
Occupational Licensing and the Opioid Crisis

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The United States' affordable care crisis and chronic physician shortage have required nurse practitioners to assume increasingly important roles in the healthcare system. Nurse practitioners can address critical access-to-care problems, provide safe and effective care, and lower the cost of care. However, restrictive occupational licensing laws — specifically, scope-of-practice laws — have limited their ability to care for patients. Spurred by interest groups opposed to allowing nurse practitioners to practice independently, states require physician supervision of nurse practitioners. Research has discredited many of the traditional reasons for these restrictive laws, but emerging arguments assert that independent practice will deepen the ongoing opioid crisis by allowing unsupervised nurse practitioners to overprescribe opioids. The opioid crisis has become one of the defining public health emergency of this generation, so these arguments warrant serious investigation. If granting nurse practitioners independence will exacerbate the opioid epidemic, restricting their practices may be justified despite the clear benefits that independence could create for patients and the healthcare system.

This Article provides new empirical evidence on the role of nurse practitioner independence in opioid prescriptions by analyzing a dataset of approximately 1.5 billion individual opioid prescriptions. Containing information on approximately 90% of all prescriptions filled at outpatient pharmacies between 2011 and 2018, this dataset provides unprecedented insight into the ongoing opioid epidemic. An analysis of these data reveals that allowing nurse practitioners to practice independently reduces the

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quantity of opioids prescribed across all physicians and nurse practitioners. Thus, this Article demonstrates that, contrary to exacerbating the opioid crisis, granting nurse practitioners independence is a valid policy option for addressing this crisis. These results can inform the ongoing state and national debates over nurse practitioner scope-of-practice laws and the opioid epidemic more generally. And based on these results, the Article proposes several policy options at the state and federal levels that could both address restrictive scope-of-practice laws and ameliorate the ongoing opioid crisis.

TABLE OF CONTENTS

INTRODUCTION	889
I. REGULATING HEALTHCARE PROVIDERS.....	894
A. <i>Nurse Practitioners and the Laws that Govern Them</i>	895
B. <i>The Scope-of-Practice Debate</i>	899
1. <i>Independent Nurse Practitioners and the Quality of Care</i>	899
2. <i>Scope-of-Practice Laws and the Cost of Healthcare</i> ...	902
3. <i>Nurse Practitioners and Access to Healthcare</i>	905
4. <i>The State of the Scope-of-Practice Debate</i>	906
II. THE OPIOID CRISIS	909
A. <i>An Evolving Epidemic</i>	909
B. <i>Healthcare Providers, Scope-of-Practice Laws, and the Opioid Crisis</i>	913
III. EMPIRICAL ANALYSIS	916
A. <i>Testing the Competing Theories of Scope-of-Practice Laws</i>	917
B. <i>The Gold Standard of Opioid Data and Measurement</i>	920
C. <i>Empirical Methodology</i>	923
D. <i>Results and Discussion</i>	927
1. <i>Relaxing Scope-of-Practice Laws Reduces Opioid Prescriptions</i>	928
2. <i>Scope-of-Practice Laws and Opioid Prescriptions in Health Professional Shortage Areas</i>	931
IV. POLICY IMPLICATIONS	936
A. <i>Contextualizing the Evidence</i>	936
B. <i>Options for Reform</i>	939
1. <i>A Federally Defined Physician</i>	941
2. <i>Federal Paths to Independence</i>	945
CONCLUSION.....	949
TECHNICAL APPENDIX.....	951
A. <i>Introduction to the Technical Appendix</i>	951

B. *Description of the Data* 951
C. *Econometric Specification* 953
D. *Additional Results from the Primary Analysis* 956
E. *Robustness Checks* 957
F. *Tables and Figures* 959

INTRODUCTION

For many people, access to healthcare means the difference between life and death, the difference between constant pain and the ability to get out of bed in the morning, or the difference between an all-consuming mental illness and the ability to remain an active member of society. Even nearly a decade after the passage of the Affordable Care Act (“ACA”), however, access to healthcare continues to dominate local and national health policy debates, and the issue remains unresolved. The ACA certainly reinvigorated the country’s interest in access to care in unprecedented ways, and it drastically altered healthcare and healthcare provision in the United States. Unfortunately, it effected both of these changes with a near laser-like focus on increasing access to health insurance.¹ For all of its virtues, this treatment of access to healthcare as effectively coextensive with access to health insurance has obscured a more fundamental problem with access to care as the following example from the *New York Times* illustrates.

A lifelong resident of rural Nebraska and registered nurse, Murlene Osburn saw a desperate need for mental health care in her community.² To meet this need in an area where psychiatrists refused to practice, Osburn completed a master’s degree and a national certification process to become a psychiatric nurse practitioner (“NP”).³ Unfortunately, when she was ready to begin caring for patients, Osburn found herself stymied by the problem that spurred her to action in the first place: the lack of psychiatrists. Nebraska law prohibited NPs from practicing without physician supervision, and the nearest physician who could

¹ See Charles Courtemanche, James Marton, Benjamin Ukert, Aaron Yelowitz & Daniela Zapata, *Early Impacts of the Affordable Care Act on Health Insurance Coverage in Medicaid Expansion and Non-Expansion States*, 36 J. POL’Y ANALYSIS & MGMT. 178, 180-95 (2017) (discussing the ACA’s role in health insurance).

² Sabrina Tavernise, *Doctoring, Without the Doctor*, N.Y. TIMES (May 26, 2015), <https://www.nytimes.com/2015/05/26/health/rural-nebraska-offers-stark-view-of-nursing-autonomy-debate.html> [<https://perma.cc/QU7G-4KN3>].

³ *Id.*

supervise her “was seven hours away by car and wanted to charge her \$500 a month” for that supervision.⁴

This example illustrates the importance of access to healthcare providers in addition to access to health insurance.⁵ And access to providers is far from given, with many areas of the country experiencing shortages of healthcare providers that experts expect to worsen over the next decade.⁶ The *New York Times* example also highlights both a viable policy option to address these shortages — the increased use of NPs to provide care — and an important obstacle to implementing this policy — restrictive laws.

NPs are registered nurses who have undergone additional training to provide healthcare services historically provided by physicians.⁷ They represent the principal source of care in many geographic areas⁸ and are more likely than physicians to practice in rural and underserved communities.⁹ This makes the 200,600 practicing NPs a natural option to address chronic, critical, and worsening physician shortages across the country.¹⁰ While NPs provide healthcare services across the country, their ability to do so is not equal in all areas. State scope-of-practice (“SOP”) laws — a subset of the occupational licensing laws that govern NPs and many other professionals — determine what services

⁴ *Id.*

⁵ Fortunately, Nebraska eventually eliminated the restriction that undermined rural residents’ access to care, allowing Osburn to begin caring for patients. *Id.*

⁶ *New Findings Confirm Predictions on Physician Shortage*, ASS’N AM. MED. COLLEGES (Apr. 23, 2019), <https://www.aamc.org/news-insights/press-releases/new-findings-confirm-predictions-physician-shortage> [<https://perma.cc/LVU7-X6YW>]; see also Lucy Skinner, Douglas O. Staiger, David I. Auerbach & Peter I. Buerhaus, *Implications of an Aging Rural Physician Workforce*, 381 *NEW ENG. J. MED.* 299, 299-301 (2019) (showing a lack of physicians in rural areas).

⁷ See *infra* Part I.A.

⁸ See David I. Auerbach, *Will the NP Workforce Grow in the Future? New Forecasts and Implications for Healthcare Delivery*, 50 *MED. CARE* 606, 606 (2012).

⁹ See Peter I. Buerhaus, Catherine M. DesRoches, Robert Dittus & Karen Donelan, *Practice Characteristics of Primary Care Nurse Practitioners and Physicians*, 63 *NURSING OUTLOOK* 144, 144-50 (2015) [hereinafter *Practice Characteristics*] (finding that NPs are more likely to care for Medicaid patients, vulnerable populations, and rural populations); Grant R. Martsof, Hilary Barnes, Michael R. Richards, Kristin N. Ray, Heather M. Brom & Matthew D. McHugh, *Employment of Advanced Practice Clinicians in Physician Practices*, 178 *JAMA INTERNAL MED.* 988, 988-89 (2018) (finding that NPs are likely to be employed in primary care).

¹⁰ *Occupational Employment and Wages, May 2019, 29-1171 Nurse Practitioners*, U.S. BUREAU LAB STAT., <https://www.bls.gov/oes/current/oes291171.htm> (last visited Nov. 11, 2020) [<https://perma.cc/5A4C-9H7S>].

NPs may provide and the conditions under which they may provide those services.

States often justify SOP laws as necessary to ensure patient safety by preventing unqualified individuals from providing care.¹¹ Though these laws can further this goal, excessively restrictive SOP laws undermine the ability of NPs to care for patients. Prior work has shown that eliminating restrictive SOP laws and allowing NPs to practice independently of physicians can facilitate access to care,¹² improve the quality of care,¹³ reduce the use of intensive medical procedures,¹⁴ and reduce the price of some healthcare services.¹⁵ Based on this evidence, the Obama and Trump administrations along with the National Academy of Medicine and other organizations have urged states to relax their SOP laws.¹⁶ A minority of states have responded by granting NPs the authority to practice independently, but the ongoing debate and

¹¹ See Morris M. Kleiner, *Enhancing Quality or Restricting Competition: The Case of Licensing Public School Teachers*, 5 U. ST. THOMAS J.L. & PUB. POL'Y 1, 3, 8 (2011) ("The general rationale for licensing is the health and safety of consumers. Beyond that, the quality of service delivery . . . [is] sometimes invoked.").

¹² Benjamin J. McMichael, *Beyond Physicians: The Effect of Licensing and Liability Laws on the Supply of Nurse Practitioners and Physician Assistants*, 15 J. EMPIRICAL L. STUD. 732, 764-65 (2018) [hereinafter *Beyond Physicians*]; Jeffrey Traczynski & Victoria Udalova, *Nurse Practitioner Independence, Health Care Utilization, and Health Outcomes*, 58 J. HEALTH ECON. 90, 103-04 (2018); see also John A. Graves, Pranita Mishra, Robert S. Dittus, Ravi Parikh, Jennifer Perloff & Peter I. Buerhaus, *Role of Geography and Nurse Practitioner Scope-of-Practice in Efforts to Expand Primary Care System Capacity*, 54 MED. CARE 81, 83-88 (2016).

¹³ Traczynski & Udalova, *supra* note 12, at 97.

¹⁴ See, e.g., Sara Markowitz, E. Kathleen Adams, Mary Jane Lewitt & Anne L. Dunlop, *Competitive Effects of Scope of Practice Restrictions: Public Health or Public Harm?*, 55 J. HEALTH ECON. 201, 209-16 (2017) (showing a reduced probability of intensive procedures related to pregnancies in states that allow nurse practitioners to practice with no barriers).

¹⁵ See Morris M. Kleiner, Allison Marier, Kyoung Won Park & Coady Wing, *Relaxing Occupational Licensing Requirements: Analyzing Wages and Prices for a Medical Service*, 59 J.L. & ECON. 261, 274-77 (2016).

¹⁶ See INST. OF MED., *THE FUTURE OF NURSING: LEADING CHANGE, ADVANCING HEALTH* 3-6 (2011); U.S. DEP'T OF HEALTH & HUMAN SERVS., U.S. DEP'T OF THE TREASURY & U.S. DEP'T OF LABOR, *REFORMING AMERICA'S HEALTHCARE SYSTEM THROUGH CHOICE AND COMPETITION* 31-36 (2018) [hereinafter *REFORMING AMERICA'S HEALTHCARE SYSTEM*]; U.S. DEP'T OF THE TREASURY OFFICE OF ECON. POLICY, COUNCIL OF ECON. ADVISERS & U.S. DEP'T OF LABOR, *OCCUPATIONAL LICENSING: A FRAMEWORK FOR POLICYMAKERS* 42 (2015) [hereinafter *OCCUPATIONAL LICENSING FRAMEWORK*]; see also MARIA SCHIFF, NAT'L GOVERNORS ASS'N, *THE ROLE OF NURSE PRACTITIONERS IN MEETING INCREASING DEMAND FOR PRIMARY CARE* 1 (2012) (noting the National Governors Association's preference for NP independence).

political battle over SOP laws has only intensified over the last decade.¹⁷ Physician organizations, in particular, vigorously oppose the relaxation of these laws and have been successful in discouraging states from granting NPs independence.¹⁸

When opposing NP independence, physician groups often argue that requiring physician supervision promotes patient safety and the delivery of high-quality care.¹⁹ Although existing clinical evidence undermines these claims,²⁰ physician groups have recently emphasized the troubling possibility that allowing NPs to practice independently will increase opioid prescriptions.²¹ The reasoning offered is straightforward: If NPs can prescribe opioids without physician supervision, then they will inappropriately overprescribe opioids and deepen the ongoing opioid crisis.²² This Article engages with the debate

¹⁷ See Benjamin J. McMichael, *The Demand for Healthcare Regulation: The Effect of Political Spending on Occupational Licensing Laws*, 84 S. ECON. J. 297, 299-301, 306-09 (2017) [hereinafter *The Demand for Healthcare Regulation*] (providing information on states that have relaxed their SOP laws and evidence that political spending at the state level drives changes in these laws).

¹⁸ See AM. MED. ASS'N, 2017 INTERIM MEETING RESOLUTIONS, NO. 214, at 238 (2017), <https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/hod/i17-resolutions.pdf> [<https://perma.cc/M4Y5-A5QX>] [hereinafter RESOLUTION 214-I-2017] (“Our [American Medical Association], in the public interest, opposes enactment of legislation to authorize the independent practice of medicine by any individual who has not completed the state’s requirements for licensure to engage in the practice of medicine and surgery in all of its branches.”); see also McMichael, *The Demand for Healthcare Regulation*, *supra* note 17, at 306-09 (finding empirical evidence that increased political spending by physician interest groups decreases the likelihood that states allow NPs to practice independently of physicians).

¹⁹ See, e.g., Letter from John Meigs, Jr., Bd. Chair, Am. Acad. of Family Physicians, to Hon. Mark Mustio, Majority Chairman, Prof'l Licensure Comm., Penn. State House & Hon. Harry Readshaw, Minority Chairman, Prof'l Licensure Comm., Penn. State House (Oct. 18, 2017), <https://www.aafp.org/dam/AAFP/documents/advocacy/workforce/scope/LT-ProfessionalLicensure-OpposingPAAPRNScopeExpansion-101817.pdf> [<https://perma.cc/4NME-DK95>] (arguing that physician supervision of NPs is necessary for the provision of safe and high-quality care).

²⁰ See BUERHAUS, *supra* note 10, at 9-14 (reviewing the available evidence); DANIEL J. GILMAN & TARA ISA KOSLOV, FED. TRADE COMM'N, POLICY PERSPECTIVES: COMPETITION AND THE REGULATION OF ADVANCED PRACTICE NURSES 36 (2014) (same).

²¹ See Letter from James L. Madara, Exec. Vice President & CEO, Am. Med. Ass'n, to Hon. Gavin Newsom, Governor of Cal. (Sept. 10, 2020), <https://searchlf.ama-assn.org/letter/documentDownload?uri=%2Funstructured%2Fbinary%2Fletter%2FLETTE%2FAMA-Letter-to-Governor-Newsom-Oppose-AB890-FINAL.pdf> [<https://perma.cc/T449-FTZ3>] (arguing that “nurse practitioners tend to prescribe more opioids than physicians”).

²² See Carole R. Myers & Jill Alliman, *Updates on the Quest for Full Practice Authority*, 14 J. NURSE PRAC. 559, 561 (2018); Lori Schirle & Brian E. McCabe, *State Variation in Opioid and Benzodiazepine Prescriptions Between Independent and*

over NP SOP laws by empirically analyzing the impact these laws have on opioid prescriptions.

Given the severity of the ongoing opioid crisis, the claim that allowing NP independence will deepen that crisis by increasing opioid prescriptions warrants careful consideration. On one hand, allowing NPs to practice independently can address critical access-to-care issues and improve the healthcare system in other important ways. On the other hand, restricting the practices of NPs may be justified despite these benefits if doing so avoids exacerbating the opioid crisis. This Article provides critical new evidence on the effect that NP SOP laws have on opioid prescriptions.

Specifically, I analyze a dataset of approximately 1.5 billion individual opioid prescriptions, which represent approximately 90% of all opioid prescriptions filled at outpatient pharmacies between 2011 and 2018. This dataset provides unprecedented insight into the ongoing opioid epidemic and the role of healthcare providers in that epidemic. Because this dataset covers nearly the universe of opioid prescriptions in the United States over eight years and is organized at the individual-prescription level, I am able to develop more complete and more granular evidence on the role of NP SOP laws in opioid prescriptions than has previously been possible.

The analysis reveals that allowing NPs to practice independently reduces the quantity of opioids prescribed across all physicians and NPs by approximately 4.4%.²³ In contrast to physician groups' claims, the evidence developed here suggests that relaxing NP SOP laws reduces opioid prescriptions. Thus, this Article demonstrates that, rather than exacerbating the opioid crisis, granting NPs independence is a valid policy option for addressing that crisis.

These results can inform the ongoing debates over both NP SOP laws and the opioid epidemic more generally, and this Article uses this evidence to recontextualize the debate over SOP laws and offer specific policy recommendations. In addition to joining various scholars and

Nonindependent Advanced Practice Registered Nurse Prescribing States, 64 NURSING OUTLOOK 86, 86-87 (2016); Virgil Dickson, *Expanded Scope: Nurse Practitioners Making Inroads*, MOD. HEALTHCARE (Feb. 20, 2016, 12:00 AM), <https://www.modernhealthcare.com/article/20160220/MAGAZINE/302209981/expanded-scope-nurse-practitioners-making-inroads> [https://perma.cc/V3V8-WCYN].

²³ In the analysis below, I examine four highly specific measures of opioid prescriptions at the individual-provider level, including the gold standard of opioid prescriptions — morphine milligram equivalents. Because different opioids may vary widely in strength, normalizing to morphine doses provides a substantially more accurate picture than the alternative measures used in past work. The measure of opioid quantity used here is the total annual morphine milligram equivalents.

organizations in urging states to reform their SOP laws, this Article engages with potential federal policy options that can both address the dire healthcare provider shortages across the country while ameliorating the opioid crisis. Federal options, such as the ones discussed below, will become increasingly relevant as state legislation has proven difficult to obtain in certain states.²⁴

This Article proceeds in four parts. Part I details the contributions that NPs make to the healthcare system and the ways SOP laws impact their ability to do so.²⁵ Part II provides context for the empirical analysis that is the focus of the Article by detailing the progression of the opioid crisis.²⁶ Part III discusses the empirical methodology and reports the results of the empirical analysis.²⁷ Part IV engages with the policy implications stemming from the results of that analysis,²⁸ and a brief conclusion follows.

I. REGULATING HEALTHCARE PROVIDERS

Historically, physicians have delivered most of the healthcare in the United States. While other providers, such as registered nurses, have always played important roles in healthcare, physicians have been responsible for directing most care delivery. Physician dominance, however, has begun to recede as NPs and other types of healthcare providers are providing “[a] growing share of health care services.”²⁹ And this trend will likely continue because the growth rate of NPs outstrips that of physicians,³⁰ which only adds urgency to resolving the debate over NP SOP laws. To provide context to that debate, this Part

²⁴ Many of these same arguments could be advanced in favor of greater autonomy for physician assistants (“PAs”). These professionals practice alongside NPs and physicians, provide care to millions of patients across the country, and play critically important roles in the healthcare system. This Article does not focus on PAs because the empirical analysis reported here is specific to NPs. Nothing in this Article should be interpreted as detracting from the importance of PAs.

²⁵ See *infra* Part I.

²⁶ See *infra* Part II.

²⁷ See *infra* Part III.

²⁸ See *infra* Part IV.

²⁹ David I. Auerbach, Douglas O. Staiger & Peter I. Buerhaus, *Growing Ranks of Advanced Practice Clinicians — Implications for the Physician Workforce*, 378 *NEW ENG. J. MED.* 2358, 2358 (2018).

³⁰ Edward Salsberg, *Changes in the Pipeline of New NPs and RNs: Implications for Health Care Delivery and Educational Capacity*, *HEALTH AFF. BLOG* (June 5, 2018), <https://www.healthaffairs.org/doi/10.1377/hblog20180524.993081/full/> [https://perma.cc/NQ78-G87J].

begins by discussing the role of NPs in the healthcare system before outlining the contours of the debate over the SOP laws that regulate NPs.

A. *Nurse Practitioners and the Laws that Govern Them*

To qualify as an NP, an individual must first become a registered nurse, which often involves completing a bachelor's degree in nursing.³¹ Most registered nurses practice for several years before returning to complete a master's or doctoral degree to become an NP.³² Their training involves clinical and didactic courses that prepare future NPs to diagnose and treat patients, order and interpret tests, and prescribe medication.³³ Following their training, NPs practice in a wide variety of medical settings, but over 60% choose to provide some form of primary care.³⁴ With this training, NPs provide care alongside physicians across the country,³⁵ but where they choose to practice and which patients they choose to care for often differs substantially from the choices made by physicians.

Relative to physicians, NPs more often choose to practice in primary care and to care for underserved populations, including Medicaid patients.³⁶ They also provide care in rural or underserved areas to a

³¹ E. KATHLEEN ADAMS & SARA MARKOWITZ, HAMILTON PROJECT, IMPROVING EFFICIENCY IN THE HEALTH-CARE SYSTEM: REMOVING ANTICOMPETITIVE BARRIERS FOR ADVANCED PRACTICE REGISTERED NURSES AND PHYSICIAN ASSISTANTS 9 (2018), https://www.brookings.edu/wp-content/uploads/2018/06/AM_Web_20190122.pdf [<https://perma.cc/LF5P-VHM8>]. NPs are one type of advanced practice registered nurse (APRN). The other three types of APRNs include “clinical nurse specialists (CNS), certified nurse midwives (CNM), and certified registered nurse anesthetists (CRNA).” *Id.* To be sure, all types of APRNs provide important healthcare services, but the focus of this Article is NPs because CNMs and CRNAs provide more specialized services (obstetrics/gynecology and anesthesia, respectively), and CNSs focus more on managing patients than on delivering healthcare services directly. *Id.*

³² See BUEHHAUS, *supra* note 10, at 4.

³³ *Id.*

³⁴ *NP Fact Sheet*, AM. ASS'N NURSE PRAC., <https://www.aanp.org/about/all-about-nps/np-fact-sheet> (last visited Oct. 6, 2020) [<https://perma.cc/Y2YV-42XJ>].

³⁵ BUEHHAUS, *supra* note 10, at 4-5.

³⁶ See Buerhaus et al., *Practice Characteristics*, *supra* note 9, at 150 (“Compared with [primary care physicians] who worked with or without [primary care NPs], [primary care NPs] also provided proportionally more care to Medicaid enrollees and vulnerable populations.”); Martsolf et al., *supra* note 9, at 988 (finding that one in three primary care practices employed a primary care NP or physician assistant); McMichael, *Beyond Physicians*, *supra* note 12, at 759-65 (finding that NPs are more likely to practice in health professional shortage areas following the relaxation of SOP laws).

greater extent than physicians.³⁷ The predilection of NPs to practice in isolated areas and care for patients who have difficulty accessing care is particularly important in an era of worsening physician shortages. For example, the Association of American Medical Colleges estimates that, by 2032, the United States will face a physician shortage of between 46,900 and 121,900.³⁸ Such a shortage has implications for the country generally, but it will impact rural areas to a greater degree. Recent estimates suggest that the number of physicians practicing in these areas could decline by 23% by 2030.³⁹ With approximately 200,600 NPs delivering care in 2019⁴⁰ NPs can alleviate physician shortages in rural and other areas. Indeed, NPs outnumber primary care physicians,⁴¹ practice in convenient locations like retail and urgent care clinics,⁴² and represent the principal source of healthcare in many parts of the country.⁴³

However, the ability of NPs to function as the principal source of healthcare depends heavily on the SOP laws in place. Prior work has

³⁷ Ying Xue, Joyce A. Smith & Joanne Spetz, Research Letter, *Primary Care Nurse Practitioners and Physicians in Low-Income and Rural Areas, 2010-2016*, 321 JAMA 102, 102-04 (2019) [hereinafter *Primary Care Nurse Practitioners*]; see Hilary Barnes, Michael R. Richards, Matthew D. McHugh & Grant Martsolf, *Rural and Nonrural Primary Care Physician Practices Increasingly Rely on Nurse Practitioners*, 37 HEALTH AFF. 908, 908 (2018) (“We found increasing NP presence in both rural and nonrural primary care practices in the period 2008–16.”); see also Buerhaus et al., *Practice Characteristics*, *supra* note 9, at 146 (“[Primary care NPs] are significantly more likely than [primary care physicians] to practice in urban and rural areas, whereas [primary care physicians] are more likely to practice in suburban locations.”); McMichael, *Beyond Physicians*, *supra* note 12, at 765 (finding that NPs are more likely to practice in health professional shortage areas following the relaxation of SOP laws).

³⁸ ASS’N OF AM. MED. COLLS., *THE COMPLEXITIES OF PHYSICIAN SUPPLY AND DEMAND: PROJECTIONS FROM 2017 TO 2032*, at 2 (2019).

³⁹ Skinner et al., *supra* note 6, at 300.

⁴⁰ *Occupational Employment and Wages*, *supra* note 10.

⁴¹ *Compare id.* (reporting 200,600 NPs in 2019), with *Occupational Employment and Wages, May 2019*, U.S. BUREAU LAB STAT., <https://www.bls.gov/oes/current/oes291215.htm> (last visited Nov. 11, 2020) [<https://perma.cc/6EDW-WT83>] (reporting 109,370 Family Medicine Physicians in 2019).

⁴² Joanne Spetz, Stephen T. Parente, Robert J. Town & Dawn Bazarko, *Scope-of-Practice Laws for Nurse Practitioners Limit Cost Savings that Can Be Achieved in Retail Clinics*, 32 HEALTH AFF. 1977, 1977-78 (2013).

⁴³ See Auerbach et al., *supra* note 29, at 2359-60; Auerbach, *supra* note 8, at 607-08; Christine M. Everett, Perri Morgan & George L. Jackson, *Primary Care Physician Assistant and Advance Practice Nurses Roles: Patient Healthcare Utilization, Unmet Need, and Satisfaction*, 4 HEALTHCARE 327, 328-29 (2016).

classified NP SOP laws in slightly different ways.⁴⁴ Each classification system has advantages and disadvantages, but I adopt a classification scheme based on two recent studies that focus on specific statutory and regulatory language.⁴⁵ Where necessary, I updated the classifications based on more recent statutory and regulatory information. This approach to classification eliminates the risk of misclassification that can occur by relying on inconsistent secondary sources. It also isolates the specific statutes and regulations that policymakers may change to achieve specific results in their healthcare systems.⁴⁶

Using these statutes and regulations, I classify each state in each year as either allowing NPs to practice independently or restricting the practices of NPs. To be classified as allowing “independent practice,” a state must (1) have no requirement that physicians supervise NPs and (2) grant NPs full prescriptive authority, i.e., allow NPs to prescribe the same range of medications as physicians.⁴⁷ States that either require physician supervision of NPs or restrict their prescriptive authority fall into the “restricted practice” category.

⁴⁴ For example, Sara Markowitz and colleagues considered a variety of restrictions on CNMs to broadly classify states as having “no barriers” to CNMs providing care, “low barriers,” “moderate barriers,” or “high barriers.” Markowitz et al., *supra* note 14, at 203-04. In contrast, a study led by Morris Kleiner focused on physician supervision requirements as they pertain to prescriptions and classified the SOP laws governing NPs by whether they allowed “limited prescription authority,” “supervised or delegated prescription authority,” or “independent prescription authority.” Kleiner et al., *supra* note 15, at 266-67.

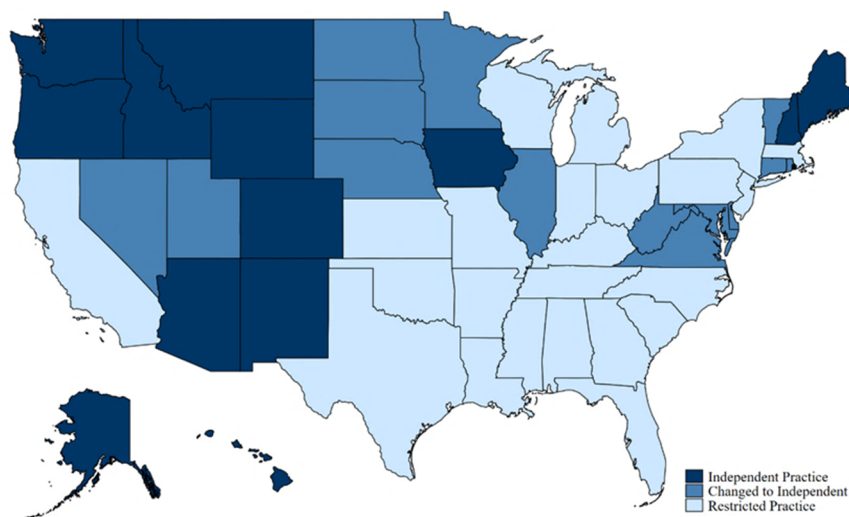
⁴⁵ See McMichael, *Beyond Physicians*, *supra* note 12, at 734-37 (discussing the classification of SOP laws); McMichael, *The Demand for Healthcare Regulation*, *supra* note 17, at 299 (same).

⁴⁶ Other studies have relied on a broad range of disparate laws to arrive at general SOP-law categorizations. Such categorizations may be less useful to policymakers who cannot determine which laws they must change to achieve a specific outcome in their healthcare systems.

⁴⁷ McMichael, *Beyond Physicians*, *supra* note 12, at 734-37; McMichael, *The Demand for Healthcare Regulation*, *supra* note 17, at 299. When classifying states based on physician supervision requirements, I treat statutes that require “collaboration” as the equivalent of statutes requiring “supervision.” Though states differ in the use of these terms, they are functionally equivalent in that they both prohibit NPs from providing care without physician oversight. See Benjamin J. McMichael, *Healthcare Licensing and Liability*, 95 IND. L.J. 821, 843 n.143 (2020) [hereinafter *Healthcare Licensing*] (treating the two terms as equivalent); Benjamin J. McMichael, Joanne Spetz & Peter I. Buerhaus, *The Association of Nurse Practitioner Scope-of-Practice Laws with Emergency Department Use: Evidence from Medicaid Expansion*, 57 MED. CARE 362, 363 (2019) [hereinafter *The Association of Nurse Practitioner*] (same).

Figure 1 provides an overview of NP SOP laws during the time period analyzed here. In 2011, fourteen states allowed NPs to practice independently, and thirty-seven states restricted the practices of NPs.⁴⁸ Of the thirty-seven states restricting NP practice, fourteen changed their laws prior to the end of 2018 to allow NPs to practice independently.⁴⁹ Figure 1 separately highlights each of the states that always allowed NPs to practice independently, always restricted NP practice, and changed from restricted to independent practice.

Figure 1. Scope-of-Practice Laws



As Figure 1 illustrates, the trend among states decidedly favors NP independence, with half of all states that currently allow independent practice adopting a law to that effect in the last decade. This trend has not emerged without opposition, however, and the debate between opponents of relaxing NP SOP laws and advocates of greater NP autonomy has become quite heated. The next subpart engages with this

⁴⁸ Here and throughout the analysis, I treat the District of Columbia as a state.

⁴⁹ These states include: Maryland, MD. CODE ANN., HEALTH OCC. § 8-302.1; North Dakota, N.D. CENT. CODE § 43-12.5-01; Vermont, VT. STAT. ANN. tit. 26, § 1574; Nevada, NEV. REV. STAT. ANN. § 632.237; Rhode Island, 5 R.I. GEN. LAWS § 5-34-3(2); Connecticut, CONN. GEN. STAT. § 20-87a; Minnesota, MINN. STAT. § 148.235; Nebraska, NEB. REV. STAT. ANN. § 38-2315; Delaware, DEL. CODE ANN. tit. 24, § 1935; Utah, UTAH CODE ANN. § 58-31d-102; West Virginia, W. VA. CODE ANN. § 9-4B-1; Illinois, 225 ILL. COMP. STAT. ANN. 65/65-43; South Dakota, S.D. CODIFIED LAWS § 36-9A-12; and Virginia, VA. CODE ANN. § 54.1-2957. See Susanne J. Phillips, *30th Annual ARNP Legislative Update*, 43 NURSE PRAC. 27, 33-54 (2018).

ongoing debating, tracing the contours of each side's arguments and the evidence that supports their arguments.

B. *The Scope-of-Practice Debate*

As NPs have assumed greater roles in the delivery of care, some groups have objected to liberalizing the SOP laws that govern NPs to allow them to provide more services and practice with greater autonomy. Principal among the opponents of relaxing NP SOP laws are physician groups, with the American Medical Association (“AMA”) offering some of the strongest resistance to granting NPs greater independence.⁵⁰ Advocates of greater NP autonomy include nursing groups, policy think tanks of various political orientations, the National Academy of Medicine, and the Obama and Trump administrations.⁵¹ Opponents of greater NP autonomy often emphasize the greater education completed by physicians and argue that NPs cannot provide safe or high-quality care without physician supervision.⁵² Proponents often respond that NPs deliver care of similar quality as physicians and that allowing greater NP autonomy lowers the cost of care and improves access to care.⁵³ This Part engages with each of these sets of arguments in turn.

1. Independent Nurse Practitioners and the Quality of Care

Perhaps the most contentious point in the debate over NP SOP laws concerns the ability of NPs to deliver high-quality care without physician oversight. Opponents of NP independence generally argue that, without physician supervision, NPs cannot safely care for patients. For example, the California Medical Association has stated that it “opposes any attempts to remove physician oversight over [NPs] and believes that doing so would put the health and safety of patients at risk.”⁵⁴ Some groups frame their arguments about quality of care in

⁵⁰ RESOLUTION 214-I-2017, *supra* note 18, at 238.

⁵¹ See *infra* Part I.B.4.

⁵² See, e.g., *Help TMA Fight Independent Practice for APRNs*, TEX. MED. ASS'N (Feb. 7, 2019), <https://www.texmed.org/Template.aspx?id=49812> [<https://perma.cc/UQB8-5P7C>] (“We say ‘No’ to nonphysician practitioners who want to expand their legal scope of practice beyond what their education, training, and skills safely allow.”).

⁵³ BUERHAUS, *supra* note 10, at 9-10.

⁵⁴ *CMA Objects to Federal Scope Expansion Under President’s Executive Order*, CAL. MED. ASS'N (Oct. 14, 2019), <https://www.cmadoes.org/newsroom/news/view/ArticleId/28183/CMA-objects-to-federal-scope-expansion-under-president-s-executive-order> [<https://perma.cc/HV7D-V323>] [hereinafter *CMA Objects to Federal Scope Expansion*].

terms of the different levels of education completed by NPs and physicians.⁵⁵ These arguments require the additional inferential step that more education is required to provide the type of care delivered by NPs, but they are effectively equivalent to statements that unsupervised NPs cannot safely care for patients.⁵⁶

Advocates of greater NP autonomy respond to these arguments by pointing to the available evidence that demonstrates NPs generally deliver care of comparable quality to that delivered by physicians.⁵⁷ Multiple studies have investigated the ability of NPs to deliver high-quality care, often comparing NP-supplied care to physician-supplied care.⁵⁸ A recent comprehensive analysis compared the quality of care delivered to Medicare beneficiaries by NPs and physicians and found that physicians perform better on certain quality measures and NPs perform better on other measures.⁵⁹ Related work has found no meaningful differences between NPs and physicians in caring for HIV

⁵⁵ See PA. MED. SOC'Y, EDUCATION AND TRAINING MATTERS 1-2 (2019), https://www.pamedsoc.org/docs/librariesprovider2/pamed-documents/advocacy-priorities/425_educationtraingmatters_print.pdf?sfvrsn=eb5e9aae_2 [<https://perma.cc/3HWP-3TSY>] (arguing that NP “education and training fails to provide an adequate clinical foundation for independent practice”); Letter from Austin I. King, President, Tex. Med. Ass'n, to James W. Johnston, Gen. Counsel, Tex. Bd. of Nursing 5 (June 30, 2014), https://www.texmed.org/uploadedFiles/Current/Advocacy/Scope_of_Practice/TBN-APRN-rules-063014.pdf [<https://perma.cc/3UYR-ALBC>] (arguing that “[d]ue to the limited training and experience required in the abbreviated programs leading to licensure of [NPs] (as compared to the required education and training of licensed physicians),” physicians must supervise NPs at all times).

⁵⁶ To be clear, NPs are not trained to provide the full range of care delivered by physicians, and to the extent physician groups note that NPs cannot provide all of the services offered by physicians, they are correct. However, the statement that supervision requirements are necessary to ensure the delivery of safe and effective care of the type that NPs are trained to provide is an empirical assertion that requires verification.

⁵⁷ ADAMS & MARKOWITZ, *supra* note 31, at 7-11; BUERHAUS, *supra* note 10, at 6-10. See generally Miranda Laurant, Mieke van der Biezen, Nancy Wijers, Kanokwaroon Watananirun, Evangelos Kontopantelis & Anneke JAH van Vught, *Nurses as Substitutes for Doctors in Primary Care*, COCHRANE DATABASE SYSTEMATIC REVIEWS, no. 7, 2018 (finding nurse-led care likely produces similar or better patient outcomes compared to physician-led care).

⁵⁸ The earliest example is the “Burlington Report.” See David L. Sackett, Walter O. Spitzer, Michael Gent & Robin S. Roberts, *The Burlington Randomized Trial of the Nurse Practitioner: Health Outcomes of Patients*, 80 ANNALS INTERNAL MED. 137, 137 (1974) (completing a randomized control trial and concluding that “nurse practitioners were effective and safe”).

⁵⁹ Peter Buerhaus, Jennifer Perloff, Sean Clarke, Monica O'Reilly-Jacob, Galina Zolotusky & Catherine M. DesRoches, *Quality of Primary Care Provided to Medicare Beneficiaries by Nurse Practitioners and Physicians*, 56 MED. CARE 484, 484-90 (2018).

patients,⁶⁰ managing diabetes,⁶¹ providing primary care,⁶² prescribing medications,⁶³ or providing critical care.⁶⁴ Reviewing the evidence, the National Academy of Medicine concluded “that access to quality care can be greatly expanded by increasing the use of . . . [NPs] in primary, chronic, and transitional care.”⁶⁵

Opponents of broader NP SOP laws have criticized this evidence as irrelevant because these studies are often “performed in a setting of physician oversight and collaboration.”⁶⁶ They argue that “[u]sing data from studies of nurse practitioners working under physician supervision to demand independent practice is a flawed practice, as there is no proof that nurse practitioner care without physician oversight is either safe or effective.”⁶⁷ However, studies that have explicitly examined the role of relaxing NP SOP laws — as opposed to the role of NPs generally — in promoting the delivery of high-quality care have concluded that NP independence either improves or has little effect on the quality of care delivered.

A 2017 study found that NP “independence had no statistically significant effect on any of the three [clinically verified indicators of

⁶⁰ Ira B. Wilson, Bruce E. Landon, Lisa R. Hirschhorn, Keith McInnes, Lin Ding, Peter V. Marsden & Paul D. Cleary, *Quality of HIV Care Provided by Nurse Practitioners, Physician Assistants, and Physicians*, 143 *ANNALS INTERNAL MED.* 729, 729 (2005).

⁶¹ George L. Jackson, Valerie A. Smith, David Edelman, Sandra L. Woolson, Cristina C. Hendrix, Christine M. Everett, Theodore S. Berkowitz, Brandolyn S. White & Perri A. Morgan, *Intermediate Diabetes Outcomes in Patients Managed by Physicians, Nurse Practitioners, or Physician Assistants: A Cohort Study*, 169 *ANNALS INTERNAL MED.* 825, 825 (2018); Yihan Yang, Qi Long, Sandra L. Jackson, Mary K. Rhee, Anne Tomolo, Darin Olson & Lawrence S. Phillips, *Nurse Practitioners, Physician Assistants, and Physicians are Comparable in Managing the First Five Years of Diabetes*, 131 *AM. J. MED.* 276, 276 (2018).

⁶² Mary O. Munding, Robert L. Kane, Elizabeth R. Lenz, Annette M. Totten, Wei-Yann Tsai, Paul D. Cleary, William T. Friedewald, Albert L. Siu & Michael L. Shelanski, *Primary Care Outcomes in Patients Treated by Nurse Practitioners or Physicians: A Randomized Trial*, 283 *JAMA* 59 (2000).

⁶³ Shiyin Jiao, Irene B. Murimi, Randall S. Stafford, Ramin Mojtabai & G. Caleb Alexander, *Quality of Prescribing by Physicians, Nurse Practitioners, and Physician Assistants in the United States*, 38 *PHARMACOTHERAPY* 417, 418 (2018).

⁶⁴ Herman G. Kreeftenberg, Sjaak Pouwels, Alexander J. G. H. Bindels, Ashley de Bie & Peter H. J. van der Voort, *Impact of the Advanced Practice Provider in Adult Critical Care: A Systematic Review and Meta-Analysis*, 47 *CRITICAL CARE MED.* 722, 722 (2019).

⁶⁵ REFORMING AMERICA’S HEALTHCARE SYSTEM, *supra* note 16, at 33-34.

⁶⁶ Rebekah Bernard, *Physicians Need Better PR*, PHYSICIANS FOR PATIENT PROTECTION (Aug. 3, 2019), <https://www.physiciansforpatientprotection.org/physicians-need-better-pr/> [https://perma.cc/ERQ8-LJKP].

⁶⁷ *Id.*

healthcare quality] studied.”⁶⁸ In contrast to claims that NP SOP laws are necessary for the protection of patients,⁶⁹ this study “d[id] not substantiate the use of [SOP] restrictions for the sole purpose of consumer protection.”⁷⁰ A separate study “cast[] further doubt on the theory that state regulations limiting NPs practice are associated with quality of care.”⁷¹ Examining patient-reported quality across many years of a nationally representative dataset, a recent study found that NP independence increases the probability that patients report being in excellent health.⁷² Another study found that NP independence had no effect on infant mortality rates, an important indicator of healthcare quality.⁷³

Overall, existing evidence does not support the contention that unsupervised NPs provide unsafe or low-quality care. To be sure, physician groups are correct in their assertion that NPs are not trained to provide the same range of services as physicians — NPs do not perform surgery, for example. Within the scope of their training, however, the evidence demonstrates that NPs perform similarly to physicians.

2. Scope-of-Practice Laws and the Cost of Healthcare

Though healthcare quality tends to receive the most attention from experts within the SOP law debate, concerns over the cost of care predominate among the patients who are most affected. Indeed, the health policy conversation over the last two decades has focused heavily

⁶⁸ Ellen T. Kurtzman, Burt S. Barnow, Jean E. Johnson, Samuel J. Simmens, Donna Lind Infeld & Fitzhugh Mullan, *Does the Regulatory Environment Affect Nurse Practitioners’ Patterns of Practice or Quality of Care in Health Centers?*, 52 HEALTH SERVICES RES. 437, 442, 449 (2017).

⁶⁹ For example, the aptly named group Physicians for Patient Protection makes this argument central to their mission of opposing the relaxation of NP SOP laws. Rebekah Bernard, *PPP Responds to Executive Order Regarding Pay Parity and Scope of Practice, Offers Solutions*, PHYSICIANS FOR PATIENT PROTECTION (Oct. 16, 2019), <https://www.physiciansforpatientprotection.org/ppp-responds-to-executive-order-regarding-pay-parity-and-scope-of-practice-offers-solutions/> [https://perma.cc/T65X-6VHH].

⁷⁰ Kurtzman et al., *supra* note 68, at 452.

⁷¹ Jennifer Perloff, Sean Clarke, Catherine M. DesRoches, Monica O’Reilly-Jacob & Peter Buerhaus, *Association of State-Level Restrictions in Nurse Practitioner Scope of Practice with the Quality of Primary Care Provided to Medicare Beneficiaries*, 76 MED. CARE RES. & REV. 597, 612 (2017) [hereinafter *Association of State-Level Restrictions*].

⁷² Traczynski & Udalova, *supra* note 12, at 98, 99 tbl.7.

⁷³ Kleiner et al., *supra* note 15, at 284-85.

on the ability of patients to obtain affordable care.⁷⁴ Advocates of greater NP autonomy have argued that removing restrictive SOP laws will facilitate the use of lower cost providers and ultimately reduce costs within that system. For example, Kathleen Adams and Sara Markowitz have explained that “[a]chieving productivity gains is one way to reduce cost pressures throughout the health-care system” and that such gains can be realized “by using lower-cost sources of labor to achieve the same or better outcomes.”⁷⁵ The “high payment rates for physicians in the United States” makes the increased use of NPs a particularly appealing strategy for cost-reduction.⁷⁶

Recent research has demonstrated that abrogating restrictive SOP laws can reduce costs within the healthcare system to the benefit of patients and the public. A study by Morris Kleiner and others found that granting NPs independence reduces the price of a common medical examination by between 3% and 16%.⁷⁷ A separate economic evaluation estimated that liberalizing SOP laws would save approximately \$543 million annually in emergency department visits alone.⁷⁸ Though specific to certified nurse midwives instead of NPs, a recent study found that eliminating restrictive SOP laws for nurse midwives would save \$101 million by reducing reliance on more intensive forms of care during birth.⁷⁹ Other studies have found that payments in connection with Medicare beneficiaries cared for by NPs were between 11% and 29% lower than those cared for by physicians,⁸⁰ the savings achieved by using retail health clinics in lieu of emergency departments are higher when NPs have more independence,⁸¹ and Medicaid costs either decrease or remain flat when NPs are granted more autonomy.⁸²

On the other side of the debate, opponents of NP independence can point to some evidence that NPs and SOP laws allowing them to practice independently may increase healthcare costs. In a recent report, the

⁷⁴ See *supra* note 1 and accompanying text.

⁷⁵ ADAMS & MARKOWITZ, *supra* note 31, at 5-6.

⁷⁶ *Id.* at 6.

⁷⁷ Kleiner et al., *supra* note 15, at 286.

⁷⁸ Traczynski & Udalova, *supra* note 12, at 100.

⁷⁹ Markowitz et al., *supra* note 14, at 211.

⁸⁰ Jennifer Perloff, Catherine M. DesRoches & Peter Buerhaus, *Comparing the Cost of Care Provided to Medicare Beneficiaries Assigned to Primary Care Nurse Practitioners and Physicians*, 51 HEALTH SERVICES RES. 1407, 1407, 1412-20 (2016) [hereinafter *Comparing the Cost of Care*].

⁸¹ Spetz et al., *supra* note 42, at 1980-82.

⁸² Edward Joseph Timmons, *The Effects of Expanded Nurse Practitioner and Physician Assistant Scope of Practice on the Cost of Medicaid Patient Care*, 121 HEALTH POL'Y 189, 193-95 (2017).

Medicare Payment Advisory Commission (“MedPAC”) highlighted several studies finding that NPs tend to increase costs.⁸³ One study found that NPs utilized more healthcare resources in caring for patients than physicians, suggesting that more extensive use of NPs may increase costs.⁸⁴ A separate study found that NPs order more medical imaging services than physicians in primary care settings.⁸⁵ Medical imaging, such as magnetic resonance imaging (“MRI”) and computed tomography (“CT”) scans can be expensive, so this study suggests that NP independence may increase costs over time. More recent work that examines a larger population contradicts these results, however. Examining data on Medicare and commercial insurance claims, a 2017 study found that NP independence does not result in more medical imaging and does not increase healthcare costs.⁸⁶ Similarly, research conducted by economists at the Federal Trade Commission (“FTC”) revealed no evidence that relaxing NP SOP laws increases healthcare costs or prices.⁸⁷ Overall, a growing body of research suggests that allowing NPs to practice independently can reduce costs and the prices patients must pay for care, while only a few studies have found evidence to the contrary.⁸⁸

⁸³ MEDICARE PAYMENT ADVISORY COMM’N, REPORT TO THE CONGRESS: MEDICARE AND THE HEALTH CARE DELIVERY SYSTEM 149 (2019).

⁸⁴ See Alnoor Hemani, Darius A. Rastegar, Carole Hill & Mohamed S. Al-Ibrahim, *A Comparison of Resource Utilization in Nurse Practitioners and Physicians*, 2 EFFECTIVE CLINICAL PRAC. 258, 260-64 (1999).

⁸⁵ Danny R. Hughes, Miao Jiang & Richard Duszak Jr., *A Comparison of Diagnostic Imaging Ordering Patterns Between Advanced Practice Clinicians and Primary Care Physicians Following Office-Based Evaluation and Management Visits*, 175 JAMA INTERNAL MED. 101, 103-06 (2015).

⁸⁶ Tomer Begaz, David Elashoff, Tristan R. Grogan, David Talan & Breena R. Taira, *Differences in Test Ordering Between Nurse Practitioners and Attending Emergency Physicians When Acting as Provider in Triage*, 35 AM. J. EMERGENCY MED. 1426, 1427-29 (2017) (finding NPs tend to order fewer tests and thus no evidence that NPs increase costs); Hangsheng Liu, Michael Robbins, Ateev Mehrotra, David Auerbach, Brandi E. Robinson, Lee F. Cromwell & Douglas W. Roblin, *The Impact of Using Mid-Level Providers in Face-to-Face Primary Care on Health Care Utilization*, 55 MED. CARE 12, 14-17 (2017) (finding no evidence that NPs increase costs).

⁸⁷ Thomas G. Koch & Nathan Petek, *The Effect of Nurse Practitioner Scope of Practice on Health Care Utilization and Health: Evidence from Law Changes and Patient Moves* 16-27 (Fed. Trade Comm’n, Working Paper, 2020), http://www.nathanpetek.com/uploads/1/2/0/1/120192201/np_scope.pdf [<https://perma.cc/7THT-YQBD>].

⁸⁸ See MEDICARE PAYMENT ADVISORY COMM’N, *supra* note 83, at 149 (reviewing these studies on the effect of NP independence on healthcare costs).

3. Nurse Practitioners and Access to Healthcare

Turning to the debate over the role of SOP laws in access to healthcare, the evidence more heavily favors advocates of greater NP autonomy than it does in either the cost or quality debates. Advocates of greater NP autonomy have argued that “[b]y unnecessarily limiting the tasks that qualified [NPs] can perform, SOP restrictions exacerbate [healthcare provider] shortages and limit access to care.”⁸⁹ An Obama administration report noted that “easing scope of practice laws for APRNs represents a viable means of increasing access to certain primary care services,”⁹⁰ and the evidence generally supports this conclusion.

For example, one study concluded that states with less restrictive SOP laws “overall had more geographically accessible” NPs.⁹¹ Similarly, a 2018 study found that relaxing SOP laws increases access to healthcare generally but has the largest positive effect in counties that have the least access to healthcare.⁹² This evidence suggests that “restrictive licensing laws limit the growth in the supply of [NPs] who could deliver care in communities with relatively few practicing physicians.”⁹³ Extending this evidence to more specific measures of healthcare access, a third study concluded that granting NPs more autonomy increases the likelihood that individuals receive a routine check-up, have access to a usual source of care, and can obtain an appointment with a provider.⁹⁴ NP independence also reduces the use of emergency departments for conditions that can be addressed in less intensive (and less expensive) settings, as patients can more easily access a healthcare provider when NPs can practice independently.⁹⁵

⁸⁹ ADAMS & MARKOWITZ, *supra* note 31, at 6.

⁹⁰ OCCUPATIONAL LICENSING FRAMEWORK, *supra* note 16, at 31-32.

⁹¹ Graves et al., *supra* note 12, at 82-84.

⁹² McMichael, *Beyond Physicians*, *supra* note 12, at 765 (noting that “NPs . . . locat[e] in areas with relatively low levels of physician supply when licensing . . . laws are amended”).

⁹³ *Id.*; see also Ying Xue, Viji Kannan, Elizabeth Greener, Joyce A. Smith, Judith Brasch, Brent A. Johnson & Joanne Spetz, *Full Scope-of-Practice Regulation Is Associated with Higher Supply of Nurse Practitioners in Rural and Primary Care Health Professional Shortage Counties*, 8 J. NURSING REG. 5, 5 (2018) (“State full SOP regulation was associated with higher NP supply in rural and primary care HPSA counties. Regulation plays a role in maximizing capacity of the NP workforce in these underserved areas, which are most in need for improvement in access to care.”).

⁹⁴ Traczynski & Udalova, *supra* note 12, at 94-100.

⁹⁵ *Id.*; see also McMichael et al., *The Association of Nurse Practitioner*, *supra* note 47, at 365-67 (finding that Medicaid expansion increases use of emergency departments generally but that states allowing NP independence saw smaller increases because newly insured patients can better access non-emergency care).

The response to the argument that allowing NPs greater autonomy increases access to healthcare by opponents of NP independence often does not focus explicitly on healthcare access. While not every study has found that relaxing SOP laws increases access to healthcare providers,⁹⁶ the existing evidence generally supports this conclusion.⁹⁷ Opponents, therefore, typically offer only indirect arguments on the access issue. In opposing a bill that would relaxing California's SOP laws, the president of the California Medical Association offered an example of a common argument: "We must ensure that every American, regardless of age or economic status, has access to a trained physician who can provide the highest level of care. Expanding access to care should not come at the expense of patient safety and we will not support unequal standards of care. . . ."⁹⁸ In other words, expanding access to NP-supplied care does not amount to expanding access to care generally because NPs provide inferior care. Though framed as an access-to-care argument, this contention is more accurately characterized as an argument about the quality of care provided by NPs, which as addressed above, appears to be equal in basic practice areas.

4. The State of the Scope-of-Practice Debate

The debate over NP SOP laws is not new, and multiple national organizations — both governmental and non-governmental — have weighed in on this debate after conducting extensive reviews of the available evidence. Perhaps the most relevant organization to opine on SOP laws to date has been the National Academy of Medicine (formerly, the Institute of Medicine). The Academy criticized restrictive SOP laws, noting that "what nurse practitioners are able to do once they graduate varies widely for reasons that are related not to their ability, education or training, or safety concerns, but to the political decisions of the state in which they work."⁹⁹ Calling for an end to restrictive SOP laws, the Academy clearly stated that NPs "should practice to the full extent of their education and training."¹⁰⁰

⁹⁶ See Ryan Kandrack, Hilary Barnes & Grant R. Martsolf, *Nurse Practitioner Scope of Practice Regulations and Nurse Practitioner Supply*, 77 MED. CARE RES. & REV. (forthcoming 2020) (finding that relaxing NP SOP laws does not generally increase NP supply).

⁹⁷ See BUEHHAUS, *supra* note 10, at 10-12 (reviewing the evidence supporting the conclusion that relaxing SOP laws increases access to healthcare providers).

⁹⁸ CMA *Objects to Federal Scope Expansion*, *supra* note 54.

⁹⁹ INST. OF MED., *supra* note 16, at 5.

¹⁰⁰ *Id.* at 4.

Researchers at the FTC reached a similar conclusion, albeit for somewhat different reasons. The FTC has no authority to enforce federal antitrust laws against states that restrict the practices of NPs with SOP laws because these laws fit squarely within the state-action immunity articulated in *Parker v. Brown*.¹⁰¹ However, FTC researchers applied the economic principles that underlie those antitrust laws and concluded that restrictive SOP laws “deny[] health care consumers the benefits of greater competition.”¹⁰² They further concluded that the harms to healthcare services markets — higher prices and decreased access to care — associated with restrictive SOP laws were not offset by any attendant benefits.¹⁰³ Consistent with these conclusions, the FTC has regularly opposed state laws that restrict the practices of NPs and supported the passage of bills that relax the SOP laws.¹⁰⁴

Neither the National Academy of Medicine, nor the FTC, is a partisan organization, and the conclusion that restrictive NP SOP laws undermine the effective functioning of the U.S. healthcare system is not a partisan one. Indeed, the Obama and Trump administrations issued separate reports evaluating the evidence on SOP laws and concluded that policymakers should relax SOP laws.¹⁰⁵ Similarly, the left-leaning Brookings Institution and right-leaning American Enterprise Institute have both evaluated the relevant evidence and issued calls for the relaxation of SOP laws.¹⁰⁶ The libertarian-leaning Cato Institute and Mercatus Center also support granting NPs independence.¹⁰⁷

¹⁰¹ 317 U.S. 341, 350-51 (1943) (“We find nothing in the language of the Sherman Act or in its history which suggests that its purpose was to restrain a state or its officers or agents from activities directed by its legislature.”); see also Aaron Edlin & Rebecca Haw, *Cartels by Another Name: Should Licensed Occupations Face Antitrust Scrutiny?*, 162 U. PENN. L. REV. 1093, 1118-27 (2014) (explaining that most occupational licensing laws, such as SOP laws, are beyond the reach of antitrust scrutiny because they are based on state statutes).

¹⁰² GILMAN & KOSLOV, *supra* note 20, at 1-2.

¹⁰³ *Id.* at 27-34.

¹⁰⁴ See *id.* at 1-4 (“[T]he FTC staff has consistently urged state legislators to avoid imposing restrictions on APRN scope of practice unless those restrictions are necessary to address well-founded patient safety concerns.”).

¹⁰⁵ OCCUPATIONAL LICENSING FRAMEWORK, *supra* note 16, at 13-14, 42; REFORMING AMERICA’S HEALTHCARE SYSTEM, *supra* note 16, at 31-36.

¹⁰⁶ ADAMS & MARKOWITZ, *supra* note 31, at 5-6 (urging the relaxation of APRN and PA SOP laws in a report issued by the Brookings Institute); BUERHAUS, *supra* note 10, at 1-2 (urging the relaxation of APRN SOP laws in a report issued by the American Enterprise Institute).

¹⁰⁷ See Charles Hughes, *These Scope of Practice Laws Don’t Improve Health Outcomes, Serve Mainly as Barriers to Entry*, CATO INST. (Nov. 2, 2016, 12:31 PM), <https://www.cato.org/blog/these-scope-practice-laws-dont-improve-health-outcomes->

While a national consensus has emerged in favor of eliminating restrictive SOP laws, many states have been unwilling to do so. Identifying a broad trend in states' decisions to maintain restrictive laws, one study noted that "SOP laws and regulations are more likely to be related to physicians' economic interests" than to an interest in promoting the delivery of high-quality or cost-effective care.¹⁰⁸ To further these economic interests, "physicians can shield themselves from market competition and avoid downward pressure on prices and increased nonprice competition (presumably over quality of care . . .)" by using SOP laws "that limit the practice of NPs" and "by requiring NPs to be supervised by members of their own profession."¹⁰⁹ To date, physician groups have been successful in using their political power to encourage many states to maintain restrictive SOP laws.¹¹⁰

One important, and deeply troubling, argument that groups opposed to NP independence have recently raised is that relaxing NP SOP laws may exacerbate the opioid crisis.¹¹¹ The opioid epidemic represents one of the most severe public health threats of this generation,¹¹² and opponents of NP independence have contended that granting NPs independence will deepen the crisis by facilitating the over-prescription of opioids.¹¹³ Of course, this argument may serve as a pretext to maintain restrictive SOP laws that benefit physicians. If, however, physician groups are correct that granting NPs independence will

serve-mainly-barriers-entry [<https://perma.cc/K4VA-768F>] (noting the harms associated with restrictive SOP laws); *Scope-of-Practice Laws*, MERCATUS CTR. GEO. MASON UNIV. (Mar. 22, 2017), <https://www.mercatus.org/scopeofpractice> [<https://perma.cc/84BF-FMGL>] (emphasizing the harms of restrictive SOP laws and arguing in favor of relaxation).

¹⁰⁸ Perloff et al., *Association of State-Level Restrictions*, *supra* note 71, at 614.

¹⁰⁹ *Id.*

¹¹⁰ See McMichael, *The Demand for Healthcare Regulation*, *supra* note 17, at 306-11.

¹¹¹ See, e.g., Melissa Patrick, *Nurse Practitioners Want to Change Law that Requires Them to Make Deals with Physicians to Prescribe Strong Painkillers*, KY. HEALTH NEWS (May 24, 2017), <http://kyhealthnews.blogspot.com/2017/05/nurse-practitioners-want-to-change-law.html> [<https://perma.cc/SDF2-LVGK>] (noting that a Kentucky physician group opposed expanding NP SOP laws by "contending that it would add to the prescription-drug abuse that continues to plague the state").

¹¹² PAIN MANAGEMENT AND THE OPIOID EPIDEMIC: BALANCING SOCIETAL AND INDIVIDUAL BENEFITS AND RISKS OF PRESCRIPTION OPIOID USE 187 (Richard J. Bonnie et al. eds., 2017) ("Not since the HIV/AIDS epidemic has the United States faced as devastating and lethal a health problem as the current crisis of opioid misuse and overdose and opioid use disorder (OUD).").

¹¹³ See Myers & Alliman, *supra* note 22, at 561 (explaining that Tennessee physician groups opposed allowing NPs to practice independently because they "blame[d] NPs . . . for Tennessee's opioid epidemic").

deepen the ongoing crisis, that would certainly favor restricting the practices of NPs. The potential to worsen an already severe crisis may even be sufficient to overwhelm all of the benefits identified in connection with granting NPs more autonomy. Accordingly, the claim that allowing NPs to practice independently will increase opioid prescriptions warrants serious investigation and analysis. Such an investigation is further warranted by the fact that this argument is one of the last remaining serious arguments that has not been fully addressed by empirical evidence. This Article provides that investigation, but before discussing the empirical analysis, the next Part provides important context by tracing the development of the opioid crisis and situating healthcare providers and SOP laws within that crisis.

II. THE OPIOID CRISIS

The opioid crisis began around 2000, and fifteen years later, opioid prescriptions had quadrupled.¹¹⁴ This explosion in opioid use has had profound and severe consequences for all segments of society. In 2017, for example, the Centers for Disease Control and Prevention (“CDC”) estimated that an individual died of an opioid overdose every 11 minutes.¹¹⁵ As tragic as the opioid epidemic is, however, it provides a nearly ideal setting in which to examine claims that NPs provide unsafe or low-quality care. If this assertion is true, then it should certainly present itself in the context of a crisis so directly connected to patient safety in the form of more opioid prescriptions. Conversely, evidence that NP independence does not worsen the opioid crisis would undermine the argument that NPs provide unsafe or low-quality care. This Part provides context for the analysis of NP SOP laws and the opioid epidemic by engaging with the history of the current crisis and detailing the role of healthcare providers and SOP laws in that crisis.

A. An Evolving Epidemic

In July 2017, the White House Commission on Combatting Drug Addiction and the Opioid Crisis called for the President to declare the

¹¹⁴ See Rose A. Rudd, Noah Aleshire, Jon E. Zibbell & R. Matthew Gladden, *Increases in Drug and Opioid Overdose Deaths — United States, 2000–2014*, 16 AM. J. TRANSPLANTATION 1323, 1324–26 (2016) [hereinafter *Increases in Overdose Deaths 2000–2014*].

¹¹⁵ The CDC estimates that “128 [Americans] die every day from an opioid overdose,” which translates into one opioid-related death every eleven minutes. *Understanding the Epidemic*, CDC, <https://www.cdc.gov/drugoverdose/epidemic/index.html> (last updated Mar. 19, 2020) [https://perma.cc/BFM2-3WGP].

opioid crisis a national public health emergency.¹¹⁶ A report issued by the Commission acknowledged the “grim reality” that “Americans consume more opioids than any other country in the world.”¹¹⁷ For example, “in 2015, the amount of opioids prescribed in the U.S. was enough for every American to be medicated around the clock for three weeks.”¹¹⁸ On October 26, 2017, the President followed the recommendation of the Commission and officially declared the opioid crisis a national emergency.¹¹⁹

The opioid epidemic differs in large part from other epidemics, such as the spread of HIV in the 1980s and 1990s or the 2020 COVID-19 pandemic, in that it stems primarily from the healthcare system itself. The White House Commission recognized that the “enormous problem” of opioid overuse “is often not beginning on street corners”; instead, “it is starting in doctor’s offices and hospitals in every state in our nation.”¹²⁰ Although opioids certainly have a place in the healthcare system for the treatment of acute pain,¹²¹ pharmaceutical companies ignited the current epidemic in the 1990s by assuring healthcare providers that patients would not become addicted to prescription opioids.¹²² This increase in activity by pharmaceutical companies coalesced with a realization by healthcare providers that pain had historically gone untreated or undertreated.¹²³ Beginning around 2000, providers increasingly accepted pain as a “fifth vital sign” and began to

¹¹⁶ WHITE HOUSE COMM’N ON COMBATING DRUG ADDICTION & THE OPIOID CRISIS, INTERIM REPORT 2 (2017), <https://www.whitehouse.gov/sites/whitehouse.gov/files/ondcp/commission-interim-report.pdf> [<https://perma.cc/T7HT-ZNMW>] [hereinafter COMBATING DRUG ADDICTION].

¹¹⁷ *Id.* at 1.

¹¹⁸ *Id.*

¹¹⁹ *Ongoing Emergencies & Disasters*, CENTERS FOR MEDICAID & MEDICARE SERVICES (Jan. 14, 2020, 12:59 PM), <https://www.cms.gov/About-CMS/Agency-Information/Emergency/EPRO/Current-Emergencies/Ongoing-emergencies> [<https://perma.cc/2N4H-7T3G>].

¹²⁰ COMBATING DRUG ADDICTION, *supra* note 116, at 1.

¹²¹ Carrie Krieger, *What Are Opioids and Why Are They Dangerous?*, MAYO CLINIC (Mar. 21, 2018), <https://www.mayoclinic.org/diseases-conditions/prescription-drug-abuse/expert-answers/what-are-opioids/faq-20381270> [<https://perma.cc/FT2Y-ZR6S>].

¹²² *Opioid Overdose Crisis*, NAT’L INST. ON DRUG ABUSE (Jan. 21, 2019), <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-crisis#> [<https://perma.cc/EV9F-R3BG>]; see also Scott G. Weiner, Sayeed K. Malek & Christin N. Price, *The Opioid Crisis and Its Consequences*, 101 *TRANSPLANTATION* 678, 679 (2017) (“[I]t is important to recognize the effect the pharmaceutical industry has had on increased opioid use.”).

¹²³ Weiner et al., *supra* note 122, at 679.

treat it more aggressively,¹²⁴ leading to a “marked[] increase[]” in the use of prescription opioids.¹²⁵

Between 1999 and 2015 providers increased their opioid prescriptions fourfold,¹²⁶ creating “the worst drug crisis in American history.”¹²⁷ Commensurate with the increase in opioid prescriptions, opioid-related deaths have quadrupled since 1999.¹²⁸ Of the 700,000 deaths from drug overdoses between 1999 and 2018, nearly 450,000 involved an opioid.¹²⁹ In 2018 alone, almost 70% of the nearly 70,000 drug-overdose deaths involved an opioid.¹³⁰ Currently, 128 Americans die from an opioid overdose each day.¹³¹ With “no sign it’s letting up,”¹³² forecasts have predicted that the opioid crisis will kill as many as 650,000 people in the next decade.¹³³ In addition to deaths, growth in opioid prescriptions has fueled increases in opioid addiction,¹³⁴ opioid-related traffic accidents,¹³⁵ admissions to facilities for substance abuse,¹³⁶ opioid-related emergency room visits,¹³⁷ and the prevalence of

¹²⁴ D. Andrew Tompkins, J. Greg Hobelmann & Peggy Compton, *Providing Chronic Pain Management in the “Fifth Vital Sign” Era: Historical and Treatment Perspectives on a Modern-Day Medical Dilemma*, 173 *DRUG & ALCOHOL DEPENDENCE* S11, S13 (2017).

¹²⁵ Weiner et al., *supra* note 122, at 679.

¹²⁶ Rudd et al., *Increases in Overdose Deaths 2000–2014*, *supra* note 114, at 1326.

¹²⁷ Julie Bosman, *Inside a Killer Drug Epidemic: A Look at America’s Opioid Crisis*, N.Y. TIMES (Jan. 6, 2017), <https://www.nytimes.com/2017/01/06/us/opioid-crisis-epidemic.html> [<https://perma.cc/7PDZ-VX6U>].

¹²⁸ *Understanding the Epidemic*, *supra* note 115.

¹²⁹ *Id.*

¹³⁰ *Id.*

¹³¹ *Id.*

¹³² Bosman, *supra* note 127.

¹³³ Max Blau, *STAT Forecast: Opioids Could Kill Nearly 500,000 Americans in the Next Decade*, STAT (June 27, 2017), <https://www.statnews.com/2017/06/27/opioid-deaths-forecast/> [<https://perma.cc/6QM6-Y992>].

¹³⁴ Andrew Kolodny, David T. Courtwright, Catherine S. Hwang, Peter Kreiner, John L. Eadie, Thomas W. Clark & G. Caleb Alexander, *The Prescription Opioid and Heroin Crisis: A Public Health Approach to an Epidemic of Addiction*, 36 *ANN. REV. PUB. HEALTH* 559, 559-70 (2015).

¹³⁵ Guohua Li & Stanford Chihuri, *Prescription Opioids, Alcohol and Fatal Motor Vehicle Crashes: A Population-Based Case-Control Study*, 6 *INJURY EPIDEMIOLOGY* (forthcoming 2020).

¹³⁶ Andrew S. Huhn, Eric C. Strain, D. Andrew Tompkins & Kelly E. Dunn, *A Hidden Aspect of the U.S. Opioid Crisis: Rise in First-Time Treatment Admissions for Older Adults with Opioid Use Disorder*, 193 *DRUG & ALCOHOL DEPENDENCE* 142, 143-47 (2018).

¹³⁷ Christopher M. Jones & Jana K. McAninch, *Emergency Department Visits and Overdose Deaths from Combined Use of Opioids and Benzodiazepines*, 49 *AM. J. PREVENTIVE MED.* 493, 497-500 (2015).

neonatal abstinence syndrome.¹³⁸ The White House Council of Economic Advisers estimated the overall cost of the opioid crisis at over \$500 billion in 2015 — nearly 3% of the United States' gross domestic product.¹³⁹ The crisis has become so severe and pervasive that it has begun to reduce participation in the labor market,¹⁴⁰ and opioid-related harms have been associated with decreasing life expectancy in the United States for several years.¹⁴¹

In tracking the development of the opioid crisis and the myriad harms it has caused, the CDC has divided the ongoing crisis into three waves based largely on the types of opioids connected to deaths. The first wave began in the late 1990s with a sharp rise in deaths caused by prescription opioids.¹⁴² The second wave began around 2010 as heroin-related deaths began to steadily increase.¹⁴³ The third wave began around 2013 as deaths caused by synthetic opioids, such as fentanyl, sharply increased.¹⁴⁴

The fact that illicit substances, and not prescription drugs, have driven the second two waves of the opioid crisis tends to mask the central role of healthcare providers in the ongoing crisis. While these providers certainly do not provide heroine or illicitly manufactured fentanyl, Scott Gottlieb, the former commissioner of the Food and Drug Administration, has explained that “[m]ost people who become addicted to opioids become medically addicted. Their first exposure is going to be a clinical prescription that they receive in a clinical setting,

¹³⁸ Neonatal abstinence syndrome occurs when an infant born to an opioid-addicted mother experiences symptoms of opioid withdrawal. Stephen W. Patrick, Robert E. Schumacher, Brian D. Benneyworth, Elizabeth E. Krans, Jennifer M. McAllister & Matthew M. Davis, *Neonatal Abstinence Syndrome and Associated Health Care Expenditures: United States, 2000-2009*, 307 JAMA 1934, 1935-40 (2012).

¹³⁹ COUNCIL OF ECON. ADVISERS, THE UNDERESTIMATED COST OF THE OPIOID CRISIS 1 (2017), <https://www.whitehouse.gov/sites/whitehouse.gov/files/images/The%20Underestimated%20Cost%20of%20the%20Opioid%20Crisis.pdf> [https://perma.cc/DC2H-FLWR].

¹⁴⁰ Dionissi Aliprantis, Kyle Fee & Mark E. Schweitzer, *Opioids and the Labor Market* 11-24 (Fed. Res. Bank of Cleveland, Working Paper No. 18-07R2, 2019), <https://www.clevelandfed.org/en/newsroom-and-events/publications/working-papers/2019-working-papers/wp-1807r2-opioids-and-the-labor-market.aspx> [https://perma.cc/6AKW-GE7P].

¹⁴¹ Rob Stein, *Life Expectancy Drops Again as Opioid Deaths Surge in U.S.*, NPR (Dec. 21, 2017, 12:01 AM ET), <https://www.npr.org/sections/health-shots/2017/12/21/572080314/life-expectancy-drops-again-as-opioid-deaths-surge-in-u-s> [https://perma.cc/7UJN-75TE].

¹⁴² *Understanding the Epidemic*, *supra* note 115.

¹⁴³ *Id.*

¹⁴⁴ *Id.*

and then they'll go on to develop an addiction."¹⁴⁵ A recent study similarly noted that "the majority of users start taking opioids that are prescribed by their physicians, even if they later progress to illicit or illegal opioid use."¹⁴⁶ The CDC echoed this assessment, explaining that "[t]he misuse of prescription opioids is intertwined with that of illicit opioids."¹⁴⁷

The centrality of healthcare providers in the current crisis has rightly given policymakers reasons to carefully consider the laws governing these providers, including any changes to those laws. And physician groups are correct to point out that, if relaxing NP SOP laws increases opioid prescriptions, then maintaining restrictions on NPs to avoid exacerbating an already debilitating crisis may be warranted. The next subpart details the role of healthcare providers and the laws that govern them in the context of the opioid crisis to provide a clear framework around this important objection to granting NPs more autonomy.

B. Healthcare Providers, Scope-of-Practice Laws, and the Opioid Crisis

Since they represent the only legal source of prescription opioids, healthcare providers have played an important role in the opioid crisis. However, not all providers approach opioid prescribing in the same way. Molly Schnell and Janet Currie examined the number of opioid prescriptions individual physicians wrote between 2006 and 2014.¹⁴⁸ The study found that opioid prescribing varied with the rank of the physician's medical school. These results illustrate that important differences in opioid prescribing exist at the level of the individual

¹⁴⁵ FDA's Scott Gottlieb: Opioid Addiction is FDA's Biggest Crisis Now, CNBC (July 21, 2017, 8:24 AM EDT), <https://www.cnbc.com/video/2017/07/21/fdas-scott-gottlieb-opioid-addiction-is-fdas-biggest-crisis-now.html> [<https://perma.cc/KM94-RMC3>].

¹⁴⁶ Janet Currie, Jonas Y. Jin & Molly Schnell, *U.S. Employment and Opioids: Is There a Connection?* 2 (Nat'l Bureau of Econ. Research, Working Paper No. 24440, 2019); see also Jennifer L. Doleac & Anita Mukherjee, *The Moral Hazard of Lifesaving Innovations: Naloxone Access, Opioid Abuse, and Crime* 8 (Mar. 31, 2019) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3135264 [<https://perma.cc/YW8L-QWTR>] ("Individuals are prescribed these drugs to treat pain, but many patients develop addictions that lead them to illegal use of prescription opioids and cheaper substitutes such as heroin.").

¹⁴⁷ Rose A. Rudd, Puja Seth, Felicity David & Lawrence Scholl, *Increases in Drug and Opioid-Involved Overdose Deaths — United States, 2010–2015*, 65 *MORBIDITY & MORTALITY WKLY. REP.* 1445, 1445-52 (2016).

¹⁴⁸ Molly Schnell & Janet Currie, *Addressing the Opioid Epidemic: Is There a Role for Physician Education*, 4 *AM. J. HEALTH ECON.* 383, 386 (2018). This study specifically excluded NPs and other non-physician providers.

provider.¹⁴⁹ Analyzing more specific measures of opioid prescriptions, McMichael, Van Horn, and Viscusi also found substantial differences across individual providers. For example, while “[f]amily physicians prescribe[d], on average, the equivalent of nearly 15 kilograms of morphine each year,”¹⁵⁰ pediatricians prescribed the equivalent of less than half a kilogram of morphine each year and obstetrician-gynecologists prescribed the equivalent of about 3.5 kilograms of morphine each year.¹⁵¹ As with the results of the Schnell and Currie study, these statistics demonstrate the importance of accounting for differences in opioid prescribing at the individual-provider level. The analysis presented below is well-suited to address these issues.

These, and other similar, studies have not gone unnoticed by legislators, who have enacted a variety of policies aimed specifically at individual providers to combat the opioid epidemic. Recognizing the differences in individual prescribing patterns, the CDC issued a guideline on prescribing opioids for chronic pain in 2016.¹⁵² State governments have taken even more active roles in pursuing various policy options to combat the opioid epidemic by targeting individual healthcare providers. Among these various policies, prescription drug monitoring programs have proven to be among the most popular and most effective.¹⁵³

These monitoring programs “collect[] data on prescriptions for controlled substances” and “allow[] authorized individuals [most importantly, healthcare providers] to view a patient’s prescribing history.”¹⁵⁴ Monitoring programs vary in their effectiveness at reducing opioid prescriptions and opioid misuse,¹⁵⁵ but research has

¹⁴⁹ See *id.* at 383. In general, physicians from lower ranked medical schools prescribe more opioids than physicians from higher ranked schools. *Id.*

¹⁵⁰ Benjamin J. McMichael, R. Lawrence Van Horn & W. Kip Viscusi, *The Impact of Cannabis Access Laws on Opioid Prescribing*, 69 J. HEALTH ECON. 1, 6 (2020) [hereinafter *The Impact of Cannabis Access Laws*].

¹⁵¹ See *id.* at 8 fig.1.

¹⁵² Deborah Dowell, Tamara M. Haegerich & Roger Chou, *CDC Guideline for Prescribing Opioids for Chronic Pain — United States, 2016*, 315 JAMA 1624, 1625-34 (2016).

¹⁵³ An exhaustive review of all of the policies state governments have implemented to combat the opioid epidemic is well beyond the scope of this Article.

¹⁵⁴ Thomas C. Buchmueller & Colleen Carey, *The Effect of Prescription Drug Monitoring Programs on Opioid Utilization in Medicare*, 10 AM. ECON. J. 77, 77-78 (2018).

¹⁵⁵ Compare Joanne E. Brady, Hannah Wunsch, Charles DiMaggio, Barbara H. Lang, James Giglio & Guohua Li, *Prescription Drug Monitoring and Dispensing of Prescription Opioids*, 129 PUB. HEALTH. REP. 139, 139 (2014) (finding that prescription drug monitoring programs do not impact opioid prescriptions), with Stephen W. Patrick, Carrie E. Fry, Timothy F. Jones & Melinda B. Buntin, *Implementation of Prescription*

demonstrated that “must access” (or “mandatory”) programs, i.e., programs that require healthcare providers to access them, effectively reduce opioid misuse.¹⁵⁶ Beyond policies explicitly aimed at the opioid crisis,¹⁵⁷ research has shown that other state laws can reduce opioid use. For example, though not intended to combat the opioid crisis, research has consistently shown that cannabis access laws reduce opioid use.¹⁵⁸

As keen as policymakers have been their search for policies to ameliorate the opioid crisis, they have proven equally keen to avoid policies that may exacerbate this crisis. Accordingly, the argument that NP independence may increase opioid prescriptions and exacerbate the opioid crisis has a particularly strong appeal. Only a few empirical studies have investigated this argument, however. One study found that NP independence affected NPs and physicians similarly, but this study was only able to analyze one year of data for Medicare patients, limiting the strength of its conclusions.¹⁵⁹ Other studies have, however, analyzed the effect of NP independence over time, using more sophisticated methodologies to isolate the role of NP independence in opioid prescribing patterns. Examining a large sample of prescriptions from across the country between 1996 and 2013,¹⁶⁰ Morris Hamilton found that relaxing NP SOP laws reduces the number of opioid prescriptions by between 9.8% and 15%.¹⁶¹ These results contrast somewhat with a

Drug Monitoring Programs Associated with Reductions in Opioid-Related Death Rates, 35 HEALTH AFF. 1324, 1327-29 (2016) (finding that prescription drug monitoring programs reduce opioid-related deaths).

¹⁵⁶ See Buchmueller & Carey, *supra* note 154, at 109 (“[W]e do find evidence that ‘must access’ [prescription drug monitoring programs] have the desired effect of curbing certain types of extreme [opioid] utilization.”).

¹⁵⁷ See, e.g., *id.* at 102 (discussing pain clinic regulation).

¹⁵⁸ See, e.g., McMichael et al., *The Impact of Cannabis Access Laws*, *supra* note 150, at 1 (“[W]e find that recreational and medical cannabis access laws reduce the number of morphine milligram equivalents prescribed each year by 11.8 and 4.2%, respectively.”); Hefei Wen & Jason M. Hockenberry, *Association of Medical and Adult-Use Marijuana Laws with Opioid Prescribing for Medicaid Enrollees*, 178 JAMA INTERNAL MED. 673, 675-78 (2018) (finding that medical and recreational cannabis access laws reduce opioid prescriptions among Medicaid beneficiaries).

¹⁵⁹ Elissa Ladd, Casey Fryer Sweeney, Anthony Guarino & Alex Hoyt, *Opioid Prescribing by Nurse Practitioners in Medicare Part D: Impact of State Scope of Practice Legislation*, 76 MED. CARE RES. & REV. 337, 339-42 (2019).

¹⁶⁰ Morris Robeson Hamilton III, *Three Essays in Health Economics* 89-90 (2017) (unpublished Ph.D. dissertation, University of Michigan), <http://deepblue.lib.umich.edu/handle/2027.42/138556> [<http://perma.cc/38W8-8NQG>].

¹⁶¹ *Id.* at 16-17.

more recent study which found that relaxing NP SOP laws increases opioid prescriptions by about 5%.¹⁶²

Collectively, the existing evidence conflicts on the question of whether allowing NPs to practice independently increases opioid prescriptions. And each study in the current literature faced important limitations in reaching its conclusions — these limitations primarily stemmed from a lack of granular data.¹⁶³ The conflict in the existing research and the limitations faced by prior research require a new analysis to provide insight into the effect of NP SOP laws on opioid prescriptions. The next Part describes the details of my analysis, which relies on a uniquely informative dataset and addresses the limitations encountered by past studies.

III. EMPIRICAL ANALYSIS

To examine the role of NP SOP laws in opioid prescriptions, I conduct an empirical analysis of prescriptions for opioids written by both NPs

¹⁶² See Diane Alexander & Molly Schnell, *Just What the Nurse Practitioner Ordered: Independent Prescriptive Authority and Population Mental Health*, 66 J. HEALTH ECON. 145, 159 (2019); see also Anca M. Grecu & Lee C. Spector, *Nurse Practitioner's Independent Prescriptive Authority and Opioids Abuse*, 28 HEALTH ECON. 1220, 1220, 1224 (2019) (finding that relaxing NP SOP laws was “associated with an increase in treatment admissions for opioid misuse and a decrease in opioid related mortality only when Mandatory Prescription Drugs Monitoring Programs are in place”); Ulrike Muench, Joanne Spetz, Matthew Jura, Chaoran Guo, Cindy Thomas & Jennifer Perloff, *Opioid-Prescribing Outcomes of Medicare Beneficiaries Managed by Nurse Practitioners and Physicians*, 57 MED. CARE 482, 482 (2019) (concluding that NPs were less likely to prescribe opioids to Medicare beneficiaries but were more likely to prescribe a higher dose than physicians).

¹⁶³ For example, the Ladd study included only one year of data, preventing it from analyzing trends over time. Ladd et al., *supra* note 159, at 339-42. The Hamilton study lacked granular information on opioid prescriptions and examined a dataset that has been criticized as non-representative. See Eric P. Slade, Howard H. Goldman, Lisa B. Dixon, Brent Gibbons & Elizabeth A. Stuart, *Assessing the Representativeness of Medical Expenditure Panel Survey Inpatient Utilization Data for Individuals with Psychiatric and Nonpsychiatric Conditions*, 72 MED. CARE RES. & REV. 736, 736-45 (2015) (criticizing bias and under-representation in the MEPS, the dataset used in the Hamilton study); Marc Berk & Gail R. Wilensky, *How to Make the Medical Expenditures Panel Survey Even More Useful*, HEALTH AFF. BLOG (Nov. 2, 2016), <http://www.healthaffairs.org/doi/10.1377/hblog20161102.057386/full/> [<http://perma.cc/3K72-TU8Y>]. The Alexander and Schnell study had rich information on the number of opioid prescriptions but could not trace these prescriptions to individual providers or examine anything but the raw number of prescriptions. Alexander & Schnell, *supra* note 162, at 153-55.

and physicians.¹⁶⁴ This Part begins by distilling the available evidence on NPs, SOP laws, and opioid prescriptions into testable hypotheses. It then outlines a dataset that provides more information on opioid prescriptions than has been available in any prior study. Most importantly, this Part describes the empirical analysis and details the results of that analysis. The Technical Appendix provides additional details and results to supplement the main analysis presented here.

A. *Testing the Competing Theories of Scope-of-Practice Laws*

Relaxing SOP laws to allow NPs to practice independently may result in a number of changes to the healthcare system. Collectively, these changes can be distilled down to two general effects that NP independence may have on healthcare delivery. First, the “access effect” describes the greater availability of care once NPs can practice independently.¹⁶⁵ With a greater supply of NPs who can better meet the demand for healthcare, patients may find it easier to access NP-supplied care.¹⁶⁶ Patients may also find it easier to access physician-supplied care as some existing physician patients begin receiving care from NPs instead, which may allow physicians to absorb new patients. Second with the “substitution effect” patients may substitute NP-supplied care for physician-supplied care once NPs can practice independently.¹⁶⁷ In general, granting NPs more autonomy can increase the supply of NPs and allow existing NPs to better meet the demands of patients for care.¹⁶⁸ This may encourage some patients to switch from physician-supplied care to NP-supplied care.

Combined, the substitution and access effects may ultimately lead to an increase or decrease in opioid prescriptions. Beginning with the access effect, all providers should prescribe more opioids to the extent that some patients who were previously unable to access healthcare are able to do so when NPs gain independence.¹⁶⁹ Individuals without access to care necessarily lack (legal) access to prescription opioids. As

¹⁶⁴ Officials from the institutional review board at the University of Alabama reviewed the analysis presented here and determined that it was exempt from institutional board review. Documentation to this effect is on file with the author.

¹⁶⁵ See Hamilton, *supra* note 160, at 3 (discussing the access effect).

¹⁶⁶ GILMAN & KOSLOV, *supra* note 20, at 20-27.

¹⁶⁷ See Hamilton, *supra* note 160, at 8 (defining the substitution effect).

¹⁶⁸ GILMAN & KOSLOV, *supra* note 20, at 20-27; see McMichael, *Beyond Physicians*, *supra* note 12, at 744-55.

¹⁶⁹ See Hamilton, *supra* note 160, at 7-9.

NPs treat more patients, they should prescribe more opioids.¹⁷⁰ Similarly, as physicians are able to treat new patients when NPs absorb some of their previous patients, physician opioid prescriptions may increase as well.¹⁷¹ Thus, the access effect should result in an overall increase in opioid prescriptions across all providers. This increase, however, is not necessarily problematic because previously untreated patients may simply receive the care they need (including opioid prescriptions).

The substitution effect, on the other hand, offers no such straightforward predictions, and the nature of the substitution effect has become the locus of disagreement in the NP-SOP-law debate. In general, the substitution effect should result in more opioid prescriptions by NPs and fewer such prescriptions by physicians to the extent that patients substitute NP-delivered care for physician-delivered care.¹⁷² If NPs and physicians prescribe opioids in exactly the same way and patients simply shift from physicians to NPs, then allowing NPs to practice independently will have a zero net effect on opioid prescriptions. A patient cared for by an NP will receive the same opioid prescription that the patient would have received from a physician. However, NPs and physicians may not prescribe opioids in the same way, and the debate over SOP laws in the context of opioids turns on how NPs will prescribe opioids in the absence of physician oversight.

Beginning with the perspective of those in favor of NP independence, multiple studies have found evidence that NPs employ fewer and less intensive treatments than do physicians.¹⁷³ The nursing model of care emphasizes less use of medically intensive treatments,¹⁷⁴ and prior work has suggested that NPs often spend more time with their patients

¹⁷⁰ See *id.*

¹⁷¹ See *id.*

¹⁷² See *id.*

¹⁷³ See, e.g., KIMBERLY GROOVER, EFFECTS OF OCCUPATIONAL LICENSING FOR NURSE PRACTITIONERS ON PRESCRIPTION USE AND QUALITY 1 (2018), <http://www.semanticscholar.org/paper/Effects-of-Occupational-Licensing-for-Nurse-on-Use-Groover/bdb01096a26d088d1ed70f44618415d34c3040bf> [<http://perma.cc/XRX7-W6SC>] (“I find that expanded prescriptive authority for nurse practitioners reduces the number of prescriptions filled per year by 8% and the number of unique medications received by 9%.”); Perloff et al., *Comparing the Cost of Care*, *supra* note 80, at 1412-20 (finding that payments for outpatient patients cared for by NPs were 29% less than those for patients cared for by physicians and that payments for inpatient patients cared for by NPs were 18% less); see also Markowitz et al., *supra* note 14, at 216 (finding that relaxing the SOP laws governing certified nurse midwives reduces the use of caesarean sections).

¹⁷⁴ See Markowitz et al., *supra* note 14, at 204 (noting that the nursing model of care emphasizes fewer intensive treatments).

instead of offering intensive medical interventions.¹⁷⁵ In the opioid context, more opioid prescriptions or higher doses of opioids are the more intensive option (compared to lower doses or alternative pain treatment regimens). Thus, the available evidence that NPs rely on less-intensive treatments suggests that NP independence will result in an overall decline in prescription opioids. As patients shift from physicians to NPs, NP-prescribed opioids should increase and physician-prescribed opioids should decrease. Because NPs are less likely to prescribe opioids for similar patients as physicians, however, the increase in NP-prescribed opioids should be smaller in magnitude than the decrease in physician-prescribed opioids. In other words, opioid prescriptions overall should decline.

In contrast to this perspective, groups opposed to NP independence assert that NPs will inappropriately overprescribe opioids in the absence of physician supervision.¹⁷⁶ If true, then opioid prescriptions overall will increase as patients substitute NPs for physicians in their care. Physician-prescribed opioids may decrease somewhat as NPs treat more patients. NP-prescribed opioids, on the other hand, should increase substantially as unsupervised NPs overprescribe these medications to patients. Because similar patients should receive more opioids from an unsupervised NP than a physician, the net effect of NP independence on overall opioid prescriptions should be positive.

Thus, the perspective of those opposed to NP independence is that the access and substitution effects will both work to increase opioid prescriptions.¹⁷⁷ The perspective of those in favor of NP independence is that, while the access effect may result in an increase in opioid prescriptions,¹⁷⁸ the substitution effect will result in a decrease in these prescriptions. In general, the substitution effect may overwhelm the access effect to result in a net overall decline in opioid prescriptions. Ultimately, the net change in opioid prescriptions depends on whether proponents or opponents of NP independence prove correct in their characterization of the practice patterns of unsupervised NPs. In other

¹⁷⁵ Univ. of Tex. Med. Branch at Galveston, *Patients Using Nurse Practitioners Are Less Likely to Have Avoidable Hospital Admissions*, SCI. DAILY (Oct. 13, 2015), <http://www.sciencedaily.com/releases/2015/10/151013155436.htm> [<http://perma.cc/N7Y2-ZNGM>]; see, e.g., GROOVER, *supra* note 173, at 24 (finding NPs often refer patients to specialists or physicians for further treatment and removing physician oversight can allow providers more time to discuss symptoms with patients); see also Markowitz et al., *supra* note 14, at 216-17.

¹⁷⁶ See Dickson, *supra* note 22 and accompanying text.

¹⁷⁷ See Dickson, *supra* note 22.

¹⁷⁸ See Schirle & McCabe, *supra* note 22, at 87.

words, the effect of NP independence on opioid prescriptions is an empirical question that cannot be answered by argumentation alone. Accordingly, this Article presents a thorough empirical analysis to answer that question, and the next Part outlines a dataset uniquely well suited to this analysis.

B. *The Gold Standard of Opioid Data and Measurement*

The dataset used in the analysis comes from Symphony Health's IDV® (Integrated Dataverse). It includes information on approximately 90% of all opioid prescriptions filled at outpatient pharmacies between 2011 and 2018. In other words, the dataset examined here represents nearly the universe of outpatient opioid prescriptions and therefore provides a nearly comprehensive picture of the opioid landscape over eight years. Information is available on all prescriptions, regardless of whether they were paid for in cash or covered by private insurance, Medicare, Medicaid, or other government assistance. The inclusion of prescriptions paid for by all of these sources represents an important advantage over prior work that has been limited to only prescriptions covered by certain payers.¹⁷⁹ Information on individual prescriptions was collected from health insurance claims and from non-retail invoices and point-of-sale information obtained from individual pharmacies. In total, approximately 1.5 billion individual prescriptions appear in the dataset.

Each observation in the dataset represents an individual prescription and includes the following information: the year the prescription was filled, the eleven-digit national drug code for the prescription, the total days supply for the prescription, the quantity of drugs, an encrypted patient identifier, and an encrypted healthcare provider identifier. Though the provider identifier is encrypted, it includes information on the type of provider (NP or physician) and the provider's state of practice.¹⁸⁰ I assign providers to the different SOP laws discussed above (either independent or restricted practice) based on the listed state of practice.¹⁸¹

From the raw prescription data, I construct the following measures of opioid prescriptions: (1) the total annual morphine milligram

¹⁷⁹ See, e.g., Ladd et al., *supra* note 159, at 339-42 (examining information from Medicare patients).

¹⁸⁰ More specifically, the dataset includes the provider's taxonomy from the National Plan and Provider Enumeration System. Using these taxonomy codes, I identify all NPs and physicians in the dataset.

¹⁸¹ See *supra* Part I.A.

equivalents (“MMEs”) prescribed by each provider, (2) the total annual days supply of opioids prescribed by each provider, (3) the number of unique patients to whom each provider prescribed opioids in a given year, and (4) whether the provider prescribed any opioids in a given year. The first outcome, MMEs, represents the gold standard of opioid measures because it accounts for both whether a patient receives an opioid and the strength of that opioid. For example, while one codeine sulfate tablet may equate to 0.15 MMEs, one fentanyl patch equates to 7.2 MMEs and one tablet of methadone hydrochloride equates to 4.0 MMEs.¹⁸² Thus, accounting for the various strengths of individual opioid prescriptions provides a more accurate picture of prescribing patterns than does focusing only on the number of prescriptions written. Full details on the calculation of the MME outcome measure are provided in the Technical Appendix.¹⁸³

While MMEs represent the best measure of opioid prescriptions, the analysis includes the other three measures mentioned above to provide a more comprehensive assessment of prescribing patterns. Additionally, these other measures capture slightly different behaviors than do MMEs, so they provide useful insight into the effect of NP independence on opioid prescriptions. Full details on the calculation of these opioid prescription measures are provided in the Technical Appendix. Collectively, the four outcomes analyzed in this Article represent the most specific measures of opioid prescribing available, and past work on the opioid crisis has specifically noted the absence of information on MMEs as an important limitation.¹⁸⁴ That limitation is not applicable here.

Table 1 provides an overview of the outcomes of interest across all years examined here. Focusing first on the means of each variable for all states, physicians prescribe more opioids than NPs across all four measures of opioid prescriptions. The average physician prescribes the

¹⁸² *Data Resources: Analyzing Prescription Data and Morphine Milligram Equivalents (MME)*, CDC (Oct. 3, 2019), <http://www.cdc.gov/drugoverdose/resources/data.html> [<https://perma.cc/J5JT-US74>].

¹⁸³ When calculating the MME outcome variable (and all other outcome variables), I exclude all prescriptions for buprenorphine/naloxone. Because this drug is used in the treatment of opioid addiction, I follow the recommendation of health policy scholars and exclude it from my analysis. The Technical Appendix *infra* provides full details on this exclusion.

¹⁸⁴ See, e.g., Wen & Hockenberry, *supra* note 158, at 678 (noting as a limitation of their study that “the data lack the necessary information to adjust our measures of prescription counts for the variations in dosage and strength or to convert the prescription counts into more standardized values, such as morphine milligram equivalents”).

equivalent of approximately 7.6 kilograms of morphine each year. The average NP prescribes the equivalent of approximately 4.1 kilograms of morphine. Similarly, the total days supply of opioids prescribed by the average physician outstrips the total days supply prescribed by the average NP by over 1,000 days. Physicians also prescribe opioids to almost twice as many patients each year compared to NPs and are more likely to prescribe opioids in general. I do *not* mean to suggest that physicians overprescribe opioids, as their practice patterns may be quite different from NPs. However, the information in Table 1 demonstrates that, on average, physicians prescribe more opioids than NPs.

Table 1. Summary Statistics

	MMEs	Days Supply	Unique Patients ¹⁸⁵	Prescribed Opioids
All States				
All Providers	7,067	2,565	55	69.9%
NPs	4,066	1,614	34	60.9%
Physicians	7,624	2,741	59	71.6%
Independent Practice				
All Providers	6,598	2,108	47	70.0%
NPs	6,030	2,148	37	66.7%
Physicians	6,713	2,100	49	70.6%
Restricted Practice				
All Providers	7,171	2,666	57	69.9%
NPs	3,588	1,484	33	59.5%
Physicians	7,824	2,882	61	71.8%

Notes: Each reported mean is calculated for the opioid measure listed above and for the set of providers listed to the left. The first set of means includes providers across all states. The second set includes providers practicing in states that allow NPs to practice

¹⁸⁵ Unfortunately, I do not have access to information that would allow me to track individual patients over time or count the total number of unique patients (of any kind, not just those that received opioids). I hope to obtain this information and investigate other potential effects of NP SOP laws in future work.

independently. The third set includes providers practicing in states that restrict the practices of NPs.

Table 1 also provides preliminary insight into the differences in prescribing patterns in states with different NP SOP laws, reporting means of the four outcome measures separately for independent and restricted practice states. Focusing on the broad differences between the two categories of SOP laws, providers in restricted practice states prescribe, on average, more opioids. Average MMEs, total days supply, and number of unique patients receiving opioids are all higher in states that restrict the practices of NPs. With respect to differences by provider type, physicians prescribe more opioids in restricted practice states than in independent practice states, while NPs prescribe fewer. These prescribing patterns are consistent with the substitution and access effects discussed above. As NPs treat more patients, they prescribe more opioids and physicians generally prescribe fewer opioids. The net difference in opioid prescriptions between independent and restricted practice states is negative, with fewer opioids prescribed in independence states. This is consistent with patients receiving relatively fewer opioids when states grant NPs independence. The statistics reported in Table 1 do not, however, establish a causal relationship between NP SOP laws and opioid prescriptions. Examining that causal relationship requires the more sophisticated empirical analysis discussed in the next subpart.

C. Empirical Methodology

To examine the potential causal effect of NP SOP laws on four separate measures of opioid prescriptions, I estimate a series of econometric models that isolate the effect of NP SOP laws from other factors that may influence opioid prescribing patterns. In a perfect world, I would conduct a laboratory-type experiment in which some providers would be randomly assigned to practice under relaxed SOP laws and others would be assigned to practice under restrictive SOP laws.¹⁸⁶ Random assignment in this manner would allow me to conduct a straightforward statistical analysis to determine the causal effects of these laws. While such an approach would eliminate the myriad other factors that may influence opioid prescriptions, randomly assigning providers to different SOP laws is not feasible for many ethical, legal, logistical, and financial reasons. Though I cannot conduct a laboratory

¹⁸⁶ See generally John Shahar Dillbary, Griffin Edwards & Fredrick E. Vars, *Why Exempting Negligent Doctors May Reduce Suicide: An Empirical Analysis*, 93 IND. L.J. 457, 482 (2018) (describing laboratory experiments as the “gold standard”).

experiment, the goal of my empirical analysis is to closely mimic such an experiment by eliminating as many potential confounding factors as possible to isolate the effect of NP SOP laws.

Prior work has shown that difference-in-differences models can accomplish this goal.¹⁸⁷ These models use the variation in state legislation on NP SOP laws to estimate the causal effect of these laws on opioid prescriptions. For example, consider Minnesota, which enacted a law allowing NPs to practice independently in 2015.¹⁸⁸ Simply comparing opioid prescriptions written by Minnesota NPs and physicians in 2014 and 2016 would reveal little useful information about the causal effect of NP independence on opioid prescriptions. Between these two years, many other factors that affect opioid prescriptions were almost certainly changing. A thoughtful analysis may be able to control for some of these factors, but isolating the effect of NP independence from all other potentially relevant factors is an impossible task.

As an alternative to comparing opioid prescriptions before and after the change in Minnesota's SOP law, an analysis could compare prescriptions between Minnesota and Wisconsin in 2016. Wisconsin has always restricted the practices of NPs¹⁸⁹ and is, in many respects, quite similar to Minnesota. However, comparing opioid prescriptions between the two states when they maintained different NP SOP laws would not elucidate the causal effect of NP independence. Though they may be similar in many ways, Minnesota and Wisconsin also differ in many ways, meaning a simple comparison of the two would not yield reliable evidence of a causal effect of NP independence.

In the parlance of laboratory experiments, the problem with each of these simple comparisons is the lack of a valid control group against which to compare the treatment group. In both cases, the providers practicing under a relaxed NP SOP law (the treatment group) may differ systematically from the providers practicing under a restrictive NP SOP law (the control group). Difference-in-differences models solve this problem by creating a valid control group against which to compare

¹⁸⁷ In a seminal paper, Nobel Prize winner Esther Duflo and others review the use of difference-in-differences models. They identify several issues that such models must address if they are to produce reliable estimates of causal effects. The analysis presented in this Article addresses all of those issues and can thus isolate the causal effect of NP SOP laws on opioid prescriptions. Marianne Bertrand, Esther Duflo & Sendhil Mullainathan, *How Much Should We Trust Differences-in-Differences Estimates?*, 119 Q.J. ECON. 249, 249-52 (2004).

¹⁸⁸ MINN. STAT. ANN. § 148.235 (2015).

¹⁸⁹ See WIS. STAT. ANN. §§ 441.16, 961.395 (2020).

providers in the treatment group. Specifically, these models compare trends in states that changed their SOP laws to those that did not. By doing so, these models can account for how opioid prescriptions would have trended over time as a result of changes in the myriad of other factors that influence opioid prescriptions and thereby isolate the role of NP SOP laws. In other words, these models effectively “net out” the effect of unobservable factors that may influence opioid prescriptions.¹⁹⁰ Thus, the models can estimate the causal effect of NP independence on opioid prescriptions.¹⁹¹

While this discussion captures the essence of a simple difference-in-differences model, the models estimated here are substantially more complex. The primary models rely on the staggered adoption of NP independence by fourteen states over an eight-year period to arrive at causal estimates. Throughout the analysis, I estimate ordinary least squares regression models.¹⁹² The analysis of the effect of NP independence on opioid prescriptions proceeds in two parts. First, I examine the effect of NP independence on opioid prescriptions generally.¹⁹³ The models in this part of the analysis can elucidate the

¹⁹⁰ Michael D. Frakes, *The Surprising Relevance of Medical Malpractice Law*, 82 U. CHI. L. REV. 317, 365 (2015) (discussing difference-in-differences models).

¹⁹¹ Difference-in-differences models require that opioid prescriptions in the “treatment” and “control” groups follow similar trends. See Andrew M. Ryan, Evangelos Kontopantelis, Ariel Linden & James F. Burgess Jr., *Now Trending: Coping with Non-Parallel Trends in Difference-in-Differences Analysis*, 28 STAT. METHODS MED. RES. 3697, 3697 (2018). Importantly, this requirement of similar trends is empirically testable, and the Technical Appendix *infra* reports the results of several tests demonstrating the validity of the difference-in-differences models estimated in this Article. In testing the parallel trends assumption that underlies all difference-in-differences models, I follow the methodology used in two recent, peer-reviewed studies. McMichael et al., *The Impact of Cannabis Access Law*, *supra* note 150, at 8-9; Wen & Hockenberry, *supra* note 158, at 674-75.

¹⁹² The full specifications of these ordinary least squares (“OLS”) models as well as detailed results from these regression models are available in the Technical Appendix *infra*.

¹⁹³ These models include all NPs and physicians in the United States who prescribed at least one medication in at least two years of the data period considered here. Because the criterion for inclusion in the analysis for each provider is the prescription of at least one medication (not necessarily an opioid) in two separate years of the study period (2011–2018), the analysis includes providers who prescribed no opioids in some years. As reported in Table 1 above, approximately 30% of the provider-years I consider involve no opioid prescriptions. While this procedure results in the inclusion of many provider-years with zero opioid prescriptions, I estimate OLS models instead of more complex models. As Joshua Angrist and Jörn-Steffen Pischke explain, the marginal effects of variables from OLS models are accurate despite the inclusion of zeros, and more complex models involve imposing specific distributional assumptions on the data that may not be warranted. JOSHUA D. ANGRIST & JÖRN-STEFFEN PISCHKE, *MOSTLY*

effect of NP independence across a wide range of settings and provide clear evidence of any causal effect.

Second, I extend the primary analysis to consider the effect of NP independence in areas of the country that suffer from health professional shortages. As numerous studies have demonstrated, NPs are often the principal healthcare providers in shortage areas, and the laws that govern their practices are particularly important in these areas.¹⁹⁴ In addition to providing insight into the areas most deprived of access to healthcare providers, these models can also help disentangle the role of the access and substitution effects discussed above. Because health professional shortage areas (“HPSAs”), by definition, lack access to healthcare providers, the access and substitution effects may function differently in these areas.

In both parts of the analysis, the dependent variable in the regression models is one of the four outcome measures discussed above.¹⁹⁵ The independent variable of interest is an indicator variable for whether a provider practiced in a state that allowed NPs to practice independently. The coefficient on this indicator variable represents the causal effect of NP independence on the relevant measure of opioid prescriptions. The models in the second phase of the analysis include indicator variables for whether a provider practiced in a county that had been wholly declared a HPSA or in a county that had been partially declared a HPSA. These models also include interactions between these HPSA variables and the NP independence variable. The coefficients on these interaction terms represent the differential effects of NP independence in areas that are not HPSAs, are partially HPSAs, or are wholly HPSAs. In addition to these independent variables of interest, each model also includes

HARMLESS ECONOMETRICS: AN EMPIRICIST’S COMPANION 94-102 (2009). Additionally, these more complex models cannot accommodate individual-level fixed effects for both theoretical and computational feasibility reasons.

¹⁹⁴ See Barnes et al., *supra* note 37, at 908; Xue et al., *Primary Care Nurse Practitioners*, *supra* note 37, at 102-04.

¹⁹⁵ The MME, total days supply, and number of unique patient variables all exhibit substantial right skews. It is standard practice in the literature to take the natural logarithm of a variable to transform it from a skewed distribution to a more normal distribution. See Dillbary et al., *supra* note 186, at 483-85; Frakes, *supra* note 190, at 368; Benjamin J. McMichael, R. Lawrence Van Horn & W. Kip Viscusi, *Sorry Is Never Enough: How State Apology Laws Fail to Reduce Medical Malpractice Liability Risk*, 71 STAN. L. REV. 341, 374-75 n.155 (2019). I follow that practice here. I also follow the practice of adding one to each variable prior to applying the natural logarithmic transformation. This is necessary because the natural logarithm is undefined at zero and is also standard practice in the literature. See Joni Hersch & W. Kip Viscusi, *Punitive Damages: How Judges and Juries Perform*, 33 J.L. STUD. 1, 14 n.14 (2004); McMichael, *Healthcare Licensing*, *supra* note 47, at 821.

control variables for the following laws that may influence opioid prescriptions: must-access prescription drug monitoring programs, laws regulating pain clinics, recreational cannabis access laws, and medical cannabis access laws.¹⁹⁶

Finally, and most importantly, every model includes a full set of indicator variables for individual providers and years. The provider variables control observed and unobserved characteristics of providers and their patient mix. Year fixed effects control for any linear or nonlinear trends in opioid prescriptions over time. The provider variables absorb much of the idiosyncratic variation present in opioid prescribing and therefore allow the models to isolate the role of SOP laws from any factors present at the provider level. For example, Schnell and Currie demonstrate that the rank of a physician's medical school is associated with that physician's prescribing patterns.¹⁹⁷ The individual provider variables control for medical school rank as well as any other factors specific to individual providers, such as the provider's medical specialty, personal history, experiences with addiction, or religion. The inclusion of these provider variables obviates the need for many other control variables since they better control for confounding factors than generic variables for various observable factors.¹⁹⁸

D. Results and Discussion

This subpart begins by presenting the results from the first phase of the analysis, which focuses on the effect of NP independence generally. It then reports the results for the effect of NP independence in different types of HPSAs. In the interest of clarity and succinctness, all results from individual regression models are presented in graphical form. Each graph reports the effect of NP independence in terms of the percentage change in the relevant opioid measure.¹⁹⁹ Full regression results (with

¹⁹⁶ For the importance of controlling must-access prescription drug monitoring programs and laws regulating pain clinics, see Buchmueller & Carey, *supra* note 154, at 102. For the importance of controlling for recreational and medical cannabis access laws, see McMichael et al., *The Impact of Cannabis Access Laws*, *supra* note 150, at 8-9; Wen & Hockenberry, *supra* note 158, at 675-77.

¹⁹⁷ Schnell & Currie, *supra* note 148, at 383-86.

¹⁹⁸ Throughout the analysis, I calculate two-way clustered standard errors at the state and provider level to correct for serial autocorrelation. The Technical Appendix *infra* provides additional details on the empirical methodology employed in my analysis.

¹⁹⁹ Because the specifications focusing on MMEs, total days' supply, and number of unique patients are log-linear models, the coefficients can be interpreted as the percent change in the dependent variable that results from allowing NPs to practice independently. The marginal effect of an indicator variable with coefficient β is

raw coefficients and additional statistics) are available in the Technical Appendix.

1. Relaxing Scope-of-Practice Laws Reduces Opioid Prescriptions

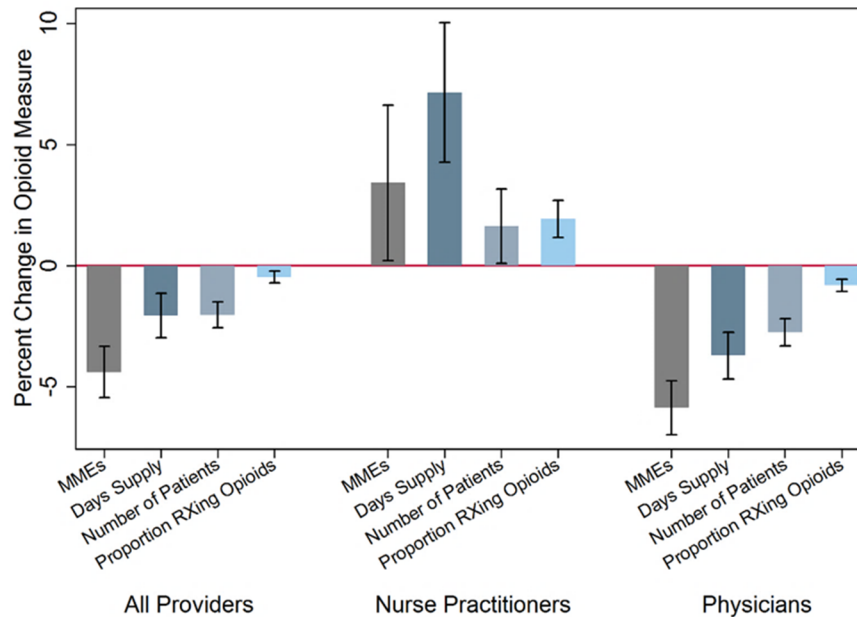
Figure 2 graphically reports the results from the primary analysis and includes twelve separate regression models — each represented by a separate bar. Each bar represents the effect of NP independence on a particular opioid measure for a particular group of providers.²⁰⁰ For example, the first bar represents the effect of allowing NPs to practice independently on the total annual MMEs prescribed by all providers. Allowing NPs to practice independently reduces total annual MMEs across all providers by approximately 4.4%. This effect represents a decrease of approximately 315.5 MMEs for each provider.²⁰¹ To place this effect into perspective, a state with 10,000 NPs and physicians could expect to see the equivalent of 31.5 fewer *kilograms* of morphine prescribed to patients *each year* by allowing NPs to practice independently.

approximately $((\exp(\beta) - 1)(100))$ percent. See generally Robert Halvorsen & Raymond Palmquist, *The Interpretation of Dummy Variables in Semilogarithmic Equations*, 70 AM. ECON. REV. 474, 474 (1980) (discussing the appropriate interpretation of the coefficient of a dummy variable). For consistency, each graph also reports the marginal effect of NP independence on the probability that a provider prescribes any opioids in terms of percent change. This percent change is calculated by dividing the coefficient on *NP independence* by the baseline mean of the indicator variable for whether a provider prescribed any opioids as reported in Table 1 above.

²⁰⁰ The error bars represent the 90% confidence intervals for the effect of NP independence on different opioid measures. If an error bar does not cross the zero line, then the associated effect is statistically significant. In the primary analysis reported in Figure 2, all effects are statistically significant.

²⁰¹ This reduction of 315.5 MMEs per provider is calculated by multiplying the effect reported in Figure 2 (4.4%) by the baseline mean amount of MMEs in states that do not allow NPs to practice independently (7,171 as reported in Table 1).

Figure 2. Effect of Scope-of-Practice Laws on Opioid Prescriptions



Notes: Each bar represents the marginal effect of *NP independence* on the dependent variable listed below. The first three dependent variables are log transformations of MMEs, total days supply, and number of unique patients. The fourth dependent variable is an indicator for whether a provider prescribed any opioids in a given year. 90% confidence intervals are reported as capped lines for each bar and are derived from standard errors clustered at the state and provider levels. Each estimate is derived from a separate regression model. The first four models include all providers, the second four include only NPs, and the final four include only physicians. All regression models include a full set of provider and year fixed effects and control variables for whether a state has a mandatory prescription drug monitoring program, allows access to recreational cannabis, allows access to medical cannabis, and has a law regulating pain clinics. Full regression results for all models reported here are available in Table A1.

The effect of NP independence across all providers stems from its separate effects on NPs and physicians. As reported in Figure 2, NPs increase the quantity of MMEs they prescribe by 3.5%, and physicians decrease the MMEs they prescribe by 5.8%. Converting these effects into raw MMEs, NPs prescribe approximately 125.6 more MMEs each year, and physicians prescribe approximately 453.7 fewer MMEs.²⁰²

²⁰² These effects on raw MMEs are calculated from the percentage effects reported in Figure 2 and the baseline mean amount of MMEs prescribed by NPs and physicians in restricted-practice states reported in Table 1.

These two effects combine to result in a net decrease in MMEs across all providers. Because physicians outnumber NPs and because physicians prescribe more MMEs on average,²⁰³ the total effect is closer in direction and magnitude to the physician effect than the NP effect.

NP independence similarly affects other measures of opioid prescriptions. Across all providers, total days supply decreases by 2.1%. In a state with 10,000 providers, this decrease would represent a reduction in the total days supply of opioids of over 1,500 years.²⁰⁴ Consistent with the MME results, allowing NPs to practice independently increases the total days supply prescribed by NPs by 7.1% and reduces the total days supply prescribed by physicians by 3.7%. The number of unique patients receiving opioids from a given provider decreases by 2.1%, with NPs and physicians increasing and decreasing their number of patients by 1.6% and 2.8%, respectively. Finally, with respect to the probability that a given provider prescribes any opioids, NP independence reduces this probability by 0.3%. NPs and physicians increase and decrease their likelihood of prescribing opioids by 1.1 and 0.6%, respectively.

Overall, I find consistent evidence across all four measures of prescription opioids. This evidence provides no support for the contention of those opposed to NP independence that this independence will increase opioid prescriptions. Instead, I find statistically significant evidence that allowing NPs to practice independently reduces opioid prescriptions. NPs increase the quantity of opioids they prescribe in response to an independence grant. This increase is consistent with the purpose of these laws, i.e., to allow NPs to provide a wider range of care to more patients. However, physicians reduce their use of prescription opioids. The reduction in physician opioid prescriptions is overall larger than the increase in NP opioid prescriptions, which results in an overall negative effect of NP independence on opioid prescriptions.

The increase in NP-prescribed opioids and decrease in physician-prescribed opioids are broadly consistent with the access and substitution effects described above. However, the results reported in Figure 2 cannot provide insight into the substitution and access effects separately. These results only demonstrate that these effects combine to decrease overall opioid prescriptions. The next Part explores the roles

²⁰³ See *supra* Table 1.

²⁰⁴ A 2.1% reduction represents almost fifty-six fewer days' supply of opioids for each individual provider (given a baseline mean of 2,666 as reported in Table 1). For over 10,000 providers, this translates into 559,860 fewer days' supply of opioids, which converts to approximately 1,534 years.

of the access and substitution effects in more detail. It also investigates the effect of NP independence in areas where many people lack access to healthcare providers — areas that prior research has found may be particularly sensitive to the effect of NP independence.²⁰⁵

2. Scope-of-Practice Laws and Opioid Prescriptions in Health Professional Shortage Areas

To investigate the role of NP independence in areas that chronically lack access to healthcare providers and to better elucidate the separate roles of the access and substitution effects described above, I re-estimate all of the empirical models reported in Figure 2 separately for areas designated as HPSAs. The Department of Health and Human Services designates a particular area as an HPSA when several criteria demonstrating unmet primary care needs are satisfied.²⁰⁶ These areas may include individual neighborhoods, parts of counties, entire counties, or groups of counties depending on the healthcare needs of the population and whether a sufficient number of primary care providers is available to meet those needs.²⁰⁷ Based on data availability, I examine providers practicing in: (1) counties which contain no HPSAs, (2) counties which have been partially designated as an HPSA, and (3) counties which have been wholly designated as HPSAs.²⁰⁸

By dividing the counties in which healthcare providers practice into these three groups, it is possible to gain greater insight into the roles of the access and substitution effects. As noted above, the access effect describes the phenomenon whereby newly independent NPs increase the capacity of the healthcare system and provide access to care to individuals who previously lacked access.²⁰⁹ The substitution effect describes the situation where existing patients substitute NPs for physicians as their source of care when the former gain

²⁰⁵ See Graves et al., *supra* note 12, at 83-88; McMichael, *Beyond Physicians*, *supra* note 12, at 759-64.

²⁰⁶ See 42 C.F.R. pt. 5, app. A (2020) (describing the criteria for designating HPSAs); *id.* § 5.3 (2020) (describing the procedures for designating HPSAs).

²⁰⁷ See 42 C.F.R. pt. 5, app. A.

²⁰⁸ The dataset I examined did not contain information on the actual county of practice for individual providers. Instead, the data supplier identified the type of county each provider practiced in and included that information in a separate dataset. This procedure is necessary to protect the confidentiality of providers.

²⁰⁹ Operating alone, the access effect suggests that NP-prescribed opioids should increase, while physician-prescribed opioids should remain stable, resulting in a general increase in opioid prescriptions.

independence.²¹⁰ In areas that lack access to healthcare providers, the access effect should dominate the substitution effect following a grant of independence because newly independent NPs may play a more significant role in addressing unmet needs. In areas that have adequate access to healthcare providers, the substitution effect should dominate as newly independent NPs may find themselves predominantly treating patients who previously received care from physicians. In other words, areas designated as HPSAs should see changes associated with NP independence that are more consistent with the access effect, and areas that do not suffer from shortages should see changes more consistent with the substitution effect.

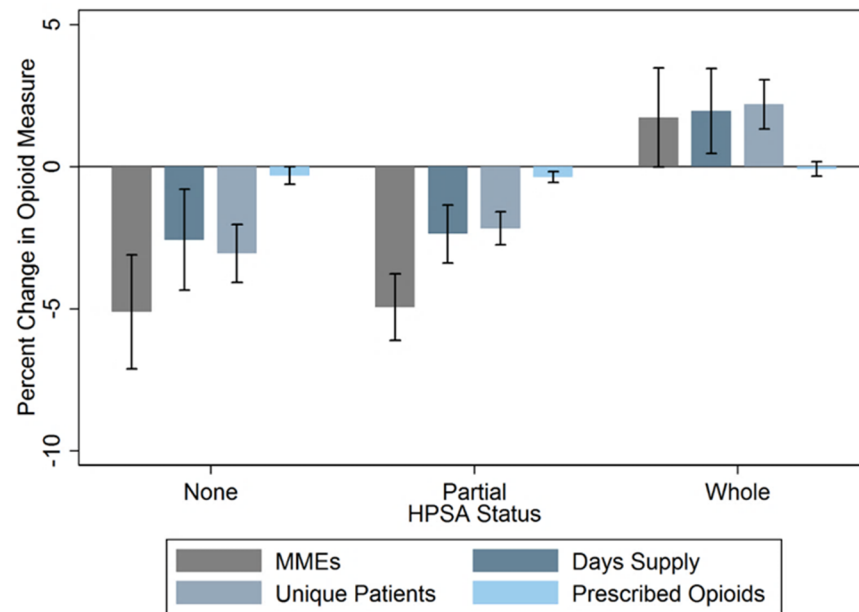
Figure 3 reports the results of four separate regression models that analyze the effect of NP independence on all providers in each of the three HPSA categories.²¹¹ In general, the effects of NP independence in areas not designated as HPSAs and areas partially designated as such are similar to the effects reported for all providers in Figure 2 above. NP independence decreases opioid prescriptions for all four measures. In contrast, NP independence generally *increases* opioid prescriptions in areas wholly designated as HPSAs. The fact that non-HPSA counties and partial HPSA counties see similar effects from NP independence likely stems from the fact that counties with significant concentrations of healthcare providers sometimes contain pockets where healthcare providers are in short supply.²¹² Thus, the relevant comparison is between providers in the non-HPSA counties and counties wholly designated as HPSAs.

²¹⁰ The evidence described above suggests that, operating alone, the substitution effect should result in fewer physician-prescribed opioids, more NP-prescribed opioids, and an overall decline in the total amount of opioids prescribed (because NPs prescribe fewer opioids than physicians).

²¹¹ Figure 3 reports the net effect of NP independence in different HPSA categories. Each net effect is calculated based on the joint effect of the *NP independence* variable and the interaction of this variable with an indicator for the relevant HPSA category. Full details on these calculations and the regression results that underlie them are provided in the Technical Appendix *infra*.

²¹² For example, both New York County (Manhattan) and Kings County (Brooklyn) in New York fall into the partial category because some neighborhoods suffer from shortages of healthcare professionals. *HPSA Find*, HRSA DATA WAREHOUSE, <https://data.hrsa.gov/tools/shortage-area/hpsa-find> (last visited Oct. 17, 2020) [https://perma.cc/RX34-55WH].

Figure 3. Results in Health Professional Shortage Areas for All Providers



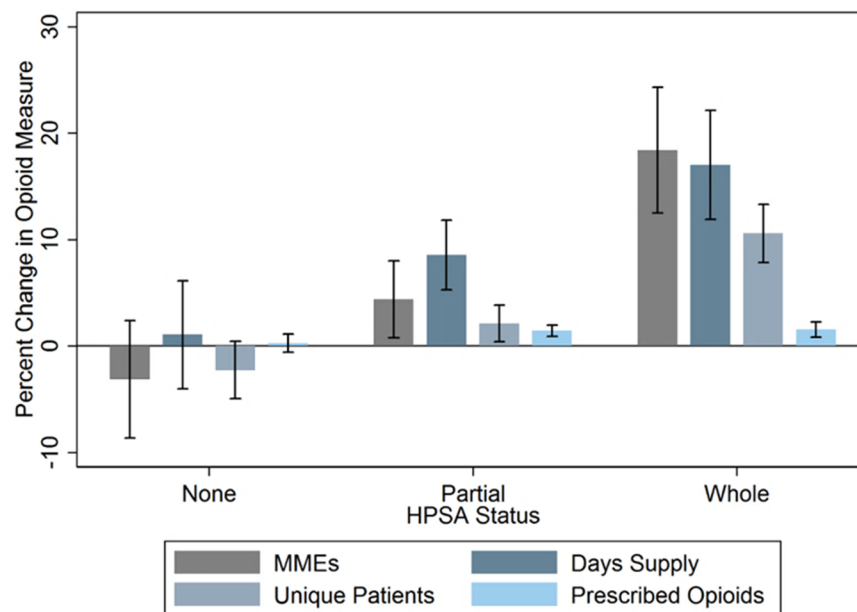
Notes: Each bar represents the marginal effect of *NP independence* on the dependent variable listed below. The first three dependent variables are log transformations of MMEs, total days supply, and number of unique patients. The fourth dependent variable is an indicator for whether a provider prescribed any opioids in a given year. Each set of effects specific to a particular outcome variable are calculated from a single regression model — four separate regression models are reported here. The Technical Appendix describes the marginal effect calculations in detail. 90% confidence intervals are reported as capped lines for each bar and are derived from standard errors clustered at the state and provider levels. Each estimate is derived from a separate regression model. All models include all providers. Each model includes a full set of provider and year fixed effects and control variables for whether a state has a mandatory prescription drug monitoring program, allows access to recreational cannabis, allows access to medical cannabis, and has a law regulating pain clinics. Full regression results for all models reported here are available in Table A2.

A comparison of these two types of counties clearly reveals different effects of NP independence. And the impact of NP independence in the two groups of counties is consistent with the access and substitution effects playing different roles in each group. In areas with little access to providers, the access effect dominates. Granting NPs independence increases opioid prescriptions across all providers, consistent with newly independent NPs (and physicians with newly freed capacity to treat patients) meeting unmet healthcare needs by prescribing more. In areas with relatively easy access to health professionals, the substitution

effect becomes more relevant. NP independence decreases opioid prescriptions as patients substituting NP-supplied care for physician-supplied care receive fewer opioids.

Figures 4 and 5 further disaggregate the roles of the access and substitution effects. As reported in Figure 4, granting NPs independence in counties wholly designated as HPSAs results in large increases in NP-prescribed opioids. Approaching 20% increases, these effects are larger than any reported in earlier analyses. In counties that have only been partially designated as HPSAs, however, the increases in NP-prescribed opioids are more modest. In counties that do not suffer from provider shortages, the evidence does not suggest an increase in NP-prescribed opioids. As reported in Figure 5, NP independence results in essentially no change in how physicians prescribe opioids in counties wholly designated as HPSAs. In non-HPSA counties and partial HPSA counties, however, physician-prescribed opioids decline substantially.

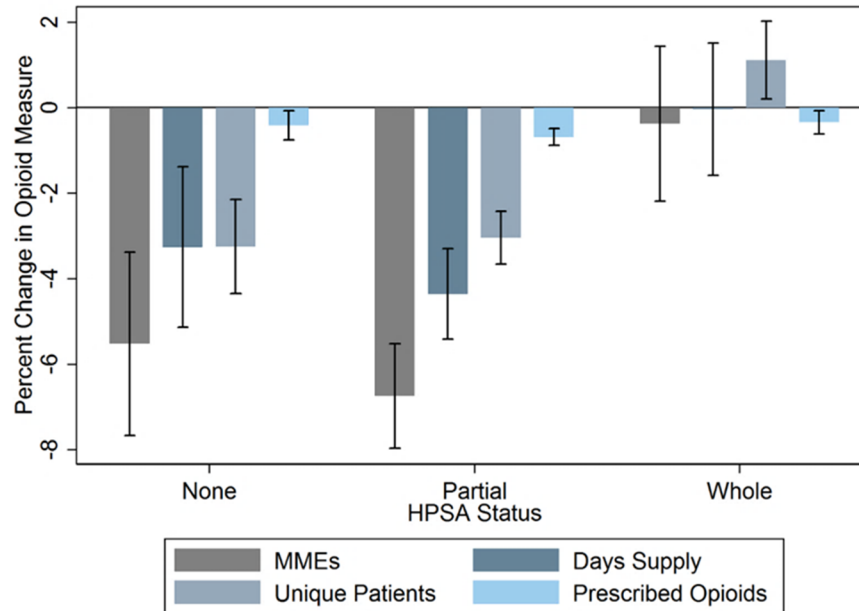
Figure 4. Results in Health Professional Shortage Areas for Nurse Practitioners



Notes: Each bar represents the marginal effect of *NP independence* on the dependent variable listed below. The first three dependent variables are log transformations of MMEs, total days supply, and number of unique patients. The fourth dependent variable is an indicator for whether a provider prescribed any opioids in a given year. Each set of effects specific to a particular outcome variable are calculated from a single regression model — four separate regression models are reported here. The Technical Appendix

describes the marginal effect calculations in detail. 90% confidence intervals are reported as capped lines for each bar and are derived from standard errors clustered at the state and provider levels. Each estimate is derived from a separate regression model. All models include only nurse practitioners. Each model includes a full set of provider and year fixed effects and mandatory variables for whether a state has a mandatory prescription drug monitoring program, allows access to recreational cannabis, allows access to medical cannabis, and has a law regulating pain clinics. Full regression results for all models reported here are available in Table A3.

Figure 5. Results in Health Professional Shortage Areas for Physicians



Notes: Each bar represents the marginal effect of *NP independence* on the dependent variable listed below. The first three dependent variables are log transformations of MMEs, total days supply, and number of unique patients. The fourth dependent variable is an indicator for whether a provider prescribed any opioids in a given year. Each set of effects specific to a particular outcome variable are calculated from a single regression model — four separate regression models are reported here. The Technical Appendix describes the marginal effect calculations in detail. 90% confidence intervals are reported as capped lines for each bar and are derived from standard errors clustered at the state and provider levels. Each estimate is derived from a separate regression model. All models include only physicians. Each model includes a full set of provider and year fixed effects and control variables for whether a state has a mandatory prescription drug monitoring program, allows access to recreational cannabis, allows access to medical cannabis, and has a law regulating pain clinics. Full regression results for all models reported here are available in Table A4.

Collectively, the evidence reported in Figures 4 and 5 suggests that the access and substitution effects play different roles in areas with differing levels of access to providers. In areas that lack access to healthcare providers, the access effect dominates the substitution effect. These areas have substantial unmet healthcare needs — including a need for opioid prescriptions among some patients. Accordingly, newly independent NPs increase the amount of opioids they prescribe, and physicians prescribe roughly the same amount of opioids. In contrast, the substitution effect dominates the access effect in areas that do not suffer from a shortage of health professionals. In these areas, newly independent NPs increase their opioid prescriptions slightly as they treat patients formerly treated by physicians. This increase is relatively muted because NPs are less inclined to prescribe opioids than physicians. Physicians, on the other hand, prescribe fewer opioids as patients switch to NPs for their healthcare needs.

IV. POLICY IMPLICATIONS

Across multiple empirical models focusing on four separate measures of opioid prescriptions that are more precise than anything in the existing literature, I find strong and consistent evidence that allowing NPs to practice independently reduces opioid prescriptions. Thus, not only does the analysis provide no support for the contention that relaxing the SOP laws governing NPs will increase opioid prescriptions, it demonstrates that these laws have exactly the opposite effect. In addition to providing a clear and direct answer to the important question regarding the effect of NP independence on opioid prescriptions, the results of the analysis provided in this Article have important implications for the ongoing debates over SOP laws and the opioid crisis more generally. This Part addresses those implications, concluding that the time has come to grant NPs across the country the authority to practice independently. Based on this conclusion, it explores various options for reforming SOP laws.

A. *Contextualizing the Evidence*

The empirical analysis presented in this Article answers the critically important question of whether allowing NPs to practice independently will exacerbate the opioid crisis. The answer is “no.” Indeed, by demonstrating that NP independence reduces opioid prescriptions, the results reported above²¹³ flip the narrative on the role of NP

²¹³ See *supra* Part III.D.1.

independence in the opioid crisis. Not only do relaxed SOP laws not increase opioid prescriptions, they result in statistically significant reductions in these prescriptions.²¹⁴ Thus, to the extent that fears of increased opioid prescriptions have dissuaded policymakers from granting NPs independence, the analysis reported above should not only address those fears but also encourage reluctant policymakers to actively pursue NP independence.

Beyond demonstrating that NP independence reduces opioid prescriptions, the results of my analysis offer important insight into the roles these laws play in areas with different levels of healthcare access. One of the primary arguments in favor of greater NP autonomy is the increased access to care this autonomy affords people who have previously lacked access.²¹⁵ And the results from the second phase of my analysis suggest that NPs meaningfully increase access to care. In areas where individuals have severely limited access to healthcare professionals (areas wholly designated as HPSAs), NP independence increases opioid prescriptions across all providers. While increasing opioid prescriptions generally may exacerbate the opioid crisis, increases in areas where individual lack access to care suggests an improvement in the healthcare system.

Collectively, the evidence developed in the second phase of the analysis demonstrates that NP independence does not operate as a blunt instrument in reducing opioid prescriptions. Allowing NPs to practice independently reduces opioid prescriptions when patients have relatively easy access to these prescriptions and increases access to these prescriptions in areas where patients have difficulty accessing care.²¹⁶ Policymakers may find this pattern of effects particularly desirable in a health-policy-oriented law. NP independence does not effect a blanket reduction in medications that some individuals may legitimately need or broadly increase access to medications that may be overused by some. Instead, it *decreases* opioid prescriptions in areas where over-use may be more likely to be a problem and *increases* opioid prescriptions in areas where unmet needs for these medications are likely to be prevalent.

While the primary goal of this Article is to examine the role of NP SOP laws in opioid prescriptions, the analysis reported above also offers important insight into the ongoing opioid crisis. In demonstrating that NP independence reduces opioid prescriptions, the results suggest that

²¹⁴ See *supra* Part III.D.1.

²¹⁵ See *supra* Part I.B.3.

²¹⁶ See *supra* Part III.D.2.

this policy change may serve as a useful tool to combat the opioid crisis. NP independence does not reduce opioid prescriptions to the same extent as other policy options.²¹⁷ However, the more modest reduction associated with NP-SOP-law relaxation can be achieved without risking some of the deleterious effects associated with other policies.

Prescription drug monitoring programs, for example, have been criticized for essentially cutting off access to opioids among patients who legitimately need these medications.²¹⁸ Despite the risks, opioids remain legal and can be an appropriate treatment for certain conditions.²¹⁹ To the extent that monitoring programs “over-correct” the issues underlying the opioid crisis by denying access to opioids among patients with a legitimate need, this policy option creates salient problems.²²⁰ In comparison to these monitoring programs, granting NPs independence may result in a more targeted reduction in opioid prescriptions. NP independence can facilitate additional time with providers and allow patients to discuss and explore alternative options for their healthcare needs instead of facing a blunt reduction in opioid prescriptions.²²¹ Indeed, the evidence developed in the second phase of the analysis above suggests such an effect: NP independence reduces

²¹⁷ As reported in the Technical Appendix, the reduction in opioid prescriptions associated with NP independence is not as substantial as the reductions associated with either must-access prescription drug monitoring programs or with cannabis access laws. See *infra* Technical Appendix.

²¹⁸ See Rebecca L. Haffajee, Anupam B. Jena & Scott G. Weiner, *Mandatory Use of Prescription Drug Monitoring Programs*, 313 JAMA 891, 891-92 (2015) (“Although [prescription drug monitoring programs] are not meant to deter opioid prescribing per se, resistant clinicians may simply decline to prescribe opioids, raise prescribing thresholds, refer patients elsewhere, or substitute to nonmonitored drugs – all of which could compromise appropriate symptom management.”); see also Daniel W. Sacks, Alex Hollingsworth, Thuy D. Nguyen & Kosali I. Simon, *Can Policy Affect Initiation of Addictive Substance Use? Evidence from Opioid Prescribing 4* (Nat’l Bureau of Econ. Research, Working Paper No. 25974, 2019) (explaining that prescription drug monitoring programs can deter providers from writing new opioid prescriptions but that this deterrence has no impact on “markers of dangerous [opioid] use”).

²¹⁹ See generally Roger Chou, Judith A. Turner, Emily B. Devine, Ryan N. Hansen, Sean D. Sullivan, Ian Blazina, Tracy Dana, Christina Bougatsos & Richard A. Deyo, *The Effectiveness and Risks of Long-Term Opioid Therapy for Chronic Pain: A Systematic Review for a National Institutes of Health Pathways to Prevention Workshop*, 162 ANNALS INTERNAL MED. 276 (2015) (reviewing effectiveness and potential harms of opioid uses).

²²⁰ Jay Greene, *Opioid Laws Hit Physicians, Patients in Unintended Ways*, MOD. HEALTHCARE (July 30, 2018, 1:00 AM), <https://www.modernhealthcare.com/article/20180730/NEWS/180739995/opioid-laws-hit-physicians-patients-in-unintended-ways> [<https://perma.cc/6XJN-FBAA>].

²²¹ See Markowitz et al., *supra* note 14, at 202, 204 (explaining that NPs often spend more time with patients).

opioid prescriptions generally but increases these prescriptions in areas that lack access to providers. This suggests that newly independent NPs do not reflexively deny opioids to those that need them and that NP independence can facilitate opioid use among those patients who have unmet needs.

Legalizing cannabis at the state level reduces opioid prescriptions to a greater extent than NP independence, but this reduction requires individuals to accept some risk of prosecution under federal law.²²² The cannabis legalization debate also implicates many other concerns from various interested parties that NP independence does not implicate.²²³ Overall, though not designed to ameliorate the opioid crisis, the evidence reported above demonstrates that allowing NPs to practice independently has just that effect and can therefore serve as another tool available to policymakers.²²⁴

Given the evidence developed above, I join various scholars and national institutions in calling for the relaxation of SOP laws so that NPs can practice independently. To the extent that policymakers become more receptive to NP independence in light of this evidence that specifically addresses concerns about increases in opioid prescriptions, the remainder of this Part explores various legal paths to independence.

B. Options for Reform

Historically, the regulation of healthcare providers has been primarily, and often exclusively, the province of state governments. While federal regulations may impact specific aspects of providers' practices,²²⁵ states have maintained most of the responsibility for determining who can provide care and under what conditions they may do so. Accordingly, the simplest and most obvious path to NP

²²² See McMichael et al., *The Impact of Cannabis Access Laws*, *supra* note 150, at 17.

²²³ I do not mean to suggest that cannabis access laws should not be pursued as a valid policy option. They should be.

²²⁴ I do not mean to suggest that NP independence should be pursued to the exclusion of either prescription drug monitoring programs or cannabis access laws. Both of these other policies have merit, should be taken seriously by policymakers, and could easily be pursued in conjunction with NP independence.

²²⁵ For example, providers must obtain a federal waiver to dispense buprenorphine (a treatment for opioid addiction) under the Drug Addiction Treatment Act of 2000. See *Become a Buprenorphine Waivered Practitioner*, SAMSHA, <https://www.samhsa.gov/medication-assisted-treatment/training-materials-resources/apply-for-practitioner-waiver> (last visited Oct. 18, 2020) [<https://perma.cc/RZC6-H2PG>] (discussing buprenorphine waivers).

independence runs through state legislatures. Theoretically, all states currently restricting the practices of NPs could cease doing so immediately with the passage of new legislation. Practically, however, several salient factors stand in the way of such a change.

The AMA and other physician groups have vehemently opposed the relaxation of state SOP laws to grant NPs more independence.²²⁶ These groups have proven willing to expend substantial resources to prevent NPs from gaining independence, and the evidence suggests that their efforts have been successful. A recent study concluded that “[a]n increase in spending by physician [political interest] groups decreases . . . the probability that states impose less restrictive physician supervision requirements on NPs.”²²⁷ Given the effects of restrictive SOP laws that inure to the benefit of physicians in the form of supervision fees and higher pay,²²⁸ continued physician opposition to these laws comes as no surprise. There are no indications that this opposition will abate in the near future. Thus, while amending state statutes to grant NPs independence represents the most obvious legal path to NP independence, it is not necessarily the most viable approach.²²⁹

²²⁶ See RESOLUTION 214-I-2017, *supra* note 18 (“Our [American Medical Association], in the public interest, opposes enactment of legislation to authorize the independent practice of medicine by any individual who has not completed the state’s requirements for licensure to engage in the practice of medicine and surgery in all of its branches.”).

²²⁷ McMichael, *The Demand for Healthcare Regulation*, *supra* note 17, at 314.

²²⁸ See Kleiner et al., *supra* note 15, at 274-77 (finding that NP independence reduces physician wages); Brendan Martin & Maryann Alexander, *The Economic Burden and Practice Restrictions Associated with Collaborative Practice Agreements: A National Survey of Advanced Practice Registered Nurses*, 9 J. NURSING REG. 22, 24-25 (2019) (“[T]he median fee to maintain a [collaborative practice agreement] was \$500 per month . . .”).

²²⁹ The COVID-19 pandemic that began in 2020 may impact the willingness of states to relax the SOP laws governing NPs. A number of states that restrict the practices of NPs issued executive orders or took other action to temporarily suspend certain restrictive SOP laws so that NPs could better address the COVID-19 pandemic. See, e.g., Order Suspending Statutes Requiring Collaborative Agreements Pursuant to Ky. Exec. Order Nos. 2020-243 & 2020-257 (Mar. 31, 2020), https://kbn.ky.gov/Documents/Order%20_KBN_APRNs.pdf [<https://perma.cc/E2RP-JYCE>] (suspending statutes that “require that Advanced Practice Registered Nurses (APRNs) have collaborative agreements with physicians as a prerequisite for the prescribing of legend drugs and controlled substances”); La. Proclamation No. 38 JBE 2020 (Mar. 31, 2020), <http://www.lsbns.state.la.us/Portals/1/Documents/news/govproclamation.pdf> [<https://perma.cc/VJ74-SHPR>] (suspending collaborative practice agreement requirements for NPs); N.J. Exec. Order No. 112 (Apr. 1, 2020), <https://nj.gov/infobank/eo/056murphy/pdf/EO-112.pdf> [<https://perma.cc/AZ9K-A3FY>] (suspending specific SOP provisions for Advanced Practice Nurses); N.Y. Exec. Order No. 202.10 (Mar. 23, 2020),

One way to avoid the political difficulties associated with pursuing NP independence in state capitols would be to pursue this independence via litigation. However, there is no clear path to independence through either the federal or state court systems. As noted above, a strategy of directly litigating the validity of restrictive SOP laws under federal antitrust law will not succeed.²³⁰ The Supreme Court has clearly stated that SOP laws enacted by state legislatures are not subject to federal antitrust scrutiny because they fit squarely within the state-action immunity articulated in *Parker v. Brown*.²³¹ While certain state SOP regulations can face antitrust scrutiny, these regulations are not responsible for the most restrictive elements of state SOP laws — state statutes are.²³² In lieu of pursuing federal challenges to state SOP laws, litigants could opt for challenges in state courts. However, there is no particular reason for optimism on this front, and without a novel theory to challenge these laws, litigation in state courts is not likely to succeed.

1. A Federally Defined Physician

In the face of state reluctance to change restrictive SOP statutes and the unavailability of a viable litigation strategy to achieve the same ends, the time has come to consider a federal legislative path to NP independence. Given the longstanding tradition of regulating healthcare providers at the state level, federal intrusion into this area of law has rightly been viewed with healthy skepticism. Nicholas Bagley has explained, for example, that “the core of our federal system is the

<https://www.governor.ny.gov/news/no-20210-continuing-temporary-suspension-and-modification-laws-relating-disaster-emergency> [<https://perma.cc/FML9-HKBM>] (relaxing NP SOP laws). These temporary changes to SOP laws may be difficult to reverse. See Alden Yuanhong Lai, Susan M. Skillman & Bianca K. Frogner, *Is It Fair? How to Approach Professional Scope-of-Practice Policy After the COVID-19 Pandemic*, HEALTH AFF. BLOG (June 29, 2020), <https://www.healthaffairs.org/doi/10.1377/hblog.20200624.983306/full/> [<https://perma.cc/HJ78-75T6>].

²³⁰ See *supra* Part I.B.4.

²³¹ *N.C. State Bd. of Dental Exam'rs v. FTC*, 574 U.S. 494, 504 (2015) (“An entity may not invoke *Parker* immunity unless the actions in question are an exercise of the State’s sovereign power. State legislation and ‘decision[s] of a state supreme court, acting legislatively rather than judicially,’ will satisfy this standard, and ‘*ipso facto* are exempt from the operation of the antitrust laws’ because they are an undoubted exercise of state sovereign authority.” (alteration in original) (citation omitted) (quoting *Hoover v. Ronwin*, 466 U.S. 558, 567-68 (1984))).

²³² See, e.g., GA. CODE ANN. § 43-34-25 (2020) (listing relevant restrictions in Georgia); N.C. GEN. STAT. § 90-18.2 (2020) (listing relevant restrictions in North Carolina).

principle that the states should take the lead unless there is a need for federal action.”²³³ The National Academy of Medicine has indicated such a need exists.²³⁴ And the potential of NP independence to generate salient benefits for patients across the country — benefits that include reductions in opioid prescriptions along with increased access to care and decreased costs of care — warrants at least a discussion of federal options that might achieve those benefits. An exhaustive review of all federal options (and the minutiae that accompany those options) is well beyond the scope of this Article. However, future work may consider the following policies when devising the most appropriate federal intervention. The purpose of this discussion is not to advocate for a single policy but to spark an important conversation among legal scholars who, with a few notable exceptions,²³⁵ have been largely absent from the critically important debate over SOP laws.

In general, the goal of any federal intervention would be to effect NP independence nationwide. And the simplest way to achieve that goal would be to declare that NPs are physicians under federal law and may not be subject to any supervision requirements beyond those imposed on other physicians. To be clear, I do not mean to suggest that the NP and medical professions are equivalent — they are not. However, the recommendation that NPs be declared physicians under federal law is not nearly as radical as it may initially appear. One reason this recommendation may appear extreme is that people often equate “physicians” with medical doctors, i.e., individuals who have completed the Doctor of Medicine (“M.D.”) degree. This perception, however, is inaccurate. Individuals who have completed the Doctor of Osteopathic Medicine (“D.O.”) degree are “physicians” just like their M.D.-trained

²³³ Nicholas Bagley, *Federalism and the End of Obamacare*, 127 YALE L.J.F. 1, 1-2 (2017).

²³⁴ See INST. OF MED., *supra* note 16, at 5 (noting that “the federal government is especially well situated to promote effective reforms by collecting and disseminating best practices from across the country and incentivizing their adoption”).

²³⁵ Gabriel Scheffler recently provided one of the most thorough analyses of federal options that may address the problems outlined in this Article, though his analysis focused more broadly on telehealth and foreign-trained physicians in addition to SOP laws. Gabriel Scheffler, *Unlocking Access to Health Care: A Federalist Approach to Reforming Occupational Licensing*, 29 HEALTH MATRIX 293, 340-53 (2019). Barbara Safriet recognized many years ago the importance of SOP laws in the provision of healthcare. Barbara J. Safriet, *Closing the Gap Between Can and May in Health-Care Providers’ Scopes of Practice: A Primer for Policymakers*, 19 YALE J. ON REG. 301, 306-23 (2002).

colleagues.²³⁶ They receive substantially similar training as those who have completed an M.D. and provide many of the same services as those with an M.D. degree. They work as general practitioners in communities across the country, deliver babies in every state, and perform surgeries in a variety of settings.²³⁷

In addition to demonstrating that the term “physician” extends beyond those who have completed an M.D., osteopathic medical practitioners provide a historical comparator to the recommendation that NPs be declared physicians under federal law. While those with a D.O. practice alongside those with an M.D. in all jurisdictions today, they could not do so historically. In the earlier part of the twentieth century, relatively few states allowed those with a D.O. to practice medicine, and by 1960 only thirty-eight states allowed these professionals to practice as physicians.²³⁸ Like NPs today, doctors of osteopathy focused heavily on primary care and encountered stiff resistance from medical doctors as they sought legal recognition of their ability to provide healthcare.²³⁹ D.O.-trained physicians eventually won recognition in all fifty states — Mississippi was the last to grant legal authority in 1973 — but the path toward recognition was aided by federal legislation.²⁴⁰ The 1946 Hill-Burton Act, for example, prohibited hospitals receiving federal funds from segregating M.D.-trained physicians from D.O.-trained physicians.²⁴¹

Like the D.O.-trained physicians of the mid-twentieth century, NPs find themselves seeking legal recognition of their ability to independently provide healthcare in all fifty states. A movement has already emerged to re-label NPs as “cathopathic physicians,” providing parallel terminology to the terms “osteopathic physician” and “allopathic physician” that describe those with D.O. and M.D. degrees, respectively.²⁴² And, though such a degree is not required, many NPs complete a “Doctor of Nursing Practice” degree before caring for

²³⁶ Stephen C. Shannon & Howard S. Teitelbaum, *The Status and Future of Osteopathic Medical Education in the United States*, 84 ACAD. MED. 707, 707-710 (2009).

²³⁷ *Id.*

²³⁸ PATRICK WU & JONATHAN SIU, A BRIEF GUIDE TO OSTEOPATHIC MEDICINE 12 (2012).

²³⁹ *Id.* at 12-13.

²⁴⁰ *Id.* at 13-14.

²⁴¹ *See id.* at 13.

²⁴² *See generally* *What Is Cathopathic Medicine?*, AM. C. CATHOPATHIC PHYSICIANS, <https://www.cathopathic.org/defining-cathopathic-medicine> (last visited Oct. 18, 2020) [<https://perma.cc/2HM2-P2MZ>] (discussing the “cathopatic” framework that underlies the unique training of advanced practice nurses).

patients.²⁴³ Of course, a change in the terminology used by the profession to describe itself or the achievement of higher educational credentials by some of its members does not mean that the NP profession is equivalent to the medical profession. It is not, and NPs do not advocate otherwise.²⁴⁴ However, equivalence with D.O.- or M.D.-trained physicians is not a prerequisite to receiving federal recognition as a “physician.”

Indeed, the federal government already recognizes certain professions as “physicians,” even though they do not receive the same training or provide the same services as those with a D.O. or M.D. For example, in the context of the Medicare program, the federal government recognizes dentists, podiatrists, chiropractors, and optometrists as “physicians” in addition to “doctor[s] of medicine or osteopathy.”²⁴⁵ Dentists, podiatrists, chiropractors, and optometrists provide some of the same services as doctors of medicine and osteopathy but clearly are not the equivalent of D.O.- or M.D.-trained physicians. The fact that Medicare nonetheless recognizes these four classes of providers as “physicians” demonstrates the flexibility of the term and opens the door to expanding this term to include other professions. Currently, this definitional statute applies only to Medicare and relies heavily on state definitions of the individual professions it includes. The remainder of this subpart details ways a statute like this could be expanded to include NPs and

²⁴³ See generally AM. ASS'N OF COLLS. OF NURSING, FACT SHEET: THE DOCTOR OF NURSING PRACTICE (DNP) (2020), <https://www.aacnnursing.org/Portals/42/News/Factsheets/DNP-Factsheet.pdf> [<https://perma.cc/9U3L-XL97>] (providing an overview of the Doctor of Nursing Practice program). I do not mean to suggest that NPs be required to complete a DNP before practicing. Nearly all of the evidence on the ability of NPs to safely and effectively care for patients has been developed in the context of NPs with master's degrees. An argument that the DNP is required to provide this level of care would be specious for the same reasons that physicians' arguments that NPs fail to complete adequate training are faulty. Additionally, arguments that all NPs should complete a DNP degree ring of anticompetitive conduct designed not to increase access to care but to restrict the supply of NPs to the benefit of those already eligible to practice. These concerns may give rise to decreased access to care and increased costs of care — concerns that NP independence is meant to address.

²⁴⁴ NPs have certainly advocated for independence from physicians, but they have not advocated that they be treated as the functional equivalents of M.D.- and D.O.-trained physicians. As Maureen Cahill, senior policy adviser for the National Council of State Boards of Nursing, has explained, “[t]hese are not folks who want to be physicians, they want to be advanced providers in nursing. . . . It's a different thing than medical practice. There's a lot of overlap, but it's a different focus.” Jan Greene, *Nurse Practitioners to Docs, Lawmakers: Give Us Our Independence*, MANAGED CARE, Sept. 2018, at 24, 27, <https://cdn.coverstand.com/38924/522196/321adcc48ca293ccfcac264122eb9593eadc1197.pdf> [<https://perma.cc/JS5R-9J74>].

²⁴⁵ 42 U.S.C. § 1395x(r) (2018).

extended beyond Medicare, thereby instituting NP independence across the country.

2. Federal Paths to Independence

The federal government already exercises some degree of control over NP SOP laws.²⁴⁶ In 2016, for example, the Department of Veterans Affairs (“VA”) amended the regulations governing providers in VA hospitals by administrative action to allow NPs to practice independently. It did so despite state SOP laws to the contrary.²⁴⁷ The VA took this step to “increase[] [its] capacity to provide timely, efficient, effective and safe primary care” and to “mak[e] the most efficient use of [NP] staff capabilities.”²⁴⁸ In extending NP independence beyond the VA by declaring NPs to be physicians, the federal government has a number of tools at its disposal.

Beginning with the most drastic option, Congress could simply preempt all state laws pertaining to the licensure of healthcare providers and replace those laws with a federal scheme. In licensing providers of all types, state governments rely heavily on professional bodies to administer relevant exams and determine qualifications to practice in a given field.²⁴⁹ And these bodies are almost invariably national in scope. Doctors of medicine and osteopathy take the United States Medical Licensing Examination or Comprehensive Osteopathic Medical Licensing Examination on the path to legal recognition as physicians.²⁵⁰ These same physicians later complete board certifications in various

²⁴⁶ Scheffler, *supra* note 235, at 348.

²⁴⁷ VA Grants Full Practice Authority to Advance Practice Registered Nurses, DEP’T VETERANS AFF. (Dec. 14, 2016, 2:05 PM), <https://www.va.gov/opa/pressrel/pressrelease.cfm?id=2847> [<https://perma.cc/ZPQ2-BKSE>].

²⁴⁸ *Id.* The VA’s policy change extended to all advanced practice registered nurses — not just NPs.

²⁴⁹ See, e.g., ASS’N OF AM. MED. COLLS., THE ROAD TO BECOMING A DOCTOR (2019), https://www.aamc.org/system/files/2019-12/Road_to_Becoming_a_Doctor_December%202019.pdf [<https://perma.cc/NQF3-5CV9>] (“Each medical school develops its own curriculum, in part, to meet the health care needs of its community, the unique mission of the school, and the learning needs of its students while also meeting the Liaison Committee on Medical Education’s rigorous requirements for accreditation.”); WHO WE ARE, NAT’L BOARD OSTEOPATHIC MED. EXAMINERS, <https://www.nbome.org/who-we-are/> (last visited Sept. 1, 2020) [<https://perma.cc/8KEQ-MPLA>] (“The National Board of Osteopathic Medical Examiners (NBOME) is an independent, nongovernmental, not-for-profit organization whose mission is to protect the public by providing the means to assess competencies for osteopathic medicine and related health care professions.”).

²⁵⁰ WU & SIU, *supra* note 238, at 5.

specialties which are similarly national in scope.²⁵¹ NPs also complete national exams on the way to state licensure.²⁵²

The national, as opposed to state, scope of these professional bodies which play important roles in the licensing of professionals favors replacing state licensing laws with a federal scheme. Indeed, physicians, nurses, and NPs alike already benefit from interstate compacts that facilitate practicing in multiple states.²⁵³ Because the practice of medicine, nursing, and other healthcare professions is not state-specific, a federal licensing scheme could work well and even create efficiencies by moving from voluntary state compacts to a simpler national process.

While replacing state licensing laws with a federal scheme could solve an important collective action problem among the states,²⁵⁴ this option may not be as straightforward as it initially appears.²⁵⁵ As Gabriel Scheffler has deftly argued, the chances of a statute which preempts state licensing laws finding its way out of Congress are slim for at least two reasons.²⁵⁶ First, opponents of NP independence would almost certainly mount a lobbying campaign against such a law. These interest group politics proved successful in derailing the last federal attempt at regulating healthcare providers.²⁵⁷ And political pressure by various interest groups at the state level has prevented the enactment of laws granting NPs independence in the past.²⁵⁸ Congressional action on the

²⁵¹ See, e.g., *Mission*, AM. BOARD INTERNAL MED., <https://www.abim.org/about/mission.aspx> (last visited Sept. 1, 2020) [<https://perma.cc/CW5P-UXKC>] (describing board certification in internal medicine). Board certification is not necessary to obtain a license to practice medicine. The existence of national boards, however, demonstrates the feasibility of federal regulation.

²⁵² See, e.g., *Family Nurse Practitioner (FNP)*, AM. ACAD. NURSE PRAC., <https://www.aanpcert.org/certs/fnp> (last visited Sept. 1, 2020) [<https://perma.cc/UF26-WVL2>] (describing the national exam completed by family NPs).

²⁵³ See, e.g., *Interstate Medical Licensure Compact*, INTERSTATE MED. LICENSURE COMPACT, <https://imlcc.org/> (last visited Sept. 1, 2020) [<https://perma.cc/U4WS-SRKF>] (describing the interstate medical licensure compact among twenty-nine states).

²⁵⁴ See Scheffler, *supra* note 235, at 346-47 (labeling the issues discussed here a collective action problem).

²⁵⁵ Assuming Congress passes such a statute, any challenge to it under the Commerce Clause — similar to challenges of the ACA — would almost certainly fail. The provision of healthcare constitutes interstate commerce, so regulating the ability of individuals to engage in this activity would fall squarely within Congress's commerce authority.

²⁵⁶ Scheffler, *supra* note 235, at 347-53.

²⁵⁷ See Mark R. Yessian & Joyce M. Greenleaf, *The Ebb and Flow of Federal Initiatives to Regulate Healthcare Professionals*, in REGULATION OF THE HEALTHCARE PROFESSIONS 169, 183-86 (Timothy Jost ed., 1997); Scheffler, *supra* note 235, at 347.

²⁵⁸ McMichael, *The Demand for Healthcare Regulation*, *supra* note 17, at 306-11.

issue may simply allow interest groups to aim their lobbying efforts at one body instead of fifty, negating any chance of NP independence. Second, “Congress has historically proven unwilling to repeal important areas of state regulation wholesale, especially in health care,” and there are no indications that Congress would abandon this reluctance in the context of NP SOP laws.²⁵⁹ When Congress does become involved, it prefers to take a more incremental approach toward healthcare regulation.²⁶⁰

Turning then to such an incremental approach that avoids the concerns raised by Scheffler, Congress may choose to exercise its authority over the Medicare program to effect NP independence instead of pursuing wholesale preemption. For example, Congress could enact a statute providing that, when caring for Medicare beneficiaries, states may not require that NPs be supervised. Enacted under Congress’s commerce power and its authority to regulate Medicare — a federal program — such a statute would alleviate some of the burdens on NPs. To ensure the effectiveness of this law, Congress would likely need to include a provision that NPs who believed in good faith that they were treating a Medicare beneficiary or an individual eligible for Medicare shall be exempt from any state SOP laws mandating physician supervision. If Congress desires to provide more structure in this type of statute, it could consider providing that states may impose no more restrictions on NPs than those imposed by the VA when NPs believe in good faith that they are treating Medicare beneficiaries.

This type of statute avoids the problems of complete preemption but still provides NPs substantial protection from restrictive state SOP laws. Ultimately, states may find it difficult to maintain restrictive SOP laws in the face of such a Medicare statute, given the importance of the Medicare program and the prevalence of Medicare patients in the healthcare system. After an experimentation period, Congress could extend this statute to the Medicaid program, again avoiding full preemption but giving NPs greater latitude and prodding states to relax their SOP laws.

In lieu of a statute that preempts state law — even in the limited context of Medicare or Medicaid — Congress may consider an approach based on the ACA. Instead of relying on the commerce power, Congress may decide to condition the receipt of existing or new funding on states’ decisions to relax their NP SOP laws. Of course, such an approach necessarily invites invalidation on the same grounds that plagued the

²⁵⁹ Scheffler, *supra* note 235, at 350.

²⁶⁰ *Id.* at 350-51.

ACA's Medicaid expansion.²⁶¹ But if Congress is willing to introduce new funding, using its spending power would avoid federal preemption of state laws altogether. Of particular relevance are the funds set aside to combat the opioid epidemic following the President's declaration of this epidemic as a national emergency — \$6 billion in total.²⁶² Congress could condition the receipt of certain funding tied to the opioid crisis to the passage of laws allowing NPs to practice independently. Although this option may cost more, it may nonetheless prove more palatable to a Congress unwilling to preempt state law.

Of course, policymakers may consider other options, and future scholarship should investigate those options in detail. With the last major argument in favor of restricting NP independence undermined by the analysis reported above, the time has come for a robust debate on the best way to implement NP independence, including federal options. These federal options have the potential to effect improvements across the healthcare system in the form of increased access and decreased cost. They may also improve the functioning of other important legal regimes. For example, certain anti-fraud statutes are tied specifically to "physicians," and declaring NPs to be physicians under federal law would place these providers clearly within the ambit of such laws.²⁶³ NP independence may also improve the ability of new laws aimed at improving the efficiency of Medicare to accomplish their goals.²⁶⁴ At the state level, prior research has found that granting NPs independence

²⁶¹ See *Nat'l Fed'n of Indep. Bus. v. Sebelius*, 567 U.S. 519, 575-86 (2012) (discussing this invalidation).

²⁶² *Ending America's Opioid Crisis*, WHITE HOUSE, <https://www.whitehouse.gov/opioids/> (last visited Sept. 2, 2020) [<https://perma.cc/2QKQ-3VCQ>].

²⁶³ The Stark Law, which prohibits a physician from referring patients to entities with which the physician has a financial relationship, forms an important part of the anti-fraud laws that protect government healthcare programs. 42 U.S.C. § 1395nn (2018). This law specifically applies only to "physicians," meaning clever NPs could engage in conduct Congress has determined may defraud government programs like Medicare because the Stark Law does not cover them. *Id.* Declaring NPs to be physicians solves this potential problem.

²⁶⁴ In 2015, Congress enacted the Medicare Access and CHIP Reauthorization Act ("MACRA"). Peter Buerhaus, Jonathan Skinner, Benjamin McMichael, David Auerbach, Jennifer Perloff, Douglas Staiger & Lucy Skinner, *The Integrity of MACRA May Be Undermined by "Incident to Billing" Coding*, HEALTH AFF. BLOG (Jan. 8, 2018), <https://www.healthaffairs.org/doi/10.1377/hblog20180103.135358/full/> [<https://perma.cc/R3US-EVDN>]. This law changes the reimbursement received by individual providers based on their ability to satisfy certain quality metrics. *Id.* Determining whether a given metric has been satisfied depends critically on accurately identifying providers in administrative records. Recent work has demonstrated that physician supervision of NPs can impede this accurate identification, undermining congressional attempts to improve the efficiency of Medicare. *Id.*

can better align the incentives for the provision of safe and effective care created by tort law.²⁶⁵ Other state and federal laws may similarly benefit from greater functionality in the wake of NP independence. A full review of these laws is beyond the scope of this Article, but, overall, NP independence can generate benefits beyond the healthcare system itself.

CONCLUSION

Examining a dataset of approximately 1.5 billion individual opioid prescriptions that represent approximately 90% of all such prescriptions written over an eight-year period, I find consistent evidence that allowing NPs to practice independently *reduces* opioid prescriptions. This evidence directly addresses concerns that granting NPs more autonomy may lead to an uptick in opioid prescriptions and a deepening of the opioid crisis. While NP-prescribed opioids increase following a grant of independence, physician-prescribed opioids decline substantially. The net effect is an overall reduction in prescription opioids across all providers.

Importantly, while NP independence reduces opioid use generally, this reduction occurs primarily in areas that have ready access to healthcare providers. In areas with depressed access to providers, opioid prescriptions remain stable or even increase. This pattern of changes is broadly consistent with NPs increasing access to healthcare in areas that need it most, effectively reducing opioid prescriptions in over-saturated areas and increasing appropriate prescriptions in areas that previously lacked access to care. Thus, beyond demonstrating that NP independence reduces opioid prescriptions, the analysis reported in this Article offers new evidence that relying more on NPs can improve the functioning of the healthcare system.

The results of my empirical analysis suggest that governments should more seriously investigate paths to NP independence. With state efforts stalling, a federal path to independence may be the most viable option at this point. And Congress could walk this path in various ways, from

²⁶⁵ When state SOP laws require physicians to supervise NPs, patients can more easily hold physicians liable for malpractice committed by NPs. Benjamin J. McMichael, *Shifting Liability with Licensing: An Empirical Analysis of Medical Malpractice and Scope-of-Practice Laws*, 12 J. TORT L. 213, 216-43 (2019). Mandatory supervision requirements facilitate the use of traditional doctrines, such as *respondeat superior* and apparent agency, by patients to hold physicians liable for the errors committed by NPs. *Id.* at 226-28. By shifting some liability from NPs to physicians when the former commit malpractice, restrictive SOP laws distort the important incentives to provide safe care created by tort law and undermine tort law's ability to efficiently deter either NPs or physicians. *Id.* at 244-45.

completely preempting existing state law to amending the rules governing the Medicare or Medicaid program. With the empirical analysis reported above demonstrating that NP independence can ameliorate the opioid crisis, policymakers can more seriously investigate NP independence without concern that patients will suffer as a result. Indeed, NP independence may help address one of the greatest public health threats of this generation as well as increase access to affordable, quality care.

TECHNICAL APPENDIX

A. Introduction to the Technical Appendix

This Technical Appendix provides additional information that, in the interest of succinctness, was not included in the main text. Importantly, the main text stands alone in reporting and discussing the primary analysis. This Appendix simply provides additional details of that analysis to further support the conclusions of the Article. Subpart B begins by providing additional details on the dataset analyzed in the Article. Subpart C discusses the econometric details of the empirical analysis. Subpart D provides more details on the primary results that are discussed in the main text. Subpart E reports a series of robustness checks designed to test whether the effects of the various legal regimes reported here represent true causal effects or spurious relationships — the robustness analysis demonstrates that the effects are, indeed, true causal effects. All figures and tables discussed here are provided at the end of this Appendix. The numbers of these figures and tables are preceded by “A” to distinguish them from the figures and tables in the main text.

B. Description of the Data

Data on individual opioid prescriptions filled by patients at outpatient pharmacies between 2011 and 2018 come from Symphony Health’s IDV® (Integrated Dataverse) dataset. The data were collected from health insurance claims (from both private and public payers) and from non-retail invoices and point-of-sale information obtained from individual pharmacies. The dataset includes approximately 1.5 billion individual opioid prescriptions, which represent approximately 90% of all opioid prescriptions filled at outpatient pharmacies in the United States over the relevant time frame. Prescription data are available regardless of payer — prescriptions for patients covered by private insurance, Medicaid, Medicare, and other government assistance are included as well as prescriptions paid for in cash.

Each observation in the dataset represents an individual prescription and includes the following information: the year the prescription was filled, the eleven-digit national drug code (“NDC”) for the prescription, the total days supply for the prescription, the quantity of drugs, an encrypted patient identifier, and an encrypted healthcare provider identifier. While the provider identifier is encrypted, it includes the provider’s state of practice and the provider’s taxonomy from the

National Plan and Provider Enumeration System (“NPPES”).²⁶⁶ Throughout the analysis, I examine only physicians and NPs, as determined by their primary taxonomies. I assign providers to different SOP laws based on the listed state of practice in the NPPES.

From these raw data, I construct the following variables, which are all defined at the provider-year level: (1) the total MMEs prescribed by each provider, (2) the total days supply prescribed by each provider, (3) the number of unique patients to whom each provider prescribed opioids, and (4) whether the provider prescribed any opioids. The first variable, total annual MMEs, is the sum of the MMEs of all opioids prescribed by each provider in each year. The MME of each individual opioid prescription is defined as:

$$MME = \frac{(Drug\ Strength) \cdot (Drug\ Quantity) \cdot (MME\ Conversion\ Factor)}{Days\ Supply}$$

Drug quantity and days supply come from the IDV® dataset. The MME conversion factor and drug strength come from a dataset compiled by the Prescription Drug Monitoring Program Training and Technical Assistance Center (“PDMPTTAC”). The PDMPTTAC dataset is organized by 11-digit NDCs. Using the NDCs in the IDV® and PDMPTTAC datasets, I match the strength per unit and conversion factor information for all prescription opioids appearing in the IDV® dataset and calculate the MME for each opioid prescription.²⁶⁷ Using the provider identifiers associated with each prescription, I then calculate the total MMEs prescribed by each provider in each year. I apply a logarithmic transformation to the total annual MMEs for each provider in each year.²⁶⁸

To calculate the total days supply prescribed by each provider in each year, I sum the days supply for all opioid prescriptions associated with each provider in each year. To calculate the total number of unique

²⁶⁶ Providers are obligated under federal law to maintain their information in the NPPES if they wish to maintain their National Provider Identifier (“NPI”) number. An NPI number is required for many transactions governed by the Health Insurance Portability and Accountability Act (“HIPAA”). I observe only their state of practice and primary taxonomy, i.e., specialty. Other identifying information is not included in the dataset I analyze.

²⁶⁷ While buprenorphine/naloxone does, technically, have an MME conversion factor, the PDMPTTAC dataset codes this conversion factor as zero. Because this drug is used in the treatment of opioid addiction, I follow the lead of the PDMPTTAC and exclude buprenorphine/naloxone from all parts of my analysis.

²⁶⁸ Here and in all other logarithmic transformations, I first add one to each observation to avoid dropping provider-years with zero MMEs (or other opioid measures).

opioid patients associated with each provider in each year, I count the number of different patient identifiers associated with each providers identifier in each year.²⁶⁹ I apply a logarithmic transformation to both the total days supply and total number of unique opioid patients variables. Finally, I create an indicator variable that equals one if a given provider prescribed at least one opioid during a given year. The criterion for inclusion in the dataset is the prescription of at least one medication (not necessarily an opioid) in at least two separate years between 2011 and 2018. Thus, my analysis includes providers who did not prescribe any opioids.

Collectively, these four variables of interest represent the most specific measures of opioid prescribing available, and past work on the opioid crisis has specifically noted the absence of information on MMEs as an important limitation.²⁷⁰ That limitation is not applicable here.

In extending the main analysis to consider providers practicing in different health professional shortage areas (“HPSAs”), I rely on the data supplier to assign individual providers to different HPSAs. These HPSAs are defined at the county level and include the following categories: (1) county contains no HPSAs, (2) part of the county has been declared an HSPA, and (3) the whole county has been declared an HSPA. With this information on HPSA status, I construct indicator variables for providers practicing in different types of counties. At no time do I observe a provider’s actual county of practice.

C. Econometric Specification

To examine the effect of SOP laws on the quantity of opioids prescribed by physicians and NPs in detail, I estimate a series of difference-in-differences models. These models control for observed and unobserved characteristics of individual providers and states over time. They also control for observed and unobserved linear and nonlinear trends in the outcomes of interest over time. They can therefore provide estimates of the change in opioid prescriptions attributable to NP SOP laws. The difference-in-differences models rely on state variation in NP SOP laws over time for identification. During

²⁶⁹ A patient obtaining opioids from multiple providers is counted separately as a unique patient for each provider. Thus, this variable should be interpreted as a provider-specific variable, not a measure of the number of patients using opioids generally.

²⁷⁰ See, e.g., Wen & Hockenberry, *supra* note 158, at 678 (“[T]he data lack the necessary information to adjust our measures of prescription counts for the variations in dosage and strength or to convert the prescription counts into more standardized values, such as morphine milligram equivalents.”).

the time period analyzed, ten states changed their SOP laws; however, because these models are estimated at the individual provider level, the actual quantity of treated units, i.e., providers whose states changed their SOP laws, numbers in the tens of thousands.

I estimate separate ordinary least squares (“OLS”) models for each of the four outcome variables with the following general specification:

$$Y_{ist} = \beta(NP\ Independence_{st}) + X_{st} + \delta_i + \tau_t + \varepsilon_{ist}.$$

In this model, i indexes individual providers, s indexes states, and t indexes years. The dependent variable, Y_{ist} , is either the natural logarithm of MMEs prescribed by provider i , the natural logarithm of the total days supply of all opioids prescribed by provider i , the natural logarithm of the number of unique patients receiving opioids from provider i , or an indicator for whether provider i prescribed any opioids. Because MMEs are generally considered a good measure of prescription opioids,²⁷¹ the specifications focusing on this measure are the preferred specifications.

The independent variable of interest, *NP Independence*, is an indicator variable that equals one when a given state allows NPs to practice without physician oversight and prescribe a full range of medications. Either physician supervision or restrictions on the medications NPs can prescribe may serve as constraints that, consistent with the idea of SOP laws serving as safety provisions, prevent NPs from engaging in dangerous overprescribing behavior. Thus, the most relevant SOP law regime is one in which NPs are under no restrictions that may ostensibly serve to protect patient safety. The *NP Independence* variable is calibrated to this regime.

The vector X_{st} includes separate indicator variables for whether a state had enacted legislation regulating pain clinics, whether a state had a mandatory PDMP in place, whether a state had passed a medical cannabis access law, and whether a state had passed a recreational cannabis access law. Pain clinic legislation may facilitate or inhibit the operation of pain clinics, which may affect individuals’ access to opioids. Buchmueller and Carey find consistent evidence that “must-access” PDMPs, i.e., PDMPs that require providers to access the monitoring program/database reduce problematic opioid use.²⁷² Prior work similarly finds consistent evidence that medical and recreational

²⁷¹ See *id.* at 678.

²⁷² See Buchmueller & Carey, *supra* note 154, at 96-98. When collecting information on both must-access PDMPs and pain clinic legislation, I follow Buchmueller and Carey and rely on the information provided by the Prescription Drug Abuse Policy System (pdaps.org). *Id.* at 84.

cannabis access laws can affect opioid use.²⁷³ Following this prior work, I include controls for all of these different legal changes.

Importantly, every model includes a full set of individual-provider fixed effects, δ_i , and year fixed effects, τ_t . Provider fixed effects control for observed and unobserved characteristics of providers and their patient mix. Year fixed effects control for any linear or nonlinear trends in opioid prescriptions over time. The provider fixed effects absorb much of the heterogeneity present in opioid prescribing and allow the models to isolate the role of SOP laws from any idiosyncratic factors present at the provider level. The inclusion of these fixed effects obviates the need for many control variables since they better control for confounding factors than traditional geographic variables. Throughout the analysis, I calculate two-way clustered standard errors at the state and provider level to correct for serial autocorrelation.

The criterion for inclusion in the analysis for each provider is the prescription of at least one medication (not necessarily an opioid) in two separate years of the study period (2011–2018). Thus, I include providers who prescribed no opioids in some years in the analysis. As reported in Table 1 above, approximately 30% of the provider-years I consider involve no opioid prescriptions. While this procedure results in the inclusion of many provider-years with zero opioid prescriptions, I estimate OLS models instead of more complex models. As Angrist and Pischke note, the marginal effects of variables from OLS models are accurate despite the inclusion of zeros, and more complex models involve imposing specific distributional assumptions on the data that may not be warranted.²⁷⁴ Additionally, these more complex models cannot accommodate individual-level fixed effects for both theoretical (e.g., the incidental parameters problem) and computational feasibility reasons.

²⁷³ See, e.g., Ashley C. Bradford & W. David Bradford, *The Impact of Medical Cannabis Legalization on Prescription Medication Use and Costs Under Medicare Part D*, 61 J.L. & ECON. 461, 482 (2018) (finding that medical marijuana laws shift urban patients away from opioid use, but not necessarily rural patients); McMichael et al., *The Impact of Cannabis Access Laws*, *supra* note 150, at 13-14 (discussing that both recreational and medical laws result in decreases in opioid prescribing); Wen & Hockenberry, *supra* note 158, at 675 (finding “that state implementation of medical and adult-use marijuana laws was associated with a lower Medicaid-covered opioid prescribing rate”). Information on medical and recreational cannabis access laws comes from the study conducted by McMichael, Van Horn, and Viscusi, *supra*.

²⁷⁴ See ANGRIST & PISCHKE, *supra* note 193, at 95-107.

D. *Additional Results from the Primary Analysis*

In the interest of succinctness and clarity, the main text reports the results from the primary empirical analysis in graphical form. The full regression results that underlie the figures presented in the main text are presented here. In addition to reporting coefficient estimates for the variable of interest — *NP independence* — the full regression results here include coefficient estimates for all control variables. Table A1 reports the regression results for the primary models that underlie Figure 2 in the Article. Panel A reports results from which the first four bars (those corresponding to “All Providers”) are derived. Panels B and C do the same for the second and third set of four bars (those for “Nurse Practitioners” and “Physicians,” respectively).

Table A1 reports the raw coefficients from the regression models. To transform these coefficients into the marginal effects reported in Figure 2 in the Article, I applied a transformation to obtain the effect of NP independence in terms of percentage increases. The marginal effect of an indicator variable with coefficient β is approximately $((\exp(\beta) - 1)(100))$ percent.²⁷⁵ For consistency, the graphs in the Article also report the marginal effect of NP independence on the probability that a provider prescribes any opioids in terms of percent change. This percent change is calculated by dividing the coefficient on *NP independence* by the baseline mean of the indicator variable for whether a provider prescribed any opioids as reported in Table 1 in the Article.

Tables A2, A3, and A4 report the regression results that underlie Figures 3, 4, and 5 in the Article, respectively. The regressions reported in these tables include an indicator for whether states allowed NPs to practice independently and an interaction between this indicator and indicators for partial HPSA status and whole HPSA status. The omitted category is non-HPSA status. Based on this series of interaction terms, the coefficient on NP independence represents the effect of independence in counties that include no HPSAs. Applying the transformation described above to this coefficient yields the marginal effect reported for providers in non-HPSA counties that is reported in Figures 3–5. The effect of NP independence in partial HPSA counties can be obtained by adding the coefficients on *NP independence* and the interaction term between the *NP independence* variable and the *HPSA (Partial)* variable. Applying the transformation described above to the sum of these coefficients yields the marginal effect reported in Figures 3–5 for the partial HPSA status counties. The same procedure applied

²⁷⁵ Halvorsen & Palmquist, *supra* note 199, at 474.

to whole HPSA status counties yields the marginal effect of NP independence in those counties. For all transformed coefficients, standard errors are calculated via the delta method.

E. Robustness Checks

A potential concern in any difference-in-differences empirical approach is the violation of the parallel trends assumption, i.e., that the trends in the opioid prescription measures were the same in the states that adopted NP independence as those that did not prior to the adoption of the new laws. A related concern is the possibility that legislative endogeneity may bias the results. For example, if legislatures respond to changes in prescription opioid use by changing the SOP laws governing NPs, the legal indicator variables may not represent the true effect of legal changes. While prior work has demonstrated that NP SOP laws are driven primarily by politics and not by healthcare outcomes,²⁷⁶ such as prescription opioid use, I conduct a series of robustness checks to determine whether a violation of the parallel trends assumption or legislative endogeneity may affect the results.

To test whether the trends in states adopting NP independence and those not adopting it differed prior to adoption, I follow the approaches of prior work.²⁷⁷ As in those studies, I find no evidence of a violation of the parallel trends assumption. I first plot the mean of the different outcome variables in states that adopted NP independence and those that did not adopt. Figure A1 reports an example of this exercise. This figure reports the mean of the natural logarithm of MMEs in states that never adopted NP independence (the control group) and states that adopted NP independence in 2014 — states that adopted NP independence prior to the study period and those that adopted in other years of the study period were excluded. Visually, nothing suggests that the pre-treatment trends in the MME variable differed across adopting and non-adopting states. I repeated this process for states that adopted NP independence during the study period for each of the four opioid variables. Nothing in these graphs suggests a violation of the parallel

²⁷⁶ See McMichael, *The Demand for Healthcare Regulation*, *supra* note 17, at 303, 306-09.

²⁷⁷ See, e.g., Ashley C. Bradford, W. David Bradford, Amanda Abraham & Grace Bagwell Adams, *Association Between U.S. State Medical Cannabis Laws and Opioid Prescribing in the Medicare Part D Population*, 178 JAMA INTERNAL MED. 667, 669-70 (2018) (using separate models based on whether or not the state had implemented medical cannabis laws); Wen & Hockenberry, *supra* note 158, at 675 (using a “quasi-experimental difference-in-differences design”).

trends assumption, so in the interest of succinctness, I do not separately report these graphs.

While visual inspection of the graphs of pre-treatment trends does not reveal any evidence of a violation of the parallel trends assumption, I further test this assumption in a series of regression models. Beginning with the general model specification provided above, I replace the *NP independence* variable with a time trend and an interaction between this time trend and an indicator variable for whether a given state would enact a law allowing NP independence in the future. I then estimate this model using observations on provider-years in states that never adopted NP independence and states that would adopt NP independence during the study period, excluding observations in these adopting states following adoption.

Table A5 reports the coefficient estimates for the interaction term between the time trend and the indicator variable for whether a state would adopt NP independence during the study period. Statistically significant coefficients would imply a statistically significant difference in time trends in states that adopt NP independence relative to states that do not. However, none of the reported coefficients is statistically significant, meaning I am unable to reject the null hypothesis that the pre-adoption trends in adopting and non-adopting states are the same. The results in Table A5 support the use of difference-in-differences models in the primary analysis.

F. Tables and Figures

Figure A1. Parallel Trends Example — States Adopting Nurse Practitioner Independence in 2014

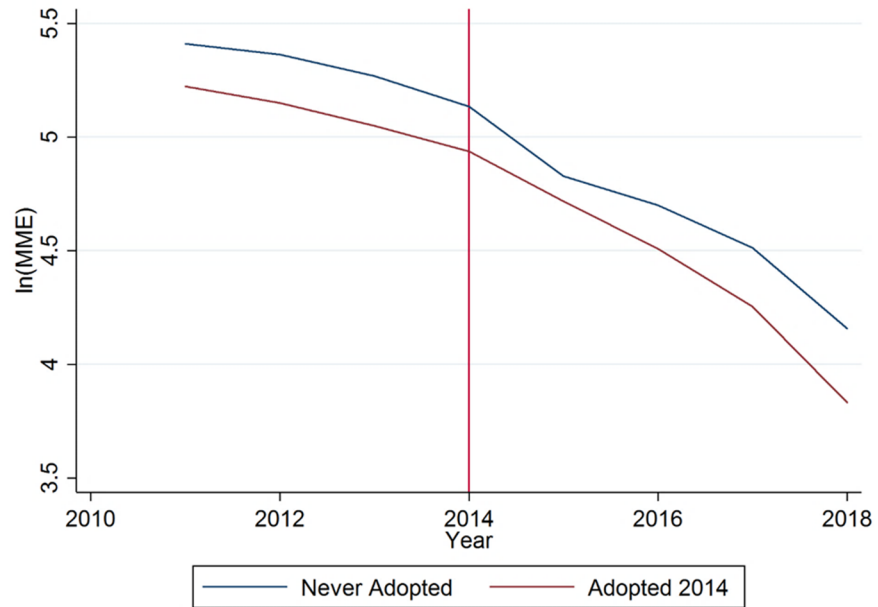


Table A1. Effect of Scope-of-Practice Laws on Opioid Prescriptions

Panel A. All Providers

	(1)	(2)	(3)	(4)
	MMEs	Days Supply	Unique Patients	Prescribed Opioids
NP Independence	-0.045*** (0.007)	-0.021*** (0.006)	-0.021*** (0.003)	-0.003*** (0.001)
Recreational Cannabis	-0.111*** (0.005)	-0.091*** (0.004)	-0.050*** (0.002)	-0.013*** (0.001)
Medical Cannabis	-0.013*** (0.004)	-0.031*** (0.003)	-0.010*** (0.002)	-0.006*** (0.001)
PDMP	-0.110*** (0.004)	-0.116*** (0.003)	-0.070*** (0.002)	-0.014*** (0.001)
Pain Clinic Legislation	0.037*** (0.008)	0.015** (0.007)	0.011*** (0.004)	0.004*** (0.001)
Observations	8,147,149	8,147,149	8,147,149	8,147,149
R-squared	0.805	0.823	0.850	0.620

Panel B. Nurse Practitioners

	(1)	(2)	(3)	(4)
	MMEs	Days Supply	Unique Patients	Prescribed Opioids
NP Independence	0.034*	0.069***	0.016*	0.011***
	(0.019)	(0.016)	(0.009)	(0.003)
Recreational Cannabis	-0.061***	-0.040***	-0.028***	-0.003
	(0.014)	(0.013)	(0.007)	(0.002)
Medical Cannabis	-0.028**	-0.063***	-0.011*	-0.017***
	(0.011)	(0.010)	(0.006)	(0.002)
PDMP	-0.029**	-0.020*	-0.044***	0.006***
	(0.012)	(0.011)	(0.006)	(0.002)
Pain Clinic Legislation	0.059**	0.057***	0.034***	-0.001
	(0.023)	(0.021)	(0.012)	(0.004)
Observations	1,237,038	1,237,038	1,237,038	1,237,038
R-squared	0.733	0.745	0.766	0.593

Panel C. Physicians

	(1)	(2)	(3)	(4)
	MMEs	Days Supply	Unique Patients	Prescribed Opioids
NP Independence	-0.060*** (0.007)	-0.038*** (0.006)	-0.028*** (0.004)	-0.006*** (0.001)
Recreational Cannabis	-0.113*** (0.005)	-0.094*** (0.004)	-0.050*** (0.002)	-0.014*** (0.001)
Medical Cannabis	-0.009** (0.004)	-0.025*** (0.004)	-0.008*** (0.002)	-0.005*** (0.001)
PDMP	-0.126*** (0.004)	-0.133*** (0.004)	-0.076*** (0.002)	-0.018*** (0.001)
Pain Clinic Legislation	0.032*** (0.008)	0.006 (0.007)	0.006 (0.004)	0.005*** (0.001)
Observations	6,910,111	6,910,111	6,910,111	6,910,111
R-squared	0.814	0.834	0.861	0.623

Notes: The dependent variable in the first three columns is a logarithmic transformation of the variable listed above. The dependent variable in the fourth column is an indicator for whether a provider prescribed any opioids. All specifications include a series of individual provider fixed effects and year fixed effects. Standard errors clustered at the provider and state levels are reported in parentheses.

* significant at the $p < 0.1$ level

** significant at the $p < 0.05$ level

*** significant at the $p < 0.01$ level

Table A2. Effect of Scope-of-Practice Laws on Opioid Prescriptions Across Areas With Different Levels of Access to Healthcare Providers

	(1) MMEs	(2) Days Supply	(3) Unique Patients	(4) Prescribed Opioids
NP Independence	-0.052*** (0.013)	-0.026** (0.011)	-0.031*** (0.006)	-0.003* (0.002)
HPSA (Whole)	-0.023*** (0.009)	-0.030*** (0.008)	-0.033*** (0.004)	0.002 (0.001)
HPSA (Partial)	-0.027*** (0.008)	-0.025*** (0.007)	-0.023*** (0.004)	0.000 (0.001)
(NP independence)x(HPSA - Whole)	0.070*** (0.016)	0.045*** (0.014)	0.053*** (0.008)	0.002 (0.002)
(NP independence)x(HPSA - Partial)	0.002 (0.014)	0.002 (0.012)	0.009 (0.007)	-0.001 (0.002)
Recreational Cannabis	-0.109*** (0.005)	-0.091*** (0.004)	-0.050*** (0.002)	-0.013*** (0.001)
Medical Cannabis	-0.013*** (0.004)	-0.031*** (0.003)	-0.010*** (0.002)	-0.006*** (0.001)
PDMP	-0.114*** (0.004)	-0.117*** (0.004)	-0.072*** (0.002)	-0.015*** (0.001)
Pain Clinic Legislation	0.033*** (0.008)	0.012* (0.007)	0.009** (0.004)	0.004*** (0.001)
Observations	8,147,149	8,147,149	8,147,149	8,147,149
R-squared	0.805	0.823	0.850	0.620

Notes: The dependent variable in the first three columns is a logarithmic transformation of the variable listed above. The dependent variable in the fourth column is an indicator for whether a provider prescribed any opioids. All specifications include a series of individual provider fixed effects and year fixed effects. Standard errors clustered at the provider and state levels are reported in parentheses.

* significant at the $p < 0.1$ level

** significant at the $p < 0.05$ level

*** significant at the $p < 0.01$ level

Table A3. Effect of Scope-of-Practice Laws on Nurse-Practitioner-Prescribed Opioids Across Areas With Different Levels of Access to Healthcare Providers

	(1) MMEs	(2) Days Supply	(3) Unique Patients	(4) Prescribed Opioids
NP Independence	-0.032 (0.035)	0.011 (0.031)	-0.023 (0.017)	0.003 (0.005)
HPSA (Whole)	-0.150*** (0.025)	-0.132*** (0.022)	-0.090*** (0.013)	-0.017*** (0.004)
HPSA (Partial)	-0.035 (0.023)	-0.021 (0.020)	-0.025** (0.011)	-0.002 (0.003)
(NP independence)x(HPSA - Whole)	0.201*** (0.044)	0.146*** (0.039)	0.123*** (0.022)	0.013** (0.006)
(NP independence)x(HPSA - Partial)	0.075* (0.038)	0.071** (0.033)	0.044** (0.018)	0.012** (0.006)
Recreational Cannabis	-0.067*** (0.014)	-0.047*** (0.013)	-0.031*** (0.007)	-0.004** (0.002)
Medical Cannabis	-0.034*** (0.011)	-0.068*** (0.010)	-0.014** (0.006)	-0.018*** (0.002)
PDMP	-0.030** (0.012)	-0.018* (0.011)	-0.045*** (0.006)	0.007*** (0.002)
Pain Clinic Legislation	0.053** (0.023)	0.055*** (0.021)	0.030** (0.012)	-0.001 (0.004)
Observations	1,237,038	1,237,038	1,237,038	1,237,038
R-squared	0.733	0.745	0.766	0.593

Notes: The dependent variable in the first three columns is a logarithmic transformation of the variable listed above. The dependent variable in the fourth column is an indicator for whether a provider prescribed any opioids. All specifications include a series of individual provider fixed effects and year fixed effects. Standard errors clustered at the provider and state levels are reported in parentheses.

* significant at the $p < 0.1$ level

** significant at the $p < 0.05$ level

*** significant at the $p < 0.01$ level

Table A4. Effect of Scope-of-Practice Laws on Physician-Prescribed Opioids Across Areas With Different Levels of Access to Healthcare Providers

	(1) MMEs	(2) Days Supply	(3) Unique Patients	(4) Prescribed Opioids
NP Independence	-0.057*** (0.014)	-0.033*** (0.012)	-0.033*** (0.007)	-0.004** (0.002)
HPSA (Whole)	-0.010 (0.009)	-0.019** (0.008)	-0.028*** (0.005)	0.005*** (0.001)
HPSA (Partial)	-0.029*** (0.008)	-0.028*** (0.007)	-0.025*** (0.004)	0.001 (0.001)
(NP independence)x(HPSA - Whole)	0.053*** (0.017)	0.033** (0.014)	0.044*** (0.008)	0.001 (0.003)
(NP independence)x(HPSA - Partial)	-0.013 (0.015)	-0.011 (0.013)	0.002 (0.008)	-0.003 (0.002)
Recreational Cannabis	-0.109*** (0.005)	-0.092*** (0.004)	-0.050*** (0.002)	-0.014*** (0.001)
Medical Cannabis	-0.007* (0.004)	-0.024*** (0.004)	-0.008*** (0.002)	-0.004*** (0.001)
PDMP	-0.131*** (0.004)	-0.136*** (0.004)	-0.078*** (0.002)	-0.019*** (0.001)
Pain Clinic Legislation	0.028*** (0.008)	0.003 (0.007)	0.004 (0.004)	0.004*** (0.001)
Observations	6,910,111	6,910,111	6,910,111	6,910,111
R-squared	0.814	0.834	0.861	0.623

Notes: The dependent variable in the first three columns is a logarithmic transformation of the variable listed above. The dependent variable in the fourth column is an indicator for whether a provider prescribed any opioids. All specifications include a series of individual provider fixed effects and year fixed effects. Standard errors clustered at the provider and state levels are reported in parentheses.

* significant at the $p < 0.1$ level

** significant at the $p < 0.05$ level

*** significant at the $p < 0.01$ level

Table A5. Parallel Trends Tests

	(1) MMEs	(2) Days Supply	(3) Unique Patients	(4) Prescribed Opioids
Parallel Trend Coefficient	-0.005 (0.012)	-0.006 (0.007)	-0.003 (0.011)	0.000 (0.001)
Observations	5,650,622	5,650,622	5,650,622	5,650,622
R-squared	0.819	0.865	0.839	0.627

Notes: Each reported coefficient comes from an interaction between the time trend and an indicator variable for whether the state will adopt NP independence in a regression with the variable above as the dependent variable.