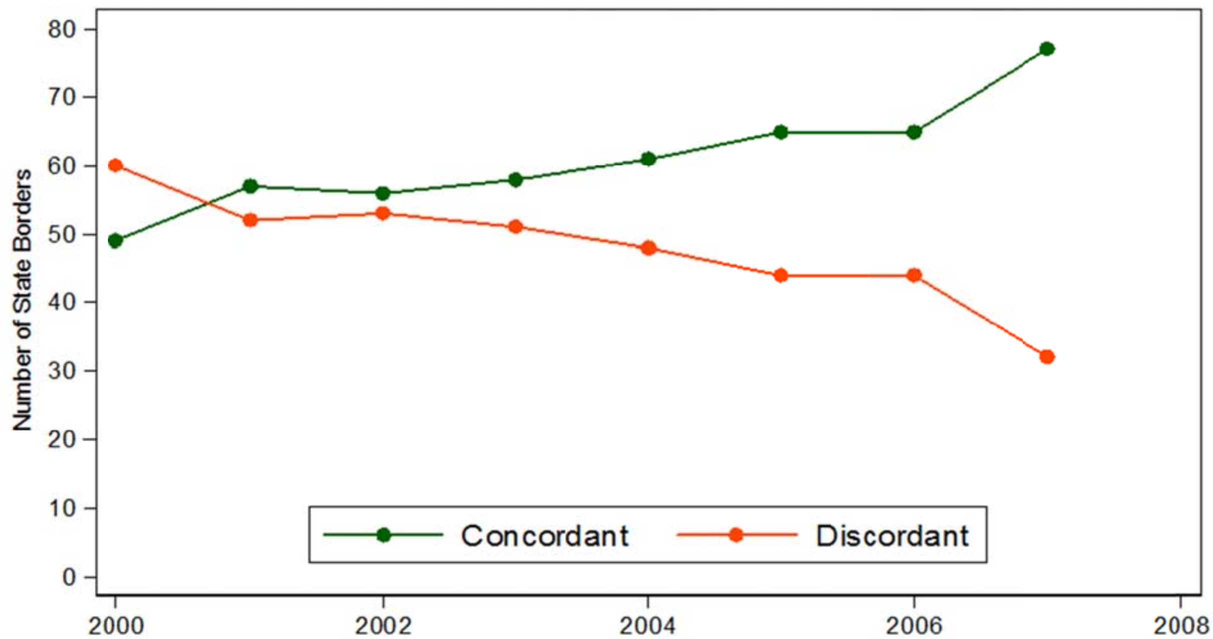


Table 1: States that Changed Licensing Laws on Permissible Tasks by Nurses

State	State Changed Prescription Authority from 2000-2011	State Changed Prescription Authority from 2005-2010
CO	Changer	Changer
FL	Changer	Non-Changer
ID	Changer	Non-Changer
KY	Changer	Changer
LA	Changer	Non-Changer
MD	Changer	Changer
MO	Changer	Changer
MS	Changer	Non-Changer
NV	Changer	Non-Changer
OH	Changer	Non-Changer
TX	Changer	Non-Changer
VA	Changer	Non-Changer
WI	Changer	Non-Changer

Table 2: Summary Statistics for Nurses and Physicians using the ACS 2002-2007

	Registered Nurses & Licensed Practical/Vocational Nurses (n=15,316)		Physicians & Surgeons (n=23,839)	
Variable	Mean	Std. Dev.	Mean	Std. Dev.
Individual Level				
ln(hourly earnings)	3.26	0.45	4.05	0.77
Experience	23.57	9.53	19.76	9.88
Experience-Squared	0.65	0.43	0.49	0.41
PhD	0.02	0.14	0.11	0.32
Gender	0.09	0.29	0.68	0.47
Married	0.68	0.47	0.82	0.39
White	0.85	0.36	0.77	0.42
Black	0.07	0.25	0.04	0.19
Citizen	0.96	0.18	0.93	0.26
For-Profit	0.50	0.50	0.37	0.48
Self-Employed	0.02	0.15	0.33	0.47
Registered Nurses	0.92	0.27		
State Regulation (n=306 states by year)				
Scope of Practice: Independence	0.51	0.50		
Prescription Authority: Independence (+ Controlled Substances)	0.27	0.44		

Note: See Appendix 1 on the sample construction.

Table 3: Basic Price Data from the Fair Health Inc. Data

CPT Code	Descriptions	Age (Year)	Number of Claims	Mean Allowed Amount	Median Allowed Amount	SD Allowed Amount
99381	Preventive Visit New Patient	0-1	551,972	108.91	106	30.06
99382	Preventive Visit New Patient	1-4	353,231	119.57	117.44	32.22
99383	Preventive Visit New Patient	5-11	425,911	117.64	114.97	31.91
99384	Preventive Visit New Patient	12-17	508,421	124.58	122.4	36.24
99391	Preventive Visit Established Patient	0-1	8,040,000	86.72	84.9	23.99
99392	Preventive Visit Established Patient	1-4	8,390,000	96.86	94.7	26.2
99393	Preventive Visit Established Patient	5-11	6,238,129	96.1	93.53	26.2
99394	Preventive Visit Established Patient	12-17	5,074,770	104.85	102.47	29.59

Table 4: ACS Estimates of the Effects of Occupational Regulations on Log Wage for Nurses, 2002-2007

	1	2	3	4	5	6	7	8
SP: Independence	-0.027	-0.028	0.023**				-0.022	0.021**
	(0.034)	(0.030)	(0.007)				(0.033)	(0.007)
PA: Independence				-0.023	-0.033	0.096***	-0.017	0.075***
(+ Controlled Substances)				(0.034)	(0.031)	(0.015)	(0.032)	(0.019)
Experience		0.016***	0.016***		0.016***	0.016***	0.016***	0.016***
		(0.002)	(0.002)		(0.002)	(0.002)	(0.002)	(0.002)
Experience-Squared		-0.337***	-0.341***		-0.337***	-0.341***	-0.336***	-0.341***
		(0.056)	(0.053)		(0.056)	(0.053)	(0.056)	(0.053)
PhD		0.007	0.000		0.006	0.000	0.007	0.000
		(0.031)	(0.031)		(0.031)	(0.031)	(0.031)	(0.031)
Gender		0.164***	0.167***		0.163***	0.167***	0.164***	0.167***
		(0.021)	(0.021)		(0.021)	(0.021)	(0.021)	(0.021)
Married		0.005	0.012		0.004	0.012	0.005	0.012
		(0.009)	(0.008)		(0.009)	(0.008)	(0.009)	(0.008)
White		-0.084***	-0.027		-0.084**	-0.027	-0.084***	-0.027
		(0.024)	(0.022)		(0.024)	(0.022)	(0.023)	(0.022)
Black		-0.046	0.003		-0.044	0.003	-0.047	0.003
		(0.034)	(0.018)		(0.034)	(0.019)	(0.034)	(0.019)
Citizen		0.131***	0.143***		0.131***	0.143***	0.131***	0.143***
		(0.028)	(0.025)		(0.028)	(0.025)	(0.028)	(0.025)
For-Profit		-0.039***	-0.037**		-0.039***	-0.037**	-0.039***	-0.037**
		(0.010)	(0.011)		(0.011)	(0.011)	(0.011)	(0.011)
Self-Employed		0.123**	0.118**		0.123**	0.118**	0.123**	0.118**
		(0.038)	(0.041)		(0.038)	(0.041)	(0.038)	(0.041)
Registered Nurses		0.488***	0.474***		0.489***	0.474***	0.488***	0.474***
		(0.022)	(0.025)		(0.022)	(0.025)	(0.022)	(0.025)
Constant	3.213***	2.545***	2.429***	3.207***	2.540***	2.429***	2.545***	2.429***
	(0.027)	(0.067)	(0.041)	(0.024)	(0.065)	(0.041)	(0.066)	(0.041)
Year-Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Fixed	No	No	Yes	No	No	Yes	No	Yes
R-squared	0.004	0.123	0.154	0.004	0.123	0.153	0.123	0.154
N	15,316	15,316	15,316	15,316	15,316	15,316	15,316	15,316

Note: * significant at the 0. 05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by state.

Table 5: ACS Estimates of the Effects of Occupational Regulations on Log Wage for Physicians, 2002-2007

	1	2	3	4	5	6	7	8
SP: Independence	0.001	-0.032+	-0.009				-0.050*	-0.015
	(0.026)	(0.017)	(0.046)				(0.021)	(0.049)
PA: Independence				0.058	0.018	0.121***	0.054	0.137*
(+ Controlled Substances)				(0.045)	(0.042)	(0.020)	(0.046)	(0.057)
Experience		0.092***	0.091***		0.091***	0.091***	0.091***	0.091***
		(0.003)	(0.003)		(0.003)	(0.003)	(0.003)	(0.003)
Experience-Squared		-1.776***	-1.774***		-1.773***	-1.774***	-1.772***	-1.774***
		(0.071)	(0.071)		(0.071)	(0.071)	(0.070)	(0.071)
PhD		-0.133***	-0.130***		-0.132***	-0.130***	-0.132***	-0.130***
		(0.017)	(0.017)		(0.017)	(0.017)	(0.017)	(0.017)
Gender		0.185***	0.184***		0.185***	0.184***	0.186***	0.184***
		(0.014)	(0.015)		(0.014)	(0.015)	(0.014)	(0.015)
Married		0.097***	0.097***		0.096***	0.097***	0.097***	0.097***
		(0.019)	(0.018)		(0.019)	(0.018)	(0.019)	(0.018)
White		-0.018	-0.015		-0.020	-0.015	-0.019	-0.015
		(0.018)	(0.019)		(0.018)	(0.019)	(0.018)	(0.019)
Black		-0.114**	-0.109**		-0.112**	-0.109**	-0.113**	-0.109**
		(0.037)	(0.038)		(0.036)	(0.038)	(0.036)	(0.038)
Citizen		0.233***	0.232***		0.233***	0.232***	0.233***	0.232***
		(0.023)	(0.024)		(0.023)	(0.024)	(0.023)	(0.024)
For-Profit		0.122***	0.117***		0.122***	0.117***	0.123***	0.117***
		(0.015)	(0.014)		(0.015)	(0.014)	(0.015)	(0.014)
Self-Employed		0.168***	0.165***		0.168***	0.165***	0.170***	0.165***
		(0.020)	(0.020)		(0.020)	(0.020)	(0.020)	(0.020)
Constant	3.976***	2.591***	2.592***	3.969***	2.581***	2.592***	2.592***	2.592***
	(0.026)	(0.051)	(0.046)	(0.023)	(0.050)	(0.046)	(0.051)	(0.047)
Year-Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Fixed	No	No	Yes	No	No	Yes	No	Yes
R-squared	0.004	0.217	0.223	0.005	0.216	0.223	0.217	0.223
N	23,839	23,839	23,839	23,839	23,839	23,839	23,839	23,839

Note: * significant at the 0. 05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by state.

Table 6: Estimates of the State Price Effects

	1	2	3	4
Direct supervision & Limited prescription	3.85	6.63*	6.65*	6.50
	(10.57)	(3.66)	(3.69)	(4.41)
Direct supervision & No prescription	17.92	16.41	16.43***	16.16**
	(11.21)	(6.01)	(6.06)	(7.14)
State Covariates	No	Yes	Yes	Yes
Year-Fixed	Yes	Yes	Yes	Yes
State-Fixed	Yes	Yes	Yes	Yes
Product-Fixed	Yes	Yes	Yes	Yes
Year × Product			Yes	Yes
State × Product				Yes
R-squared	0.64	0.65	0.65	0.79
N	2,110	1,054	1,054	1,054

Note: * significant at the 0. 05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by state.

Table 7**:** Sensitivity Estimates of the State Price Effects using Dental Regulations as a Falsification test

	1	2
Direct supervision & Limited prescription	11.60***	5.52**
	(3.13)	(2.87)
Direct supervision & No prescription	8.73***	4.05**
	(1.88)	(1.61)
State Covariates	No	Yes
Year-Fixed	Yes	Yes
State-Fixed	Yes	Yes
Product-Fixed	Yes	Yes
Year × Product Fixed	Yes	Yes
State × Product Fixed	Yes	Yes
R-squared	0.98	0.99
N	612	306

Note: Tripple difference results with median allowed price in State×Year×Product Cell as dependent variable are shown; * significant at the 0. 05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by state.

Table 8: MSAs in the State Border Analysis

MSA	State 1	State 2	State 3	State 4
Augusta - Aiken	GA	SC		
Boston - Worcester - Lawrence	MA	NH	ME	CT
Chattanooga	TN	GA		
Chicago - Gary - Kenosha	IL	IN	WI	
Cincinnati - Hamilton	OH	KY	IN	
Clarksville - Hopkinsville	TN	KY		
Columbus	GA	AL		
Cumberland	MD	WV		
Davenport - Moline - Rock Island	IA	IL		
Evansville - Henderson	IN	KY		
Fargo - Moorhead	ND	MN		
Flagstaff	AZ	UT		
Fort Smith	AR	OK		
Huntington - Ashland	WV	KY	OH	
Johnson City - Kingsport - Bristol	TN	VA		
Kansas City	MO	KS		
La Crosse	WI	MN		
Las Vegas	NV	AZ		
Memphis	TN	AR	MS	
Minneapolis - St. Paul	MN	WI		
New York - Northern New Jersey - Long Island	NY	NJ		
Norfolk - Virginia Beach - Newport News	VA	NC		
Omaha	NE	IA		
Parkersburg - Marietta	WV	OH		
Portland - Salem	OR	WA		
Providence - Fall river - Warwick	RI	MA		
Sioux City	IA	NE		
St. Louis	MO	IL		
Steubenville - Weirton	OH	WV		
Washington D.C. - Baltimore	DC	MD	VA	WV
Wheeling	WV	OH		

Table 9: State Border MSA Analysis

	1	2	3	4
Direct supervision & Limited prescription	-1.40	3.67**	3.87***	3.04*
	(3.79)	(1.36)	(1.41)	(1.57)
Direct supervision & No prescription	-3.53	5.13**	5.31**	4.47*
	(5.26)	(2.01)	(2.03)	(2.32)
State Covariates	No	Yes	Yes	Yes
Year-Fixed	Yes	Yes	Yes	Yes
State-Fixed	Yes	Yes	Yes	Yes
MSA-Fixed	Yes	Yes	Yes	Yes
Product-Fixed	Yes	Yes	Yes	Yes
Year * Product			Yes	Yes
MSA*Product				Yes
R-squared	0.73	0.77	0.78	0.82
N	3,581	1,756	1,756	1,756

Note: The results with median allowed price in MSA×State×Year×Product Cell as dependent variable are shown; * significant at the 0. 05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by MSA.

Table 10: Determinants of the Passage of Laws Allowing Nurses to Have Greater Autonomy for Patient Care

	1
log(Population)	1.034
	(0.211)
Black (%)	8.76
(1×10^{12})	(7.12)
Households per zipcode	1.000
	(0.000)
Income per Household	1.000
	(0.000)
log(Average house value)	1.196
	(0.933)
$\chi^2(5)$	0.30
N	65

Appendix A: Data Construction for the Model of Regulation Effects on Hourly Earnings from the American Community Survey (ACS)

In this paper, we focused on individuals whose occupations belonged to registered nurses (313 in “occp”, 29-1111 in “socp”) and licensed practical/vocational nurses (350 in “occp”, 29-2061 in “socp”), and physicians and surgeons (306 in “occp”, and 29-1060 in “socp”).

To generate our sample of nurses and physicians, we followed Kleiner and Park’s (2009) sample selection rules. We started by dropping individuals who belong to the categories “Working without pay in family business or farm” and “Unemployed.” Thus, our sample includes individuals who belong to the classes of (1) Private wage and salary workers, (2) Government workers (who work in any local, state, or federal governmental unit), and (3) Self-employed both in own not incorporated business and in own incorporated business. Next, we kept individuals whose education is Masters or Professional Degrees, or PhD for dentists and individuals whose education is “Below 12th Grade without Diploma” for dental hygienists. We also dropped individuals whose age is greater than 65 and whose years of experience (=Age −Years of Schooling – 6) is below zero and individuals whose usual working hours in the past 12 months are less than 20 hours or more than 60 hours.

To compute the hourly earnings, we first computed annual hours worked (i.e., the usual working hours times the number of weeks for the past 12 months). Then we compute annual earnings by adding the wage (i.e., “wagp”) and salary income and the income from self-employment (i.e., “semp”), and then divide the annual earnings by annual hours worked.

In computing the hourly earnings, however, the ACS has two potential measurement problems: the topcoding (or censoring) of both incomes (i.e., “wagp” and “semp”), particularly for physicians and surgeons, and the presence of outliers. To deal with the topcodings, as much of the literature does, we adjusted the topcoded incomes by a factor (typically, 1.34 or 1.4) that approximates the mean for those above the censoring point (Card and DiNardo, 2002). In this paper, we present empirical results with hourly earnings adjusted by a factor of 1.34.

As for the presence of outliers, we confirmed that a few individuals report implausibly high or low earnings relative to their hours of work, which would affect the estimated mean and variance of hourly earnings. Since the income from self-employment of the ACS is reported in net after subtracting expenses, we deleted observations on the basis of implausibly low hourly wages. Specifically, we deleted these observations with measured hourly wages below the federal minimum wage of $5.15 during 2002–2007. To deal with the individuals with implausibly high hourly earnings, we trimmed down the top 1 percent of the sample.

Appendix Table A1. Sample Construction from the ACS

	Nurses		Physicians & Surgeons
Selection Rule	Registered Nurses	Licensed Practical /Vocational Nurses	
Initial observations	128,668	33,295	38,009
1. Unemployed or working without pay in family business or farm	-157	-58	-34
2. Educational attainment (Masters/Professional degrees and PhDs for Nurses; Professional degrees and PhDs for Physicians)	-110,380	-31,756	-1,186
3. Age equal to or over 65	-1,391	-80	-3,429
4. Experience(=Age−Years of schooling – 6) less than 0	-54	-28	-175
5. Less than 20 hours and more than 60 hours	-2,106	-165	-8,663
6. Hourly wage less than the federal minimum of $5.15 during 2001–2007	-138	-20	-190
7. Missing in hourly earnings	-2	0	-6
8. Trim down the top 1% of the sample	-289	-23	-487
Total observations	14,151	1,165	23,839

Appendix B: CPS Merged Outgoing Rotation Groups Estimates of the Effects of Occupational Regulations on Log Wage for Nurses, 2002-2007

	1	2	3	4	5	6	7	8
SP: Independence	0.015	0.008	-0.12				0.002	-0.114
	(0.038)	(0.039)	(0.107)				(0.047)	(0.112)
PA: Independence				0.029	0.020	-0.324***	0.019	-0.207
(+ Controlled Substances)				(0.029)	(0.029)	(0.038)	(0.040)	(0.127)
Experience		0.018**	0.019**		0.018**	0.018**	0.018**	0.019**
		(0.006)	(0.005)		(0.006)	(0.005)	(0.006)	(0.005)
Experience-Squared		-0.405**	-0.422**		-0.404**	-0.418**	-0.405**	-0.421**
		(0.141)	(0.135)		(0.142)	(0.135)	(0.141)	(0.136)
PhD		0.036	0.024		0.035	0.025	0.036	0.024
		(0.064)	(0.066)		(0.063)	(0.067)	(0.064)	(0.066)
Gender		0.177***	0.178***		0.177***	0.179***	0.177***	0.178***
		(0.041)	(0.043)		(0.040)	(0.043)	(0.041)	(0.043)
Married		0.022	0.026		0.022	0.025	0.022	0.026
		(0.024)	(0.025)		(0.024)	(0.025)	(0.025)	(0.025)
White		-0.014	0.037		-0.014	0.037	-0.014	0.037
		(0.046)	(0.044)		(0.046)	(0.043)	(0.046)	(0.044)
Black		-0.077	-0.020		-0.076	-0.022	-0.076	-0.020
		(0.047)	(0.045)		(0.047)	(0.046)	(0.046)	(0.045)
Citizen		0.132+	0.139+		0.132+	0.141+	0.132+	0.139+
		(0.070)	(0.076)		(0.071)	(0.076)	(0.070)	(0.076)
Part-time		0.064	0.045		0.064	0.046	0.064	0.045
		(0.039)	(0.034)		(0.039)	(0.035)	(0.039)	(0.035)
For-Profit		-0.018	-0.010		-0.018	-0.007	-0.018	-0.010
		(0.031)	(0.029)		(0.031)	(0.031)	(0.031)	(0.029)
Registered Nurses		0.004	0.004		0.004	0.007	0.004	0.005
		(0.038)	(0.037)		(0.037)	(0.038)	(0.038)	(0.037)
Constant		0.450***	0.443***		0.450***	0.444***	0.450***	0.443***
		(0.056)	(0.052)		(0.056)	(0.052)	(0.056)	(0.052)
Year-Fixed	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Fixed	No	No	Yes	No	No	Yes	No	Yes
R-squared	0.007	0.070	0.117	0.007	0.070	0.117	0.070	0.117
N	1,975	1,975	1,975	1,975	1,975	1,975	1,975	1,975

Note: * significant at the 0. 05 level; ** significant at the 0.01 level; *** significant at the 0.001 level; Standard error shown in parenthesis is clustered by state.