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Healthcare Licensing and Liability

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The United States' affordable care crisis and chronic physician shortage have required advanced practice registered nurses (APRNs) and physician assistants (PAs) to assume increasingly important roles in the healthcare system. The increased use of these nonphysician providers has improved access to healthcare and lowered the price of care. However, restrictive occupational licensing laws—specifically, scope-of-practice laws—have limited their ability to care for patients. While these laws, by themselves, have important implications for the healthcare system, they also interact with other legal regimes to impact the provision of care. Restrictive scope-of-practice laws can increase the malpractice liability risk of physicians and decrease this risk for APRNs and PAs via several traditional tort doctrines, such as respondeat superior. In this Article, I provide the first empirical analysis of the interplay between malpractice liability and scope-of-practice laws in the provision of healthcare.

I concentrate on obstetric care and analyze a dataset of nearly 70 million births over an eighteen-year period. The results demonstrate that relaxing APRN and PA scope-of-practice laws significantly reduces the caesarean section rate—which is currently over three times the rate recommended by the World Health Organization—when malpractice liability risk is low. When malpractice liability risk is high, however, relaxing these laws results in no change in the caesarean section rate. I find similar results for other outcomes, such as medical inductions of labor. The results thus elucidate an important interaction between scope-of-practice laws and malpractice liability.

Based on this evidence, which shows that relaxing scope-of-practice laws can significantly reduce the number of women who unnecessarily undergo major surgery, I argue that states should eliminate restrictive scope-of-practice laws for APRNs and PAs. Doing so will remove unnecessary limits on capable healthcare professionals, better allow malpractice liability to deter the delivery of unsafe care, and improve patient health outcomes.

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INTRODUCTION

As access to healthcare continues to dominate national and local healthcare policy debates, much of the discussion has centered on the ways in which individuals pay for health insurance. Medicaid expansion, the Affordable Care Act's health insurance exchanges, and value-based healthcare have received a disproportionate amount of attention recently. While these debates are important, access to healthcare fundamentally depends on a healthcare workforce that is willing and able to supply the healthcare demanded by individuals across the country. Indeed, without an adequate healthcare workforce, the quality of an individual's insurance coverage becomes relatively meaningless. And recent evidence suggests that many parts of the United States lack adequate access to healthcare providers. For example, research suggests that demand for physicians could outstrip supply, resulting in a shortage of as many as 90,000 physicians by 2025.[1] Rural areas could be particularly affected, with recent estimates suggesting that the number of physicians practicing in these areas could decrease 23% by 2030.[2]

In the face of the ongoing shortfall of physicians, advanced practice registered nurses (APRNs) and physician assistants (PAs) are increasingly serving as frontline

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1. IHS MARKIT LTD., THE COMPLEXITIES OF PHYSICIAN SUPPLY AND DEMAND: PROJECTIONS FROM 2017 TO 2032, at 12 (2019), https://www.aamc.org/system/files/c/2/31-2019_update_-_the_complexities_of_physician_supply_and_demand_-_projections_from_2017-2032.pdf [https://perma.cc/PN5G-QZPZ].

2. Lucy Skinner, Douglas O. Staiger, David I. Auerbach & Peter Buerhaus, *Implications of an Aging Rural Physician Workforce*, 381 NEW ENG. J. MED. 299, 300 (2019).

healthcare providers and playing more important roles in the healthcare system.[3] Indeed, APRNs and PAs are the principal source of primary care in many geographic areas, and these providers are more likely than physicians to practice in rural and underserved areas.[4] However, while APRNs and PAs continue to assume more responsibility throughout the country, their legal authority to care for patients varies widely from state to state.[5] Specifically, state scope-of-practice (SOP) laws, which are a subset of the more general occupational licensing laws, determine what services members of a given profession may provide and the conditions under which they may provide those services.[6]

States generally justify SOP laws as necessary to ensure patient safety by preventing unqualified individuals from providing care.[7] While these laws can serve this purpose, overly restrictive SOP laws can have the opposite effect by inhibiting the ability of qualified APRNs and PAs to care for patients. Clinical research has shown that, within their training and education, APRNs and PAs can provide care that equals or exceeds that provided by physicians,[8] and recent economic analyses have demonstrated that restrictive SOP laws can function as anticompetitive restraints that protect physicians in markets for healthcare services at the expense of patients.[9] Studies within this latter strand of research have found evidence of harm typical of anticompetitive restrictions, including higher prices, reduced access to

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3. Grant R. Martsolf, 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).

4. David I. Auerbach, *Will the NP Workforce Grow in the Future? New Forecasts and Implications for Healthcare Delivery*, 50 MED. CARE 606, 607–08 (2012); Thomas Kippenbrock, Wen-Juo Lo, Ellen Odell & Bill Buron, *The Southern States: NPs Made an Impact in Rural and Healthcare Shortage Areas*, 27 J. AM. ASS'N NURSE PRAC. 707, 710–13 (2015); Benjamin J. McMichael, *Beyond Physicians: The Effect of Licensing and Liability Laws on the Supply of Nurse Practitioners and Physician Assistants*, 15 J. EMPIRICAL LEGAL STUD. 732, 759–64 (2018); Ying Xue, James S. Goodwin, Deepak Adhikari, Mukaila A. Raji & Yong-Fang Kuo, *Trends in Primary Care Provision to Medicare Beneficiaries by Physicians, Nurse Practitioners, or Physician Assistants: 2008–2014*, 8 J. PRIMARY CARE & COMMUNITY HEALTH 256, 260 (2017).

5. *See* McMichael, *supra* note 4, at 734–37 (discussing the state variation in the legal authority of APRNs and PAs).

6. *See* Barbara J. Safriet, *Closing the Gap Between* Can *and* May *in Health-Care Providers' Scopes of Practice: A Primer for Policymakers*, 19 YALE J. REG. 301, 317–23 (2002) (discussing SOP laws generally); *see also* McMichael, *supra* note 4, at 734–37 (discussing the SOP laws governing nurse practitioners and PAs).

7. 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 (2010) ("The general rationale for licensing is the health and safety of consumers. Beyond that, the quality of service delivery . . . [is] sometimes invoked.").

8. *See* DANIEL J. GILMAN & TARA ISA KOSLOV, FTC, POLICY PERSPECTIVES: COMPETITION AND THE REGULATION OF ADVANCED PRACTICE NURSES 27–35 (2014) (reviewing the existing evidence).

9. *See, e.g.*, 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 5–11 (2018) (discussing the anticompetitive nature of many SOP laws).

healthcare services, and changes in how care is provided.[10] Based on this evidence, multiple national organizations, including the National Academy of Medicine, have called on states to relax their SOP laws.[11] Both the Obama and Trump Administrations have issued similar recommendations.[12] A minority of states have heeded these calls, but the ongoing debate and political battle over SOP laws has only intensified over the last decade.[13] Physician organizations, in particular, vigorously oppose the relaxation of these laws—often on grounds of promoting patient safety.[14]

As important as the debate over SOP laws is, it has so far excluded a meaningful discussion of a parallel legal mechanism which can both accomplish the same goals as SOP laws (i.e., promote patient safety) and modulate the effect these laws have on healthcare providers. Specifically, APRNs and PAs may be sued for malpractice just as physicians and other professionals may be.[15] And a large body of evidence

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10. *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) (showing that restrictive SOP laws raise prices); 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) (demonstrating that restrictive SOP laws induce changes in how care is delivered); McMichael, *supra* note 4, at 759–64 (finding that restrictive SOP laws inhibit access to healthcare).

11. These organizations include, among others, the National Academy of Medicine (formerly the Institute of Medicine), the National Governors Association, and the American Association of Retired People. AMANDA DUNKER, ESTHER KROFAH & FREDERICK ISASI, NATIONAL GOVERNORS ASSOCIATION, THE ROLE OF PHYSICIAN ASSISTANTS IN HEALTH CARE DELIVERY 1 (2014); INST. OF MED., THE FUTURE OF NURSING: LEADING CHANGE, ADVANCING HEALTH 3–6 (2011); MARIA SCHIFF, THE ROLE OF NURSE PRACTITIONERS IN MEETING INCREASING DEMANDS FOR PRIMARY CARE 1 (2012); Jo Ann Jenkins, *Advanced Practice Nurses Play an Essential Role in Health Care*, AARP (May 10, 2018), https://www.aarp.org/health/health-insurance/info-2018/advanced-practice-nurses-healthcare.html [https://perma.cc/JYU2-D5A8].

12. U.S. DEP'T HEALTH & HUM. SERVS., U.S. DEP'T TREASURY & U.S. DEP'T LAB., REFORMING AMERICA'S HEALTHCARE SYSTEM THROUGH CHOICE AND COMPETITION 31–36 (2018); U.S. DEP'T TREASURY OFF. ECON. POL'Y, COUNCIL OF ECON. ADVISERS & U.S. DEP'T LAB., OCCUPATIONAL LICENSING: A FRAMEWORK FOR POLICYMAKERS 13–14 (2015).

13. *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) (providing information on states that have relaxed their SOP laws and evidence that political spending at the state level drives changes in these laws).

14. *See, e.g.*, AMA, *Memorial Resolutions Adopted Unanimously* 238 (2017), https://www.ama-assn.org/sites/ama-assn.org/files/corp/media-browser/public/hod/i17-resolutions.pdf [https://perma.cc/K6SR-9Y8L] ("Resolution 214. APRN Compact . . .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 infra* Section IV.C (reviewing the debate over SOP laws in detail).

15. Benjamin J. McMichael, Barbara J. Safriet & Peter I. Buerhaus, *The Extraregulatory Effect of Nurse Practitioner Scope-of-Practice Laws on Physician Malpractice Rates*, 75 MED. CARE RES. & REV. 312, 313, 315–17 (2018).

has demonstrated that tort liability can impact how providers deliver care, including deterring them from providing unsafe care.[16] For example, recent empirical research has found that tort reforms, which decrease the liability risk faced by providers, can reduce the incentives to invest in patient safety and increase the rate at which preventable medical complications occur, suggesting that tort liability effectively deters providers.[17] While tort liability can result in overdeterrence, which may induce the practice of defensive medicine—providing unnecessary treatment to avoid liability—existing evidence is clear that malpractice liability influences how providers care for patients.[18] Research on the deterrent effect exerted by tort law has focused almost exclusively on physicians, but APRNs and PAs may respond similarly to physicians when faced with the threat of malpractice liability, as prior work has demonstrated the similarity of care delivered by physicians, APRNs, and PAs.[19] Given the demonstrated ability of tort law to deter the provision of unsafe care, the debate over SOP laws and the necessity of these laws to ensure patient safety requires a simultaneous discussion of malpractice liability.

More importantly, however, evaluating SOP laws and malpractice liability alongside one another is necessary because these two legal regimes may interact to affect the delivery of healthcare by APRNs, PAs, and physicians. In particular, restrictive SOP laws require that APRNs and PAs work closely with physicians—often explicitly mandating physician supervision of APRNs and PAs.[20] This close relationship may better enable patients injured as a result of negligence involving APRNs and PAs to hold physicians liable under a variety of legal doctrines,

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16. *See, e.g.*, Ronen Avraham & Max Schanzenbach, *The Impact of Tort Reform on Intensity of Treatment: Evidence from Heart Patients*, 39 J. HEALTH ECON. 273, 273 (2015) ("We conclude that tort reform reduces treatment intensity overall, even though it changes the mix of treatments."); Janet Currie & W. Bentley MacLeod, *First Do No Harm? Tort Reform and Birth Outcomes*, 123 Q.J. ECON. 795, 795 (2008) ("We find that reform of the Joint and Several Liability rule (or the 'deep pockets rule') reduces complications of labor and procedure use, whereas caps on noneconomic damages increase them.").

17. Bernard S. Black, Amy R. Wagner & Zenon Zabinski, *The Association Between Patient Safety Indicators and Medical Malpractice Risk: Evidence from Florida and Texas*, 3 AM. J. HEALTH ECON. 109, 109 (2017); Toshiaki Iizuka, *Does Higher Malpractice Pressure Deter Medical Errors*, 56 J.L. & ECON. 161, 163 (2013).

18. *See* Michael Frakes & Anupam B. Jena, *Does Medical Malpractice Law Improve Health Care Quality?*, 143 J. PUB. ECON. 142, 157–58 (2016) (defining and discussing defensive medicine). *See generally* MICHELLE M. MELLO & ALLEN KACHALIA, MEDICAL MALPRACTICE: EVIDENCE ON REFORM ALTERNATIVES AND CLAIMS INVOLVING ELDERLY PATIENTS (2016) (providing an extensive review of the available evidence on malpractice liability and the provision of healthcare).

19. *See, e.g.*, MARYJOAN D. LADDEN & SUSAN B. HASSMILLER, ROBERT WOOD JOHNSON FOUND., IMPROVING PATIENT ACCESS TO HIGH-QUALITY CARE: HOW TO FULLY UTILIZE THE SKILLS, KNOWLEDGE, AND EXPERIENCE OF ADVANCED PRACTICE REGISTERED NURSES 8 (2013) (noting that "[h]ealth outcomes are comparable for patients treated by primary care NPs and MDs . . . .").

20. Markowitz et al., *supra* note 10, at 203–04; McMichael, *supra* note 13, at 299–301, 306–09.

including vicarious liability doctrines.[21] In general, physicians can expect to face higher liability costs when APRNs and PAs face restrictive SOP laws because patients will find it easier to hold physicians liable for errors related to APRNs and PAs. Similarly, because some patients will choose to pursue physicians instead of APRNs and PAs when SOP laws are restrictive, APRNs and PAs can expect to face lower liability costs. The liability cost shifting induced by restrictive SOP laws has important implications for healthcare delivery based on prior work showing that liability costs influence how providers care for patients.[22]

The purpose of this Article is to provide the first empirical evidence on the joint role of malpractice liability and SOP laws in the provision of healthcare and, in so doing, coalesce the debates over these two legal regimes. Prior work has shown that allowing APRNs to practice without physician supervision can lower the rate at which physicians pay out malpractice settlements and verdicts by as much as 31%.[23] However, no evidence exists on the joint role that SOP laws and malpractice liability play in the delivery of healthcare. The absence of this evidence is particularly problematic because the effect individual laws have on the provision of healthcare is an important point of contention in the ongoing debate over SOP laws.

Throughout the empirical analysis, I focus on the provision of obstetric care during childbirth, particularly the method of delivery chosen.[24] According to the World Health Organization, the rate of births via caesarean section ("C-section") in the United States is currently three times the recommended rate, which places both mothers and infants at risk.[25] Thus, obstetric care is a critically important context in which to examine the patient-safety implications of both SOP laws and malpractice liability. To do so, I analyze the effect of changes in the SOP laws governing APRNs and PAs across states with different levels of malpractice pressure as measured by the malpractice insurance premiums paid by physicians in that state.[26] If malpractice liability modulates the way SOP laws affect how physicians, APRNs, and PAs provide care, then changes in SOP laws will have different effects on the provision of obstetric care in states with high and low levels of malpractice pressure.

I analyze a restricted-use dataset obtained from the National Center for Health Statistics (NCHS), which contains details on *every* recorded birth in the United States

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21. McMichael et al., *supra* note 15, at 315–17 (discussing the various legal doctrines that allow plaintiffs to more easily establish physician liability when a state maintains restrictive SOP laws).

22. *See* Y. Tony Yang, David M. Studdert, S. V. Subramanian & Michelle M. Mello, *Does Tort Law Improve the Health of Newborns, or Miscarry? A Longitudinal Analysis of the Effect of Liability Pressure on Birth Outcomes*, 9 J. EMPIRICAL LEGAL STUD. 217, 231–36 (2012) (finding that providers alter their behavior in response to changes in liability risk).

23. McMichael et al., *supra* note 15 at 321.

24. Markowitz et al., *supra* note 10, at 209–16.

25. AP Betrán, MR Torloni, JJ Zhang & AM Gulmezoglu, *WHO Statement on Caesarean Section Rates*, 123 BJOG 667, 667 (2015).

26. I use the term "malpractice pressure" throughout this article to refer generally to the risk of malpractice liability. Doing so better captures the function of risk in this context—pressuring providers to perform certain procedures—and is consistent with prior research in this area. *See, e.g.*, Iizuka, *supra* note 17, at 161 (using the term "pressure" to refer to malpractice liability risk).

between 1998 and 2015. The primary empirical models contain over 69 million observations, and because the dataset is the same one used in the calculation of the official birth statistics by the Centers for Disease Control and Prevention (CDC),[27] the empirical results here represent the best available evidence on the roles of SOP laws and malpractice liability in the delivery of obstetric care.

In general, the empirical analysis reveals that the degree of malpractice pressure modulates the effect that SOP laws have on the provision of healthcare. For example, consistent with prior work,[28] I find that allowing APRNs and PAs to practice with more autonomy reduces the use of medically intensive procedures in labor and delivery, including delivery via C-section. Extending the analysis, I find that relaxing SOP laws reduces C-sections when malpractice pressure is low but has almost no effect when malpractice pressure is high. I find similar results for other outcomes, including medical inductions of labor. These results suggest SOP laws impact the delivery of healthcare differently across different levels of malpractice pressure.

The evidence developed in the empirical analysis demonstrates a clear and pervasive interaction between SOP laws and malpractice liability, and this interaction has a salient effect on the provision of healthcare. Thus, the analysis demonstrates the importance of considering the role of malpractice liability alongside SOP laws in the continued debate over the necessity of these laws. More importantly, the results of the analysis point to a potential resolution to the increasingly heated debate over SOP laws. Tort law and SOP laws share the goals of protecting patient safety and promoting the delivery of high-quality healthcare, even if they differ in their approaches to achieving these goals. However, because restrictive SOP laws effectively shift liability risk from APRNs and PAs to physicians, these laws necessarily distort the incentives to provide safe and high-quality care created by tort law.

Based on the empirical analysis, which bears out this distortion of incentives, I join the National Academy of Medicine and others in calling for the elimination of restrictive SOP laws. Importantly, however, my recommendation differs from prior calls to abrogate these laws by providing, in tort law, a specific alternative mechanism on which states can rely to accomplish the goal that justified the introduction of SOP laws in the first place—ensuring patient safety. The empirical evidence presented here demonstrates that tort law exerts a deterrent effect on APRNs and PAs and that this effect is stronger when they bear more of their own liability risk in the absence of restrictive SOP laws. While the medical malpractice system as currently implemented is far from perfect and efforts to reform it should certainly continue,[29] malpractice liability can deter individual providers and can do

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27. *See, e.g.*, Joyce A. Martin, Brady E. Hamilton, Michelle J.K. Osterman, Anne K. Driscoll & T.J. Mathews, *Births: Final Data for 2015*, 66 NAT'L VITAL STAT. REP. 1, 2–3 (2017) (using the same dataset as that used here).

28. *See* Markowitz et al., *supra* note 10, at 216 (finding that relaxed SOP laws lead to "lower observed probabilities of labor inductions, C-sections, apparent elective inductions, and apparent elective C-sections relative to states with [restrictive SOP laws]").

29. *See, e.g.*, Yang et al., *supra* note 22, at 218 (explaining that "[d]efensive medicine is deterrence gone awry" and noting that its practice may be induced by the current malpractice system). Based on the nature of the analysis presented here, the extent to which providers

so without generating the substantial harms to patients that prior work has attributed to restrictive SOP laws (e.g., impeding access to care and raising the costs of care).[30]

This Article proceeds as follows: Part I discusses healthcare providers and the SOP laws that govern them. Part II provides an overview of the malpractice liability these providers may face. Part III empirically investigates the roles that these two seemingly disparate, but intimately related, legal regimes play in the provision of healthcare. Part IV discusses the primary policy implications of this analysis and uses the results of the analysis to provide a new path forward in resolving the heated and ongoing debate over SOP laws. An online technical appendix provides the econometric details of the main analysis and offers relevant supplementary analyses.[31]

I. LICENSING HEALTHCARE PROVIDERS

While physicians have historically delivered most of the healthcare in the United States, this trend has changed recently, with APRNs and PAs providing more care traditionally reserved to physicians.[32] Indeed, the growth rates for APRNs and PAs significantly outstrip those for physicians—particularly in primary care specialties where the physician shortage is most acute—suggesting that APRNs and PAs will only deliver a greater proportion of care in the United States going forward.[33] This Part first provides an overview of APRNs, PAs, and their roles in providing care, with a focus on obstetric care. It then details the SOP laws that govern these providers and engages with the existing evidence on the effects these laws have on APRNs, PAs, their patients, and the healthcare system.

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practice defensive medicine is beyond the scope of this Article. Future work can investigate the extent of defensive medicine in more detail.

30. *See* Kleiner et al., *supra* note 10, at 276–77 (highlighting the propensity of restrictive SOP laws to increase the price of healthcare); McMichael, *supra* note 4, at 759–64 (highlighting the propensity of restrictive SOP laws to impede access to healthcare).

31. Benjamin J. McMichael, *Healthcare Licensing and Liability: Technical Appendix* (U. Ala. Legal Stud., Res. Paper No. 3357906, 2019) [hereinafter *Technical Appendix*], https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3357906 [https://perma.cc/ST3V-HYLW].

32. 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) ("A growing share of health care services are being provided by advanced practice registered nurses (APRNs), particularly nurse practitioners (NPs), who make up the majority of APRNs, and by physician assistants (PAs).").

33. E. Kathleen Adams & Sara Markowitz, *Loosening Restrictions on the Scope of Practice for PAs*, 32 J. AM. ACAD. PHYSICIAN ASSISTANTS 8, 8 (2019) ("The growth in the supply of PAs between 2016 and 2026 is projected to exceed that of [nurse practitioners] and indeed, all diagnosing and health-treating practitioners."); Edward Salsberg, *Changes in the Pipeline of New NPs and RNs: Implications for Health Care Delivery and Educational Capacity*, HEALTH AFF.: HEALTH AFF. BLOG (June 5, 2018), https://www.healthaffairs.org/do/10.1377/hblog20180524.993081/full/ [https://perma.cc/78XT-F4H9] ("The number of new nurse practitioners (NPs) graduating each year continues to rise rapidly and will likely exceed the annual number of new physicians completing training in the next few years.").

A. Advanced Practice Registered Nurses and Physician Assistants

APRNs are registered nurses who have undergone additional training—typically completing a master's degree or professional doctorate—and practice in a wide variety of medical specialties. The term "APRN" includes four different types of nursing professionals: nurse practitioners (NPs), certified nurse midwives (CNMs), certified registered nurse anesthetists (CRNAs), and clinical nurse specialists (CNSs).[34] NPs and CNSs practice in a wide range of specialties,[35] while CNMs and CRNAs practice almost exclusively in obstetrics/gynecology and anesthesiology, respectively.[36] PAs are healthcare professionals who have completed training—usually resulting in a graduate degree—to provide healthcare in different specialties.[37] Both APRNs and PAs may diagnose and treat patients, order and interpret tests, and write prescriptions.[38]

According to the Bureau of Labor Statistics, there were approximately 180,000 NPs, 6300 CNMs, 44,000 CRNAs, and 115,000 PAs practicing in 2018.[39] Compared to physicians, APRNs and PAs are more likely to practice in primary care and to provide care to underserved populations, including Medicaid beneficiaries.[40] APRNs and PAs currently outnumber family and general practice physicians and are the principal source of care in some parts of the country.[41] While APRNs and PAs receive relatively less formal training than physicians—eighteen months to three years for the former and upwards of seven to eight years for the latter—they function similarly to physicians in a variety of healthcare settings.[42] And there is a near consensus in the clinical literature that, when providing care within the scope of their education and training, the healthcare outcomes of APRNs and PAs equal or exceed those of physicians.[43] To be sure, APRNs and PAs complete less training than

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34. ADAMS & MARKOWITZ, *supra* note 9, at 9.

35. NPs tend to focus more specifically on patient care and can prescribe medications, while CNSs generally focus on patient care, management, and administration and often do not prescribe medications. *Nurse Practitioner vs. Clinical Nurse Specialist*, NP SCHOOLS, https://www.nursepractitionerschools.com/faq/np-vs-cns [https://perma.cc/7C4Q-494U].

36. *Certified Nurse Midwife*, NURSE, https://nurse.org/resources/certified-nurse-midwife/ [https://perma.cc/B338-X9LN]; *Nurse Anesthetist*, NURSE, https://nurse.org/resources/nurse-anesthetist/ [https://perma.cc/E8TB-9YLG].

37. ADAMS & MARKOWITZ, *supra* note 9, at 8–9.

38. *Id.* at 8–10; McMichael, *supra* note 4, at 734–35.

39. The Bureau of Labor Statistics does not separately count CNSs. *Occupational Employment Statistics: May 2018 Occupation Profiles*, U.S. BUREAU LAB. STAT., https://www.bls.gov/oes/current/oes_stru.htm#29-0000 [https://perma.cc/K2LT-QDFJ].

40. Peter I. Buerhaus, Catherine M. DesRoches, Robert Dittus & Karen Donelan, *Practice Characteristics of Primary Care Nurse Practitioners and Physicians*, 63 NURSING OUTLOOK 144, 144–53 (2015); McMichael, *supra* note 4, at 759–64; Kevin Stange, *How Does Provider Supply and Regulation Influence Health Care Markets? Evidence from Nurse Practitioners and Physician Assistants*, 33 J. HEALTH ECON. 1, 1–3 (2014).

41. Auerbach, *supra* note 4, at 607–608; Auerbach et al., *supra* note 32, at 2358–59.

42. ADAMS & MARKOWITZ, *supra* note 9, at 8–10; McMichael, *supra* note 4, at 734–36.

43. *See generally* MIRANDA LAURANT, MIEKE VAN DER BIEZEN, NANCY WIJERS, Kanokwaroon WATANANIRUN, EVANGELOS KONTOPANTELIS & ANNEKE JAH VAN VUGHT,

physicians and therefore cannot provide all of the services delivered by physicians—they do not, for example, perform major surgery. However, within certain healthcare settings—primary care being the prime example—APRNs and PAs perform similar functions as physicians with similar patient outcomes.[44]

Both APRNs and PAs deliver obstetric and gynecological care. Recent work estimated that CNMs, NPs specializing in women's health, and PAs make up approximately 18%, 15%, and 2% of the women's health workforce, respectively.[45] Conducting a systematic review of studies involving comparisons between CNMs and physicians, a large team of clinicians and researchers led by Meg Johantgen concluded that CNMs employ interventions, such as epidurals and medical induction of labor, less than physicians but that infant health outcomes do not differ across CNMs and physicians.[46] Women's health NPs (and other types of NPs) do not provide obstetric care as CNMs do—they do not generally participate in labor and delivery—but they do provide other services, including prenatal care, that can ultimately affect obstetric outcomes (e.g., by intervening early to prevent or stop preterm labor).[47] Similarly, PAs do not participate in obstetric care to the same extent as CNMs, but they are trained to provide neonatal and obstetric/gynecological care.[48] And PAs may provide some services that overlap with CNMs, such as labor management and normal deliveries.[49]

Of note is the fact that APRNs and PAs do not, themselves, perform C-sections.[50] As major surgery, this would be outside the training of APRNs and PAs, though they could certainly assist with the surgery and may be involved in the initial stages of labor prior to the C-section. If an APRN or PA is initially responsible for a normal delivery and later determines that the patient requires a C-section, the APRN or PA would refer the patient to a physician. As noted in a recent study by Sara Markowitz and colleagues, this decision of whether and when to refer a patient for a C-section is sensitive to the SOP laws governing providers.[51] These laws may also impair access to APRNs and PAs by discouraging these providers from practicing in certain

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NURSES AS SUBSTITUTES FOR DOCTORS IN PRIMARY CARE (REVIEW) (2019) (reviewing the available evidence); GILMAN & KOSLOV, *supra* note 8 (same).

44. LAURANT ET AL., *supra* note 43, at 2–3.

45. Oren Berkowitz & Susan E. White, *An Opportunity for PAs as Obstetrical Laborists*, 31 J. AM. ACAD. PHYSICIAN ASSISTANTS 40, 40 (2018).

46. Meg Johantgen, Lily Fountain, George Zangaro, Robin Newhouse, Julie Stanik-Hutt & Kathleen White, *Comparison of Labor and Delivery Care Provided by Certified Nurse-Midwives and Physicians: A Systematic Review, 1990 to 2008*, 22 WOMEN'S HEALTH ISSUES e73, e75–80 (2012).

47. Berkowitz & White, *supra* note 45, at 40–42; Jennifer Doyle & Angela Silber, *Preterm Labor: Role of the Nurse Practitioner*, 40 NURSE PRACTITIONER 49, 50–54 (2015).

48. Kelly Donkers, Judy Truscott, Carl Garrubba & Deborah DeLong, *High-Fidelity Simulation Use in Preparation of Physician Assistant Students for Neonatal and Obstetric Care*, 27 J. PHYSICIAN ASSISTANT EDUC. 68, 68–72 (2016); Tamara S. Ritsema & Amy M. Klingler, *Can PAs Help Address the Pressing Public Health Problem of Rising Maternal Mortality?*, 31 J. AM. ACAD. PHYSICIAN ASSISTANTS 11, 11–12 (2018).

49. Berkowitz & White, *supra* note 45, at 40–42.

50. *Id.*

51. Markowitz et al., *supra* note 10, at 216.

areas.[52] This impaired access, in turn, may affect C-section rates because APRNs and PAs may steer patients away from C-sections to a greater extent than physicians.[53] The next subsection provides more details on SOP laws.

B. Scope-of-Practice Laws

While APRNs and PAs function similarly to physicians and achieve comparable healthcare outcomes among their patients, they—unlike physicians—face substantial state variation in the occupational licensing laws that govern how they may provide care.[54] Occupational licensing laws govern many aspects of APRN and PA practices, but the most important subset of these laws are the SOP laws that determine what services APRNs and PAs may provide and under what conditions they may provide them. Prior work has classified APRN and PA SOP laws in different ways.[55] While each classification scheme has its own advantages and disadvantages, I follow a version of the scheme provided in two recent studies that relied on specific statutory and regulatory language (instead of secondary sources) to classify individual state SOP laws.[56] This approach to classification minimizes the risk of inconsistent statutory and regulatory interpretation, which may occur when relying on various secondary sources. It also isolates specific SOP laws that policymakers may focus on changing in the future, instead of considering a broad range of disparate laws to arrive at overly general—and potentially less useful to policymakers—categorizations of SOP laws.[57]

In particular, the approach adopted here focuses on both the physician supervision requirements imposed on APRNs and PAs and the prescriptive authority granted to APRNs and PAs, thereby isolating the specific laws that have the largest impacts on the care delivered by APRNs and PAs.[58] I classify a state as allowing "APRN independence" if it (1) requires no physician supervision of APRNs and (2) grants APRNs full prescriptive authority (i.e., effectively places no more restrictions on

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52. McMichael, *supra* note 4, at 749–59.

53. *Id.*

54. *See* Safriet, *supra* note 6, at 317–23 (providing an overview of SOP laws).

55. 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 10, 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 10, at 266–67.

56. *See* McMichael, *supra* note 4, at 734–37 (discussing the classification of SOP laws); McMichael, *supra* note 13, at 299 (same).

57. This is not to suggest that other classification schemes are "wrong." Indeed, though they focus on somewhat different statutes and regulations, the ultimate classification schemes used in prior work are often highly correlated with one another. *Compare* Markowitz et al., *supra* note 10, at 203–04, *and* Kleiner et al., *supra* note 10, at 266–67, *with* McMichael, *supra* note 4, at 734–37.

58. Other SOP laws may affect APRNs and PAs, but laws such as the ability to sign death certificates or issue handicap placards have smaller impacts on the ability of APRNs and PAs to care for patients generally.

APRNs' prescriptive authority than on physicians').[59] Similarly, I classify a state as allowing "PA autonomy"[60] if it (1) allows PAs to practice at remote sites with visits from their supervising physicians required no more than monthly and (2) grants PAs full prescriptive authority (i.e., effectively places no more restrictions on PAs than on physicians).[61]

This categorization of laws also has the advantage of focusing specifically on the SOP laws that are most salient in connecting APRNs and PAs to physicians. These connections are critically important for evaluating the role of malpractice liability as described in detail below.[62] Table A1 in the *Technical Appendix* provides an overview of state SOP laws between 1998 and 2015—the beginning and end of the period considered here.[63] With respect to the SOP laws considered here, two details are particularly important. First, while the trend has been decidedly in favor of granting APRNs and PAs more autonomy and authority, states do not relax the SOP laws governing APRNs and PAs simultaneously, so the patterns of changes in the laws for APRNs and PAs are different.[64] Second, while these laws come from prior work focusing on NPs and not APRNs generally, a review of the statutory language confirms that the laws considered here apply to CNMs as well as NPs.[65] Although these laws do not apply to CRNAs and CNSs, these providers play smaller roles in the provision of obstetric and gynecological care, and are therefore not the focus of the analysis presented here.[66] Accordingly, the results pertaining to APRN SOP laws reported below should be interpreted in the context of NPs and CNMs as opposed to all four types of APRNs.

The current literature on occupational licensing laws focuses heavily on the role these laws play in professional labor markets and healthcare output markets, with relatively little emphasis on SOP laws or the effect of these laws on the provision of healthcare. For example, several studies have considered the effects of licensing laws on the labor market outcomes (including earnings and hours worked) of NPs, PAs, and physicians.[67] Generally, NP earnings increase and physician earnings decrease

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59. McMichael, *supra* note 4, at 734–37; McMichael, *supra* note 13, at 299.

60. For ease of exposition, I refer to PAs as practicing autonomously; however, they are never allowed to practice without some level of physician involvement.

61. McMichael, *supra* note 4, at 734–37; McMichael, *supra* note 13, at 299.

62. *See infra* Section II.B.

63. *Technical Appendix*, *supra* note 31.

64. McMichael, *supra* note 4, at 734–37.

65. Overall, statutes generally treat CNMs and NPs the same, with a few exceptions that are often limited to the prescriptive authority of CNMs while actively caring for laboring mothers in a hospital. *See* Markowitz et al., *supra* note 10, at 203–04; McMichael, *supra* note 4, at 734–37.

66. I do not mean to suggest that CRNAs and CNSs play no role in obstetric care. CRNAs often provide anesthesia services in labor and delivery settings, and CNSs may play important roles in managing pre-, peri-, and postnatal care. The roles of CRNAs and CNSs warrant future investigation. However, these providers are not the focus of this study since they do not provide obstetric and gynecological care to the extent that the other providers considered here do and are not generally considered part of the women's health workforce. *See* Berkowitz & White, *supra* note 45, at 40–42.

67. *See, e.g.*, Michael J. Dueker, Ada K. Jacox, David E. Kalist & Stephen J. Spurr, *The Practice Boundaries of Advanced Practice Nurses: An Economic and Legal Analysis*, 27 J.

when the former gain greater authority and independence from the latter.[68] Consistent with this evidence, prior research examining the effect of different licensing and SOP laws on the supplies of APRNs and PAs has found evidence that more of these providers practice in areas with less restrictive SOP laws.[69]

With respect to output markets, multiple studies have confirmed that granting NPs and PAs greater authority leads to reduced prices and lower healthcare expenditures.[70] In particular, the price of a common medical examination decreases by 3% to 16% when NPs gain greater independence,[71] the savings achieved by using retail health clinics instead of emergency departments are higher when NPs have more independence,[72] and Medicaid costs either decrease or remain flat when NPs and PAs are granted more authority.[73] Kevin Stange found that a greater supply of NPs and PAs had relatively little impact on the office-based healthcare market. However, he concluded that healthcare markets are more responsive to changes in NP and PA supply when these providers possess more autonomy, suggesting that restrictive SOP laws may blunt the effect NPs and PAs can have on healthcare markets.[74]

REG. ECON. 309, 309 (2005) ("We find that in States where APNs have acquired a substantial amount of professional independence, the earnings of APNs are substantially lower, and those of physicians' assistants (PAs) are substantially higher, than in other States."); Kleiner et al., *supra* note 10, at 261 ("We find that when nurse practitioners have more independence in their scope of practice, their wages are higher but physicians' wages are lower . . . ."); John J. Perry, *The Rise and Impact of Nurse Practitioners and Physician Assistants on Their Own and Cross-Occupation Incomes*, 27 CONTEMP. ECON. POL'Y 491, 491 (2009) ("It is found that changes in NP and PA regulatory authority do impact the labor markets of [NPs, PAs, and physicians].").

68. Kleiner et al., *supra* note 10, at 261.

69. *See, e.g.*, McMichael, *supra* note 4, at 732 ("Relaxing licensing laws to allow NPs to practice with less physician oversight increases the supply of NPs in areas with few practicing physicians by 60 percent . . . ."); Patricia B. Reagan & Pamela J. Salsberry, *The Effects of State-Level Scope-of-Practice Regulations on the Number and Growth of Nurse Practitioners*, 61 NURSING OUTLOOK 392, 392 (2013) ("Restrictive [SOP laws] reduced the number of NPs by about 10 per 100,000 and reduced the growth rate by 25%.").

70. The literature on occupational licensing laws is not limited to APRNs and PAs. *See, e.g.*, EDWARD J. TIMMONS, JASON M. HOCKENBERRY & CHRISTINE PIETTE DURRANCE, MERCATUS RES., MORE BATTLES AMONG LICENSED OCCUPATIONS: ESTIMATING THE EFFECTS OF SCOPE OF PRACTICE AND DIRECT ACCESS ON THE CHIROPRACTIC, PHYSICAL THERAPIST, AND PHYSICIAN LABOR MARKET 18–19, 25 (2016) (examining the laws governing chiropractors, physical therapists, and physicians); Morris M. Kleiner & Kyoung Won Park, *Battles Among Licensed Occupations: Analyzing Government Regulations on Labor Market Outcomes for Dentists and Hygienists* 19–20 (Nat'l Bureau of Econ. Research, Working Paper No. 16560, 2010) (examining dentists and dental hygienists).

71. Kleiner et al., *supra* note 10, at 276–77.

72. 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, 1980–82 (2013).

73. 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).

74. Stange, *supra* note 40, at 9–15.

Relatedly, recent work has found that relaxing SOP laws can result in greater access to care and increased utilization of primary care services. For example, relaxing SOP laws increases access to healthcare most in the counties that have the least access to care,[75] and NPs treat more Medicare patients in states with less restrictive SOP laws.[76] Conducting a wide-ranging study, Jeffrey Traczynski and Victoria Udalova found that granting NPs more autonomy increases access to care, lowers barriers to care, increases self-reported quality of care, increases the use of medical care in underserved populations, reduces the use of emergency departments for primary care, and reduces healthcare costs by up to 1.3%.[77]

Perhaps most related to the analysis presented below is the recent study conducted by Markowitz and colleagues.[78] Focusing on obstetric care, the Markowitz team found that SOP laws have few effects on maternal health behaviors or infant health outcomes.[79] However, states with less restrictive laws have lower rates of labor inductions and C-sections (including elective inductions and C-sections), suggesting that relaxing SOP laws leads to the provision of lower intensity care with no offsetting costs in terms of health outcomes.[80] The analysis presented below extends the work of the Markowitz team by examining a potential mechanism which may interact with SOP laws to affect the provision of healthcare—malpractice liability. As discussed in detail below, the malpractice pressure exerted on different types of providers may vary depending on the SOP laws in place because these laws may shift liability for medical errors between different providers.[81] Additionally, this study builds on the work of Traczynski and Udalova and the Markowitz group by examining *both* APRNs *and* PAs—with the notable exception of the 2014 study conducted by Stange, most of the work on SOP laws has excluded PAs from consideration.[82]

II. HOLDING HEALTHCARE PROVIDERS LIABLE

Like physicians and other professionals, APRNs and PAs may be held liable for malpractice when they negligently injure patients. And prior work has demonstrated the potential of malpractice liability to substantially impact healthcare providers, the healthcare system, and the provision of care. However, despite a robust debate over the importance of malpractice liability in the healthcare system, malpractice liability is rarely, if ever, mentioned in the debate over SOP laws. This Part engages with the evidence on the effect of malpractice liability on the healthcare system, with a focus on obstetric care, before tracing the legal connections between liability and SOP

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75. McMichael, *supra* note 4, at 744–45.

76. Yong-Fang Kuo, Figaro L. Loresto Jr., Linda R. Rounds & James S. Goodwin, *States with the Least Restrictive Regulations Experienced the Largest Increase in Patients Seen by Nurse Practitioners*, 32 HEALTH AFF. 1236, 1238–41 (2013).

77. Jeffrey Traczynski & Victoria Udalova, *Nurse Practitioner Independence, Health Care Utilization, and Health Outcomes*, 58 J. HEALTH ECON. 90, 104 (2018).

78. Markowitz et al., *supra* note 10, at 204–08.

79. *Id.* at 209–16.

80. *Id.* at 209–10.

81. *See infra* Part II.

82. Stange, *supra* note 40, at 1.

laws. The evidentiary and legal foundation laid here provides the basis for the empirical analysis presented in the next section.

A. Malpractice Liability and the Provision of Healthcare

By allowing individuals harmed by another's negligence—here, malpractice—to recover damages, tort law both compensates victims for their injuries and deters wrongdoers—negligent providers—from engaging in tortious behavior in the first instance. While the compensatory role played by tort law is certainly important,[83] its ability to deter negligence—the provision of substandard, low-quality, or unsafe healthcare—is at least as important and has garnered attention from researchers and policymakers alike.[84] The current literature on the role of malpractice liability in the healthcare system can be broadly categorized into two strands, though there is some overlap between the two. In the first, studies focus on the general question of the extent to which malpractice liability impacts how providers deliver care, particularly whether it deters them from the provision of unsafe or low-quality care. In the second, studies focus more narrowly on the question of defensive medicine, which is "a deviation from sound medical practice that is induced primarily by a threat of liability"—in other words, a problem of overdeterrence.[85]

Beginning with the first, and more general, strand of research, the evidence demonstrates that malpractice liability exerts meaningful deterrence on providers. For example, Bernard Black and colleagues examined "the association between rates of adverse patient safety events and rates for paid medical malpractice claims" and concluded that "hospitals can meaningfully reduce malpractice claims by investing in patient safety."[86] Indeed, their finding that "a one standard deviation reduction in [standardized patient safety measures] would decrease paid malpractice claims by about 16 percent" demonstrates a clear relationship between malpractice liability and patient safety.[87] Examining a similar set of patient safety measures, Toshiaki Iizuka similarly concluded that "higher liability pressure reduces preventable medical complications," consistent with tort law exerting a deterrent effect on providers.[88]

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83. Frakes & Jena, *supra* note 18, at 142 ("The imposition of liability under tort law is sometimes said to serve a purely private function—to correct the injustice created by a wrongdoer and/or to provide compensation to those harmed by that wrongdoer.").

84. *See* Black et al., *supra* note 17, at 109 ("A central goal of tort liability is to deter risky or negligent behavior by imposing liability on the 'acting' party for harm to an injured party."); Yang et al., *supra* note 22, at 217–18 ("In the context of medical malpractice, conventional tort theory suggests that health-care providers who face the threat or imposition of economic and noneconomic penalties for rendering negligent care will take socially optimal levels of precautions, thus improving the quality of care and health outcomes."). *See generally* MELLO & KACHALIA, *supra* note 18, at 9–12 (reviewing the studies focusing on tort law's ability to deter providers and reforms aimed at modifying this deterrence role).

85. David M. Studdert, Michelle M. Mello, William M. Sage, Catherine M. DesRoches, Jordon Peugh, Kinga Zapert & Troyen A Brennan, *Defensive Medicine Among High-Risk Specialist Physicians in a Volatile Malpractice Environment*, 293 JAMA 2609, 2609 (2005).

86. Black et al., *supra* note 17, at 110.

87. *Id.* at 111.

88. Iizuka, *supra* note 17, at 164.

Because of the sensitivity of obstetric care to malpractice pressure,[89] multiple studies have investigated the role of liability risk in the provision of obstetric care. Measuring malpractice pressure directly with the malpractice insurance premiums paid by physicians and examining the effect of malpractice liability on labor and delivery outcomes, Tony Yang and colleagues concluded that "higher malpractice premiums for obstetrician-gynecologists stimulate greater use of cesarean section and reduced rates of VBAC [vaginal birth after a C-section]," which is suggestive of a deterrence role for tort law.[90] Taking a different approach by focusing on the specific deterrence malpractice claims can have on individual physicians—instead of examining the general deterrence exerted by malpractice pressure—Ity Shurtz analyzed the effect of malpractice claims on the provision of obstetric care.[91] He found that C-section rates increased between 4% and 8% after a physician faced a successful malpractice claim (i.e., one that led to a payment).[92] Thus, Shurtz demonstrated that tort law generally and tort claims specifically can deter physicians and impact how they deliver care. Along the same lines, David Dranove and Yasutora Watanabe examined the effect of lawsuits filed against individual physicians and physicians who practiced in the same hospital.[93] They found similar, though somewhat smaller, effects as reported by Shurtz.[94]

Approaching the issue of deterrence from yet another angle, Michael Frakes and Anupam Jena concentrated on healthcare quality, liability pressure, and the question of "pressure to do what?"[95] Examining changes in the standards of care against which physicians' actions are judged and their effect on obstetric complications (among other outcomes), Frakes and Jena concluded that "medical liability forces—under the right structural framework—hold the potential to elevate the quality floor."[96] Noting that some prior work had found mixed results on the deterrent effect exerted

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89. Beomsoo Kim, *The Impact of Malpractice Risk on the Use of Obstetrics Procedures*, 36 J. LEGAL STUD. S79, S82–85 (2007). *See generally* Michelle M. Mello & Carly N. Kelly, *Effects of a Professional Liability Crisis on Residents' Practice Decisions*, 105 OBSTETRICS & GYNECOLOGY 1287, at 1290–94 (2005); Michelle M. Mello, David M. Studdert, Catherine M. DesRoches, Jordon Peugh, Kinga Zapert, Troyen A. Brennan & William M. Sage, *Effects of a Malpractice Crisis on Specialist Supply and Patient Access to Care*, 242 ANNALS SURG. 621, at 623–25 (2005); Studdert et al., *supra* note 85, at 2612–14.

90. Y. Tony Yang, Michelle M. Mello, S.V. Subramanian & David M. Studdert, *Relationship Between Malpractice Litigation Pressure and Rates of Cesarean Section and Vaginal Birth After Cesarean Section*, 47 MED. CARE 234, 238 (2009).

91. Ity Shurtz, *The Impact of Medical Errors on Physician Behavior: Evidence from Malpractice Litigation*, 32 J. HEALTH ECON. 331, 332–35 (2013).

92. *Id.* at 332. Shurtz explains that "fear of lawsuits affects treatment patterns and may encourage high-cost, low-benefit medical treatment ('defensive medicine')." *Id.* at 331–32. With this possibility in mind, Shurtz's study "examine[d] the impact of physicians' medical errors on their subsequent behavior . . . ." *Id.* at 332.

93. David Dranove & Yasutora Watanabe, *Influence and Deterrence: How Obstetricians Respond to Litigation Against Themselves and Their Colleagues*, 12 AM. L. ECON. REV. 69, 69–74 (2010).

94. *Id.*

95. Frakes & Jena, *supra* note 18, at 143.

96. *Id.* at 144.

by tort law,[97] the authors cautioned against "rul[ing] out medical liability from the health care quality discussion based on" these studies.[98] In earlier work, Frakes examined the effect of changes in the standard of care on physician practice patterns.[99] He found that the movement from a standard based on local practices to one based on national practices led to a decline in regional variation in care.[100] Based on this evidence, he concluded that "the law holds the potential to deter particular clinical practices."[101]

While not all studies that have investigated the effect of malpractice liability on healthcare generally or obstetric care specifically have found evidence of a deterrent effect,[102] the weight of the evidence suggests that malpractice liability impacts the delivery of care and deters individual providers.[103] Indeed, the propensity of physicians to respond to the threat of liability has sparked an intense debate over whether malpractice liability overdeters providers, which has, in turn, led to concerns about the practice of defensive medicine.[104] Generally speaking, "[d]efensive medicine is deterrence gone awry," as providers perform tests and procedures not because they are medically indicated but to avoid liability in the future.[105]

The existence and pervasiveness of defensive medicine form the basis of the second strand of research focusing on malpractice liability and healthcare, and Frakes and Jena provide an extensive discussion of why the more narrow and nuanced question of defensive medicine should be separated from the more general question of deterrence.[106] While the extent to which defensive medicine is practiced remains a contentious issue, prior studies have revealed some evidence that providers practice defensively. For example, Katherine Baicker and several coauthors found that a 10% increase in the average payment to a patient who has asserted a malpractice claim was associated with up to a 1.8% increase in the use of diagnostic

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97. *See, e.g.*, Lisa Dubay, Robert Kaestner & Timothy Waidmann, *The Impact of Malpractice Fears on Caesarean Section Rates*, 18 J. HEALTH ECON. 491, 491 (1999) (finding only small effects of malpractice pressure on obstetric outcomes).

98. Frakes & Jena, *supra* note 18, at 158.

99. Michael Frakes, *The Impact of Medical Liability Standards on Regional Variations in Physician Behavior: Evidence from the Adoption of National-Standard Rules*, 103 AM. ECON. REV. 257, 257–60 (2013).

100. *Id.* at 267–71.

101. *Id.* at 275.

102. *See, e.g.*, Gilbert W. Gimm, *The Impact of Malpractice Liability Claims on Obstetrical Practice Patterns*, 45 HEALTH SERVS. RES. 195, 195 (2010) ("I did not find evidence that physicians changed their practice patterns by increasing C-section rates in response to malpractice claims."); Kim, *supra* note 89, at S84 ("My findings demonstrate that c-section rates are not responsive to medical malpractice risk.").

103. *See generally* MELLO & KACHALIA, *supra* note 18, at 1–2 (providing a thorough evaluation of the role of malpractice liability in the healthcare system).

104. For a review of the ongoing debate over defensive medicine, see Benjamin J. McMichael, *The Failure of "Sorry": An Empirical Evaluation of Apology Laws, Health Care, and Medical Malpractice*, 22 LEWIS & CLARK L. REV. 1199. 1200–02 (2018).

105. Yang et al., *supra* note 22, at 218.

106. Frakes & Jena, *supra* note 18, at 157.

tests,[107] and Brandon Roberts and Irving Hoch concluded that Medicare spending increases by nearly $2.50 per beneficiary for every additional lawsuit per 100,000 county residents.[108]

With respect to obstetric care, some evidence suggests that providers respond to malpractice liability consistent with the practice of defensive medicine. For example, following up on their original study which showed changes in C-section and VBAC rates in response to malpractice pressure,[109] Yang and colleagues found that indicators of adverse birth outcomes remained unchanged when malpractice pressure increased.[110] This suggests that providers practice defensively, as they change how they treat patients, with little effect on adverse outcomes.[111]

The traditional response to the practice of defensive medicine and to medical malpractice liability crises more generally has been the passage of tort reforms, which are designed to limit malpractice pressure on providers.[112] Despite these intentions, the evidence is mixed on whether tort reforms reduce malpractice pressure and the practice of defensive medicine (or change the treatment decisions of providers more generally).[113] In early work, Daniel Kessler and Mark McClellan found that tort reforms which directly reduce malpractice pressure, such as caps on noneconomic damages, decrease hospital expenditures by 5% to 9% for patients suffering from cardiac episodes, with little change in medical complications or mortality rates.[114] Examining a similar patient population, a more recent study also found that noneconomic damages caps reduce the probability that a patient suffering from a heart attack receives relatively more intensive and invasive treatment, with no attendant increase in mortality rates.[115] Reviewing the available evidence,

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107. Katherine Baicker, Elliott S. Fisher & Amitabh Chandra, *Malpractice Liability Costs and the Practice of Medicine in the Medicare Program*, 26 HEALTH AFF. 841, 847–48 (2007).

108. Brandon Roberts & Irving Hoch, *Malpractice Litigation and Medical Costs in Mississippi*, 16 HEALTH ECON. 841, 846 (2007).

109. Yang et al., *supra* note 90, at 237–40; *see also* Philip Zwecker, Laurent Azoulay & Haim A. Abenhaim, *Effect of Fear of Litigation on Obstetric Care: A Nationwide Analysis on Obstetric Practice*, 28 AM. J. PERINATOLOGY 277, 277 (2011) (finding that higher malpractice premiums are associated with higher incidences of C-sections and lower rates of vaginal births after C-sections).

110. Yang et al., *supra* note 22, at 237.

111. *Id.*

112. Myungho Paik, Bernard Black & David A. Hyman, *Damage Caps and Defensive Medicine, Revisited*, 51 J. HEALTH ECON. 84, 84–87 (2017); *see also* Paul C. Weiler, *Reforming Medical Malpractice in a Radically Moderate—and Ethical—Fashion*, 54 DEPAUL L. REV. 205, 216–19 (2005).

113. *See generally* MELLO & KACHALIA, *supra* note 18, at 101–03 (reviewing the available evidence on tort reforms and concluding that some are effective and some are not); Michelle M. Mello, Allen Kachalia & David M. Studdert, *Medical Liability—Prospects for Federal Reform*, 376 NEW ENG. J. MED. 1806, 1806–08 (2017) (reviewing the same).

114. Daniel Kessler & Mark McClellan, *Do Doctors Practice Defensive Medicine?*, 111 Q.J. ECON. 353, 386 (1996).

115. Avraham & Schanzenbach, *supra* note 16, at 276–78, 284.

Michelle Mello and Allen Kachalia concluded that tort reforms can reduce some, though not all, indications of defensive medicine.[116]

Focusing on the role of tort reform in the provision of obstetric care, Janet Currie and Bentley MacLeod considered the possibility that fear of malpractice liability causes obstetricians to perform C-sections at an inappropriately high rate.[117] Examining a variety of reforms, they found that noneconomic damages caps increase the use of C-sections, while joint and several liability reform (which alters how liability is allocated between the obstetrician and other actors that may contribute to a medical error) reduces the use of this procedure.[118] These results are somewhat counterintuitive based on conventional wisdom that higher malpractice pressure induces the provision of more intensive treatments, and they contradict the results from previous studies. However, Currie and MacLeod explain that if the rate of C-sections is excessive—which existing evidence suggests it is[119]—not because of liability but because this procedure is more profitable, then noneconomic damages caps (which reduce liability) should increase C-section use and joint and several liability reform (which increases the accountability of providers for their own actions) should decrease C-section use.[120] They find similar evidence that noneconomic damages caps and joint and several liability reform increase and decrease, respectively, inductions of labor and complications of labor and delivery.[121]

Extending the work of Currie and MacLeod, Frakes analyzed the role of tort reform in the provision of obstetric care, focusing on C-sections, episiotomies, and delivery bed days (all of which are measures of treatment intensity).[122] Importantly, he examined obstetric data over a longer time period than Currie and MacLeod, which allowed him to examine a richer set of legal changes and augment the empirical analysis.[123] He found that noneconomic damages caps reduce the use of

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116. MELLO & KACHALIA, *supra* note 18, at 101–03; *see also* Anca M. Cotet, *The Impact of Noneconomic Damages Cap on Health Care Delivery in Hospitals*, 14 AM. L. & ECON. REV. 192, 216–17 (2012) (finding that tort reforms can reduce the overall number of surgeries and hospital admissions). *But see* Frank A. Sloan & John H. Shadle, *Is There Empirical Evidence for "Defensive Medicine"? A Reassessment*, 28 J. HEALTH ECON. 481, 481 (2009) (finding no effect of tort reforms on Medicare spending).

117. Currie & MacLeod, *supra* note 16, at 820, 825–26.

118. *Id.* at 819–26.

119. Ana P. Betrán, Mario Merialdi, Jeremy A. Lauer, Wang Bing-Shun, Jane Thomas, Paul Van Look & Marsden Wagner, *Rates of Caesarean Section: Analysis of Global, Regional and National Estimates*, 21 PAEDIATRIC PERINATAL EPIDEMIOLOGY 98, 101–05 (2007).

120. Currie & MacLeod, *supra* note 16, at 804–13. This description is consistent with the practice of "offensive medicine," which involves an increase in the use of relatively more profitable procedures when the liability risk associated with those procedures declines. Other research has found evidence of the practice of offensive medicine in obstetrics and cardiology. *See* Avraham & Schanzenbach, *supra* note 16, at 275 (finding evidence of offensive medicine in the treatment of heart attack patients); Shurtz, *supra* note 91, at 338–39 (finding evidence consistent with offensive medicine in the performance of C-sections).

121. Currie & MacLeod, *supra* note 16, at 819–26.

122. Michael Frakes, *Defensive Medicine and Obstetric Practices*, 9 J. EMPIRICAL LEGAL STUD. 457, 459, 462–64 (2012).

123. *Id.* at 467–71.

episiotomies and the number of delivery bed days and have no statistically significant effect on C-sections.[124]

While the effect of malpractice liability on the provision of healthcare has garnered substantial attention over the past thirty years, this attention has been overwhelmingly focused on physician-delivered care. Indeed, the few studies to even consider APRNs and PAs in a malpractice context have focused on either the propensity of these providers to generate malpractice claims[125] or the effect of malpractice pressure on their location decisions.[126] While the evidence demonstrates that APRNs and PAs generate malpractice claims and respond, at least in where they choose to practice, to malpractice liability, no prior work has investigated how malpractice liability interacts with SOP laws to affect the provision of healthcare. The empirical analysis below fills the gap in the existing evidence, but before delving into that analysis, the next Section details the legal connections between malpractice liability and SOP laws for physicians, APRNs, and PAs.

B. Legal Connections Between Providers and Implications for Liability

In general, patients may hold APRNs and PAs liable for malpractice just as they may hold physicians and other professionals liable.[127] However, while physicians are generally responsible for their own malpractice, the same is not necessarily true for APRNs and PAs, as patients may use various theories of liability to hold a physician supervising an APRN or PA liable for an injury involving the APRN or PA.[128] Indeed, the number of malpractice claims against APRNs and PAs may be artificially low because claimants may choose to assert claims against their supervising physicians under various theories of vicarious and direct liability.[129]

Four general doctrines are particularly relevant.[130] While these doctrines may bear slightly different names in different states and may be treated slightly differently by those states, the doctrines discussed here—primarily in the language of the restatements for ease of exposition—form the core of the legal bases for holding physicians liable based on the actions of APRNs and PAs.[131] First, under the theory

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124. *Id.* at 471–79.

125. *See* Douglas M. Brock, Jeffrey G. Nicholson & Roderick S. Hooker, *Physician Assistant and Nurse Practitioner Malpractice Trends*, 74 MED. CARE RES. & REV. 613, 615–622 (2017) (examining the number of malpractice claims paid by or on behalf of PAs, NPs, and physicians).

126. McMichael, *supra* note 4, at 749–59.

127. *See* Brock et al., *supra* note 125, at 615–622 (detailing the number of claims paid by or on behalf of NPs and PAs).

128. McMichael et al., *supra* note 15, at 314–17.

129. *Id.* at 321–24.

130. *See id.* at 314–17; *see also* Thomas R. McLean, *Crossing the Quality Chasm: Autonomous Physician Extenders Will Necessitate a Shift to Enterprise Liability Coverage for Health Care Delivery*, 12 HEALTH MATRIX 239, 264 (2002) ("[T]he medical director of a physician extender accrues liability either directly for negligent selection and retention of an incompetent physician extender, or vicariously under the doctrines of respondeat superior or the principle of ostensible agency."); *id.* at 264–70 (discussing the relevant doctrines).

131. States may maintain doctrines that are related to, but not exactly the same as, the doctrines discussed here. One example is the "captain of the ship" doctrine which allows

of respondeat superior, a supervising physician may be held liable for the malpractice of an APRN or PA under her supervision because "[a]n employer [the physician] is subject to liability for torts committed by employees [the APRN or PA] while acting within the scope of their employment."[132] Here, an employee "is an agent whose principal controls or has the right to control the manner and means of the agent's performance of work."[133] And "[a]n employee acts within the scope of employment when performing work assigned by the employer or engaging in a course of conduct subject to the employer's control."[134] Thus, an APRN or PA providing healthcare under the supervision of a physician is essentially the archetypal example of a situation in which the principal (the physician) may be held liable for the tort (malpractice) of the agent (the APRN or PA).

Second, under a theory of apparent agency, a patient may hold a supervising physician liable for the malpractice of an APRN or PA under her supervision if the physician's "manifestations" caused the patient to reasonably believe that the APRN or PA was acting on the physician's behalf.[135] In other words, if the patient believes (as a result of some action taken or not taken by the physician) that the APRN or PA was acting on the physician's behalf, the patient may extend liability for the acts of the APRN or PA to the physician.

Third and fourth, the related doctrines of negligent hiring and negligent supervision may allow patients to hold physicians directly, as opposed to vicariously, liable. Under these doctrines, it is not the malpractice of the APRN or PA that results in the physician's liability but the physician's direct failure in hiring or supervising the APRN or PA.[136] For example, if a physician is responsible for supervising an APRN, and the latter causes harm to a patient because she lacked the appropriate training to provide a healthcare service safely, the physician may be held liable for negligent supervision.

In general, restrictive SOP laws that require physician supervision of APRNs and PAs may facilitate the use of these (and related) theories in holding physicians liable for medical errors involving APRNs and PAs in two distinct ways. First, restrictive SOP laws may *directly* aid patients in holding physicians liable for errors involving APRNs and PAs. For example, if a patient was harmed by an APRN in a state that

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patients to hold a physician liable for malpractice when other providers were involved in the injury based on the physician's status as the "captain of the ship" (i.e., the provider in overall control of the situation). *See, e.g.*, Ochoa v. Vered, 212 P.3d 963, 966–67 (Colo. App. 2009) (discussing the captain of the ship doctrine). The purpose of the discussion here is to provide the general legal basis for holding a physician liable based on the contents of a state's SOP laws. An exhaustive review of all of the variations of the doctrines that may allow a patient to hold a physician liable based on the involvement of an APRN or PA is well beyond the scope of this discussion.

132. RESTATEMENT (THIRD) OF AGENCY § 2.04 (AM. LAW INST. 2006).

133. *Id.* § 7.07(3)(a).

134. *Id.* § 7.07(2).

135. *Id.* § 7.08; *see also id.* § 2.03.

136. While "supervision" accounts for most of what may create liability, a physician may be liable for the harm caused by an APRN or PA if it was caused by the physician's "negligence in selecting, training, retaining, supervising, or otherwise controlling the" APRN or PA. *Id.* § 7.05(1).

requires physician supervision of APRNs, that patient will find it relatively easy to show that the physician "controlled" or had the "right to control" the APRN in providing healthcare—a necessary element under respondeat superior—since a state statute explicitly provides that right to control and may even require that the physician and APRN reduce that right to control to writing in the form of a supervision agreement. Similarly, patients may find it easier to show that a physician was negligent in supervising a PA when state law requires that the physician be onsite when the PA is providing care.

Next, restrictive SOP laws may *indirectly* aid patients in holding physicians liable. For example, even if a patient chooses not to (or is unable to for some reason) rely on a statute requiring physician supervision of APRNs to establish the elements under respondeat superior, the fact that such a statute exists necessarily means that APRNs will be more likely to enter into practice arrangements that satisfy the requirements of this doctrine. Similarly, restrictive SOP laws can force APRNs and PAs into practice arrangements that necessarily involve a physician hiring and supervising them, thereby facilitating claims of negligent hiring and supervision.

Prior empirical research has found evidence that SOP laws directly impact the malpractice claims filed against physicians.[137] Examining a national dataset of malpractice claims filed against physicians, Benjamin McMichael, Barbara Safriet, and Peter Buerhaus found that the number of claims asserted against physicians decline as NPs gain more autonomy.[138] This is consistent with patients holding physicians liable (vicariously or directly) for harms involving NPs under their supervision and suggests that relaxing supervision requirements for APRNs erodes the ability of injured patients to hold physicians liable.

To be clear, while the evidence demonstrates that restrictive SOP laws facilitate the ability of patients to hold physicians liable, laws requiring physician supervision are neither necessary, nor sufficient, to establish any of the theories of liability discussed here. Whether a physician can be held liable ultimately depends on the facts of a case, and while restrictive SOP laws can facilitate—directly or indirectly as discussed above—physician liability, the facts of a particular case may not lend themselves to physician liability even though a restrictive SOP law is in place.[139] Conversely, the facts may lend themselves to physician liability even in the absence of a restrictive SOP law. Additionally, states may differ in their willingness to apply certain doctrines to the physician-APRN and physician-PA relationships, though the courts that have reached this question have generally held that APRNs and PAs function as the agents of their supervising physicians, thus allowing injured patients to pursue vicarious liability claims against those physicians.[140]

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137. McMichael et al., *supra* note 15, at 323–24.

138. *Id.*

139. *See, e.g.*, Petzel v. Valley Orthopedics Ltd., 770 N.W.2d 787, 792–94 (Wis. Ct. App. 2009) (holding that summary judgment on physician's liability was inappropriate based on factual questions surrounding a PA's involvement).

140. *See, e.g.*, Ruggiero v. Miles, 125 A.D.3d 1216, 1216–17 (N.Y. App. Div. 2015) (holding physician vicariously liable for the negligence of an APRN); Cox v. M.A. Primary and Urgent Care Clinic, 313 S.W.3d 240, 253–54 (Tenn. 2010) (noting that "a physician assistant stands in an agency relationship with his or her supervising physician" and holding that, therefore, the physician "could be found vicariously liable for [the PA's] negligence").

Though restrictive SOP laws do not guarantee that a patient may hold a physician (directly or vicariously) liable when an APRN or PA was involved in causing harm to that patient, such laws certainly facilitate this liability.[141] State laws that mandate more physician involvement in the practices of APRNs and PAs necessarily ease plaintiffs' burdens under all the theories outlined above, as pointing to a state statute mandating some level of supervision generally makes the supervision element of a vicarious liability claim (or negligent supervision/hiring claim) easier to prove.[142]

By easing the burden of holding physicians liable, restrictive SOP laws effectively shift liability away from APRNs and PAs to physicians.[143] This shifting of liability has the effect of raising the expected costs of liability for physicians and commensurately lowering these costs for APRNs and PAs.[144] Thus, all else equal,

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But see TEX. OCC. CODE ANN. § 157.060 (West Supp. 2018) ("Unless the physician has reason to believe the physician assistant or advanced practice registered nurse lacked the competency to perform the act, a physician is not liable for an act of a physician assistant or advanced practice registered nurse solely because the physician signed a standing medical order, a standing delegation order, or another order or protocol, or entered into a prescriptive authority agreement . . . .").

141. CAROLYN BUPPERT, NURSE PRACTITIONER'S BUSINESS PRACTICE AND LEGAL GUIDE 268 (4th ed. 2012) ("[I]f a physician is required, by policy or law, to supervise, then a physician has the responsibility of supervisors in general.").

142. *Id.* at 267 ("[P]hysicians cannot expect to be fully free from threat of lawsuit for the acts of the [APRNs] they collaborate with or supervise until the legal requirements for collaboration are lifted.").

143. Two additional details are worth noting. First, with respect to APRNs, some states require that APRNs "collaborate" with physicians (instead of that they be "supervised" by physicians). *Compare* N.Y. EDUC. LAW § 6902 (McKinney 2016) (referring to a "collaborating physician"), *with* TENN. CODE ANN. § 63-7-126 (2017) (referring to physician "supervision"). In addition to making little difference in terms of actual physician involvement in an APRN's practice, the terms "collaborate" and "supervise" are functionally equivalent for the purposes of liability. *See, e.g.*, *Ruggiero*, 125 A.D.3d at 1216–17 (holding that a physician, despite the use of "collaborate" instead of "supervise" in the state statute, had the right to control the actions of the APRN and that, accordingly, he could be held vicariously liable for the APRN's malpractice). Second, with respect to PAs, all states require that physicians supervise PAs. McMichael, *supra* note 4, at 735–36. While these requirements will generally ease patients' burdens in holding physicians liable, more restrictive supervision requirements will nonetheless further ease those burdens. In general, however, the marginal difference between different classes of physician supervision laws for PAs in terms of the ease with which a physician can be held liable will be smaller than the marginal difference between classes for APRNs.

144. The liability shifting discussed here may be undermined by the availability of other legal doctrines. Depending on the facts of the case and the specific legal theory or theories employed, the physician may be able to pursue the APRN or PA involved in the injury for indemnification or contribution—subrogation rights may also become relevant. While the possibility that these (or other) doctrines may impact the ways in which liability costs are shifted among different types of providers is worth noting, there are good reasons to believe that the availability of these legal avenues will not dramatically impact the liability shifting discussed here. First, the majority of malpractice claims are resolved via settlement, which may undermine the ability of physicians to pursue indemnification or contribution claims against APRNs and PAs. *See* Benjamin J. McMichael, R. Lawrence Van Horn & W. Kip

physicians face higher malpractice pressure when state law requires them to supervise or collaborate with APRNs and PAs, while APRNs and PAs face lower malpractice pressure. This connection between malpractice liability and SOP laws and its ability to shift liability among providers has the potential to substantially impact how providers deliver healthcare, particularly since both legal regimes have been shown to independently impact healthcare delivery.[145] The next Part explores this connection and its potential impact in more detail.

III. EMPIRICAL ANALYSIS

To test whether the legal connections between SOP laws and malpractice liability have a direct impact on the provision of healthcare, I conduct the first empirical analysis of the joint effect of these legal regimes. Examining the role of these regimes in healthcare necessarily involves analyzing clinical outcomes, and I focus on obstetric care throughout the analysis, specifically, the method of delivery employed at birth. This healthcare outcome has been analyzed by prior work,[146] meaning there exists a useful point of comparison for the results reported here.

Before delving into the details of the empirical analysis, it is important to note that the question of whether physicians, APRNs, and PAs practice defensive medicine is beyond the scope of this Article. While interesting, analyzing this question is of secondary concern to the broader questions of whether and to what extent tort law deters providers and whether it interacts with SOP laws. Additionally, as Frakes and Jena note,[147] examining whether providers practice defensively involves nuanced considerations that are difficult to appreciate without an understanding of how tort law exerts influence on those providers generally. This Article focuses on the broader question of tort law's effect on providers and leaves the more specific question of defensive medicine to future work.

This Part begins with an overview of the medical context in which the analysis occurs and the dataset I examine. It then engages with the existing literature and the legal regimes mentioned above to form hypotheses about how changes to those regimes may impact the provision of healthcare. Most importantly, it describes the

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Viscusi, *"Sorry" Is Never Enough: How State Apology Laws Fail to Reduce Medical Malpractice Liability Risk*, 71 STAN. L. REV. 341, 367 (2019) (providing evidence that most malpractice claims are resolved without verdicts). Second, indemnity claims are rarely pursued even when available. Gary T. Schwartz, *The Hidden and Fundamental Issue of Employer Vicarious Liability*, 69 S. CAL. L. REV. 1739, 1753, 1764–67 (1996) (discussing the rarity of indemnification claims). Third, prior work has noted that subrogation rights, even when they are legally available, may be difficult to assert and may, therefore, be rarely used. *See* A. Mitchell Polinsky & Steven Shavell, *Subrogation and the Theory of Insurance When Suits Can Be Brought for Losses Suffered*, 34 J.L. ECON. & ORG. 619, 636–38 (2018) (discussing the legal restrictions on subrogation and general ignorance of the availability of subrogation); *see also* Kenneth S. Reinker & David Rosenberg, *Unlimited Subrogation: Improving Medical Malpractice Liability by Allowing Insurers to Take Charge*, 36 J. LEGAL STUD. S261, S261–67 (2007) (offering a proposal to address important limitations of subrogation).

145. *See* Markowitz et al., *supra* note 10, at 216; Yang et al., *supra* note 22, at 240–41.

146. *E.g.*, Currie & MacLeod, *supra* note 16, at 819–26.

147. Frakes & Jena, *supra* note 18, at 157–58.

empirical analysis and discusses the results of that analysis. The *Technical Appendix* discusses the econometric details of the analysis as well as supplementary analyses and results.[148]

A. Data and Medical Context

While SOP laws and malpractice liability can impact a wide range of healthcare services, it is not feasible to examine the entire healthcare system at once. Accordingly, I limit my analysis to a single context—obstetric care. Obstetric care is a critically important area of healthcare and one which suffers from problems that have substantial implications for patients. For example, among developed countries, the United States has the highest maternal mortality rate, and, as maternal mortality rates continue to decline across much of the world, they have increased in the United States.[149] In fact, childbirth is more likely to kill the mother today than a quarter century ago.[150] While many reasons may help to explain this problematic trend, the provision of unnecessarily intensive treatments may factor into high maternal mortality rates.[151] Indeed, in the United States, 32% of infants are delivered via C-section.[152] The World Health Organization (WHO), following a systematic review of the available evidence, "concluded that at population level, [C-section] rates higher than 10% were not associated with reductions in maternal and newborn mortality rates."[153] While C-sections can improve outcomes and save lives, at current rates, they can pose significant risks to mothers and infants and are often performed for nonmedical reasons.[154]

Beyond the importance of obstetric care in and of itself, it is uniquely well suited to an empirical analysis of the joint effect of SOP laws and malpractice liability for several reasons. First, obstetric care can be provided by physicians, APRNs (particularly CNMs), and PAs, meaning that changes to the SOP laws governing

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148. *Technical Appendix*, *supra* note 31.

149. *See* Nicholas J. Kassebaum, Caitlyn Steiner, Christopher J. L. Murray, Alan D. Lopez & Rafael Lozano, GBD 2015 MATERNAL MORTALITY COLLABORATORS, *Global, Regional, and National Levels of Maternal Mortality, 1990–2015: A Systematic Analysis for the Global Burden of Disease Study 2015*, 388 LANCET 1775, 1775–77 (2016) (reviewing maternal mortality across the world and placing U.S. rates in context); *see also* Marian F. MacDorman, Eugene Declercq, Howard Cabral & Christine Morton, *Is the United States Maternal Mortality Rate Increasing? Disentangling Trends from Measurement Issues*, 128 OBSTETRICS & GYNECOLOGY 447, 447 (2016) ("[T]he estimated maternal mortality rate for 48 states and Washington, DC, increased from 2000 to 2014; the international trend was in the opposite direction.").

150. Ritsema & Klingler, *supra* note 48, at 11.

151. Elizabeth Heubeck, *Midwives Could Be Key to Reversing Maternal Mortality Trends*, CONN. HEALTH I-TEAM (Oct. 30, 2018), http://c-hit.org/2018/10/30/midwives-could-be-key-to-reversing-maternal-mortality-trends/ [https://perma.cc/4YB4-VBCA].

152. *See Technical Appendix*, *supra* note 31, at A18.

153. Betrán et al., *supra* note 25, at 667.

154. Ties Boerma et al., *Global Epidemiology of Use of and Disparities in Caesarean Sections*, 392 LANCET 1341, 1341 (2018) ("[T]he large increase in [C-section] use, often for non-medical indications, is of concern given the risks for both women and children.").

these providers will impact the delivery of obstetric care.[155] Second, providers are sensitive to malpractice pressure when providing obstetric care, meaning that changes in malpractice pressure should impact how these providers practice.[156] Because both legal regimes can impact the provision of obstetric care, it is a useful context in which to begin searching for a joint effect of these two regimes.

Third, the treatment choices for laboring mothers allow for some discretion on the part of the provider (in consultation with the patient). The presence of "gray areas" in which providers could legitimately choose either the more intensive or less intensive treatment option means that it is possible to observe some marginal changes in treatment choices in response to changes in SOP laws and malpractice pressure. Fourth, as described in detail below, it is possible to obtain information on nearly every birth in the United States. Including every instance of a particular type of care in an empirical analysis eliminates concerns about the possibility of biased samples and other potential problems that can occur when only a subset of information is included in the analysis.

The focus of my analysis is the choice of delivery procedure.[157] I also consider the role of access to care by examining the rate at which CNMs attend births.[158] To obtain information on obstetric care, I rely on the National Vital Statistics System (NVSS). Each infant born alive in the United States is issued a certificate of live birth by the state in which the birth occurred.[159] Each state then cooperates with the NVSS, which is maintained by the Centers for Disease Control and Prevention (CDC) and the National Center for Health Statistics (NCHS), to compile a complete dataset of all births within the United States each year.[160] I analyze the restricted version of this dataset pursuant to a data use agreement with the NCHS. This is the same dataset used by Currie and MacLeod, the Yang group, and the Markowitz group, so the results presented here are comparable to their results. However, while they each limited their analyses to a sample of the dataset—10%, 5%, and 25%, respectively—I analyze the entire dataset, which contains all births between 1998 and 2015—over 69 million in total.[161]

In the NVSS dataset, I observe a variety of information about each birth, including whether a physician or CNM attended the birth.[162] Among the information

155. *See* Markowitz et al., *supra* note 10, at 209–16 (finding statistically significant effects of SOP laws on the provision of obstetric care).

156. *See* Yang et al., *supra* note 22, at 234 (finding statistically significant effects of malpractice pressure on the provision of obstetric care).

157. While maternal mortality is obviously important as well, the dataset I examine does not include information on mortality. Future work should investigate the effect of SOP laws and malpractice pressure on mortality in more depth.

158. Heubeck, *supra* note 151 (explaining the importance of access to CNMs).

159. *National Vital Statistics System: Birth Data*, CDC: NAT'L CTR FOR HEALTH STAT. (Nov. 27, 2019), https://www.cdc.gov/nchs/nvss/births.htm [https://perma.cc/6NZS-6676].

160. *Id.*

161. Currie & MacLeod, *supra* note 16, at 815; Markowitz et al., *supra* note 10, at 207; Yang et al., *supra* note 22, at 224.

162. As noted by the Markowitz group, the provider listed as the attendant at birth on the birth certificate is not always a perfect representation of which provider actually cared for the mother during labor. Markowitz et al., *supra* note 10, at 206, 208. Data drawn from birth certificates generally undercounts the number of births attended by CNMs. *Id.* While these

concerning delivery method contained in the dataset, I focus on indicators for whether the infant was delivered vaginally, whether the infant was delivered via C-section, whether the infant was delivered vaginally after the mother had previously received a C-section, and whether labor was medically induced. Vaginal births represent the lowest level of treatment intensity, as they can involve little to no medical intervention. C-section births represent the highest level of intensity since they involve "a surgical procedure used to deliver a baby through incisions in the abdomen and uterus."[163] Medical induction of labor represents an intermediate level of intensity between the two, as it involves a specific medical intervention but not a surgical procedure.[164] C-sections can follow attempted vaginal deliveries and medical inductions of labor, and when this occurs, I define that birth as occurring via C-section. I also separately consider vaginal births after previous C-sections (VBACs) because having a prior C-section reduces the provider's discretion in performing a vaginal delivery in subsequent births. Thus, SOP laws and malpractice pressure may affect VBAC rates differently from other birth outcomes.

In addition to these general outcomes, I collect information to determine whether a birth was "high risk," consistent with the approach of Currie and MacLeod.[165] High-risk births are those in which the mother suffers from a condition which would limit providers' discretion regarding the most appropriate method of delivery.[166] I also collect information that allows me to identify, consistent with the Markowitz study, whether a C-section or induction was apparently "elective."[167] A procedure is elective if, based on the information provided on the birth certificate, there are no clinical characteristics that favor greater medical intervention.[168] While the primary focus of the analysis is on C-sections generally, considering delivery methods in different contexts (e.g., high-risk and low-risk) is important because providers have differing degrees of discretion to choose different delivery procedures in these contexts.

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issues do not make the information on attendants useless, the results from the analysis of whether a CNM attended a birth should be interpreted with these limitations in mind.

163. *C-section*, MAYO CLINIC, https://www.mayoclinic.org/tests-procedures/c-section/about/pac-20393655 [https://perma.cc/67VP-WU69].

164. *Labor Induction*, MAYO CLINIC, https://www.mayoclinic.org/tests-procedures/labor-induction/about/pac-20385141 [https://perma.cc/6EZT-QX64].

165. Currie & MacLeod, *supra* note 16, at 814.

166. If the mother suffers from any of the following conditions, Currie and MacLeod define the birth as high-risk: "anemia, cardiac or lung conditions, diabetes, herpes, eclampsia, incompetent cervix, previous large or preterm deliveries, renal failure, rh problems, or uterine bleeding or other medical risk factors." *Id.* I identify all of these conditions using the NVSS data and create an indicator variable for high-risk pregnancy based on the presence of one or more of these factors. While the information available on birth certificates changed in 2003, it is still possible to identify high-risk births across the entire dataset.

167. Markowitz et al., *supra* note 10, at 206.

168. A labor induction is elective if any of the following characteristics are present: "1) premature rupture of membranes and 2) chorioamnionitis (inflammation of the fetal membranes due to bacterial infection) or evidence of chorioamnionitis as indicated by the presence of intrapartum fever." A C-section is elective if 1 and 2 are present and there is "3) presentation other than cephalic (any part of the fetus other than the head appearing first) and 4) fetal distress or fetal intolerance of labor." *Id.*

Next, I collect information on a series of pregnancy and infant health outcomes, including the length of gestation, birth weight, the five-minute Apgar score,[169] and whether the infant suffered a birth injury. All of these outcomes are indicative of infant or maternal health.[170] While these outcomes are certainly important, I examine them primarily as a means to test whether any observed changes in how providers deliver care translate into positive or negative outcomes for patients. Accordingly, much of this analysis is provided in the *Technical Appendix*.[171]

Finally, I collect demographic and medical information about the mother and infant from the data provided in each birth certificate. Specifically, I gather information on the mother's age, education level, race, and marital status at the time of birth. I also obtain information on the sex of the infant and the number of infants born during a single birth episode. I use this demographic and medical information to construct control variables in my analysis since all of these factors can influence the method of delivery.

In addition to all of the other information provided in the NVSS dataset, each observation includes the state where the delivery occurred—this information is only available in the restricted-use files which require NCHS permission to access. Based on this state information, I assign an SOP law to each birth. As described above, I assign each state in each year to either the "APRN Independence" or "Restricted Practice" category, depending on the APRN SOP laws in place in a particular year, and to either the "PA Autonomy" or "Limited Practice" category, depending on the PA SOP laws in place.

Measuring the malpractice pressure faced by individual providers is somewhat more difficult than measuring SOP laws. One way that prior work has examined the role of malpractice pressure is to consider the effect of tort reforms on various outcomes.[172] However, while tort reforms may represent clear shifts in the liability risk faced by providers, they may not fully capture all of the factors that influence the malpractice risks providers must confront. Therefore, I follow the lead of the Yang group and measure malpractice liability risk using the malpractice premiums paid by physicians since these premiums reflect the various influences on malpractice risk.[173] Information on premiums comes from a series of surveys of

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169. *Apgar Score*, MEDLINE PLUS (Jan. 6, 2020), https://medlineplus.gov/ency/article/003402.htm [https://perma.cc/D4YF-HBTN] ("Apgar is a quick test performed on a baby at 1 and 5 minutes after birth. The 1-minute score determines how well the baby tolerated the birthing process. The 5-minute score tells the health care provider how well the baby is doing outside the mother's womb.").

170. *See generally* Am. C. Obstetrics & Gynecology, *Committee Opinion No 579: Definition of Term Pregnancy*, 122 OBSTETRICS GYNECOLOGY 1139, 1139–40 (2013); Douglas Almond, Kenneth Y. Chay & David S. Lee, *The Costs of Low Birth Weight*, 120 Q.J. ECON. 1031, 1031–36 (2005).

171. *Technical Appendix*, *supra* note 31.

172. *See, e.g.*, Avraham & Schanzenbach, *supra* note 16, at 273 (examining the role of tort reform in the provision of cardiac care).

173. Yang et al., *supra* note 22, at 222, 226–27.

malpractice insurers conducted by the *Medical Liability Monitor* (MLM), a trade publication among malpractice insurers.[174]

In the early 1990s, the MLM began surveying malpractice insurers about the rates they charged physicians in different parts of the country.[175] The information obtained through these surveys represents the only source of national, longitudinal data on malpractice insurance premiums.[176] In each year, the MLM surveyed malpractice insurers in each state and obtained information on the premiums charged to physicians in three specialties: general surgery, internal medicine, and obstetrics/gynecology.[177] Beginning with the raw survey responses, several researchers led by Bernard Black cleaned the data to produce uniform information on the malpractice premiums charged to the three specialties from the early 1990s through 2016.[178] As a measure of malpractice pressure, I rely on the (weighted) average premium charged at the state level as calculated by the Black group. Throughout my analysis, I use the state-level information on malpractice premiums because the researchers who cleaned the data acknowledge some reporting issues at the substate level and because the data use agreement that allows me to analyze the NVSS dataset does not permit matching malpractice premium information below the state level.[179]

At the state level, the Black team provides the average premium charged to different specialties for several different types of policies.[180] To maintain consistency, I concentrate on the premiums charged for a single insurance policy type: $1 million/$3 million claims-made policies. This type of policy provides coverage for individual incidents up to $1 million, with an overall cap of $3 million (over multiple incidents) for the policy period. By limiting my analysis to a single type of policy, I standardize the measure of malpractice pressure and avoid the problem that a state or year may appear to have higher malpractice pressure simply because I measure that pressure with the premium for a different type of policy. While $1 million/$3 million claims-made policies are, by far, the most common type of policy, the MLM dataset lacks information on this type of policy for several states in several years of my study period.[181] To address this problem, I use multiple imputation methods to impute the premiums charged when they are missing.[182]

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174. *See Rate Survey*, MED. LIABILITY MONITOR, https://medicalliabilitymonitor.com/rate-survey/ [https://perma.cc/YCB9-TDLH] (discussing the MLM's rate survey).

175. Bernard Black, Jeanette W. Chung, Jeffrey Traczynski, Victoria Udalova & Sonal Vats, *Medical Liability Insurance Premia: 1990–2016 Dataset, with Literature Review and Summary Information*, 14 J. EMPIRICAL LEGAL STUD. 238, 238 (2017).

176. *Id.* at 238.

177. *Id.* at 239.

178. *Id.* at 239–41.

179. *See id.* at 242.

180. Bernard Black, Jeanette W. Chung, Jeffrey Traczynski, Victoria Udalova & Sonal Vats, *Medical Liability Insurance Premia 1990-2015: Dataset, with Literature Review, and Summary Information* 1–5 (NW. L. & Econ. Research Paper 16-04), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2477120 [https://perma.cc/8NFT-5KU3].

181. *Id.* at 5–6.

182. Specifically, I impute missing data using a linear regression with the following set of demographic variables (defined at the state level): unemployment rate, average income, percentage female, percentage white, percentage black, percentage Hispanic, percentage with

However, estimating the models reported below with the states missing premium data excluded from the analysis leads to little change in the results.

Throughout the analysis, I use the malpractice premiums paid by general surgeons as the measure of malpractice pressure. While the MLM dataset includes premium information for obstetricians/gynecologists, using these premiums may induce bias in the results. Specifically, SOP laws can affect the ability of patients to hold physicians liable, which can affect the number and size of malpractice claims against physicians. This can, in turn, impact the malpractice premiums paid by physicians.[183] Moreover, the treatment patterns of obstetric providers themselves may influence obstetrician/gynecologist premiums, potentially introducing additional bias.[184] To address each of these concerns, I follow the approach of Beomsoo Kim who, when analyzing the impact of malpractice pressure on obstetricians, measured that pressure by focusing on other specialties.[185] In particular, the premiums paid by general surgeons are not sensitive to state SOP laws because APRNs and PAs cannot practice general surgery alone and will, therefore, always be supervised by surgeons when practicing in that context. Thus, in the surgery context, changes in SOP laws will not meaningfully shift liability among APRNs, PAs, and physicians.[186] Additionally, changes in obstetric practices will not impact the premiums paid by general surgeons, making these premiums the best available measure for the malpractice pressure faced by obstetric providers.[187]

Using the data on malpractice premiums paid by general surgeons, I classify states into quartiles based on the average malpractice premium charged in each year, and I use a series of indicator variables for these quartiles throughout my analysis. Thus, each state in each year may be categorized into one of four quartiles, with the first quartile having the lowest level of malpractice pressure and the fourth quartile having

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less than a high school education, percentage with a high school education, percentage with some college education, and percentage with a college education. I also include a series of indicators for the following tort reforms: noneconomic damages caps, punitive damages caps, collateral source rule reform, and joint and several liability reform.

183. McMichael et al., *supra* note 15, at 323–24.

184. Kim, *supra* note 89, at S84 ("One challenge for reliable identification is that malpractice risk as defined [by a measure of risk specific to obstetrics] may be correlated with other factors related to the treatment decision, such as unobserved patient characteristics, physician quality, or practice style.").

185. *Id.* ("In particular, I use the malpractice risk for specialties other than ob-gyn as an instrument for the ob-gyn risk measure.").

186. This is not to suggest that APRNs and PAs do not practice alongside general surgeons.

187. In the interest of completeness, I have estimated all of the models reported below using the premiums paid by obstetrician/gynecologists instead of those paid by general surgeons. While these models suffer from the problems outlined above, I nonetheless estimated them to ensure that the point estimates do not change wildly. In general, the point estimates change somewhat, but the overall results are the same.

the highest.[188] This approach avoids imposing any assumptions of strict linearity on the effect of malpractice pressure.[189]

The final dataset I examine includes over 69 million observations of individual births between 1998 and 2015.[190] Each observation includes the method of delivery, medical and demographic information about the mother and infant, and the nature of the delivery (e.g., high risk). Based on the state where the birth occurred, each observation is linked to an SOP law for APRNs, an SOP law for PAs, and a malpractice pressure quartile as defined above. With this information available for over 69 million births, the dataset analyzed here represents one of the richest sources of information on legal regimes and healthcare outcomes available. It is worth noting that the dataset I examine is essentially the same one used by the CDC in calculating official U.S. birth statistics.[191]

Prior to conducting a formal empirical analysis that can reveal the causal effects of different legal regimes, it is useful to examine the general contours of these regimes and the healthcare outcomes they may affect. Figure 1 offers a summary of C-section rates across the country. Panel A reports the percentage of births involving a C-section in each state in 2015, and Panel B reports the percentage change in C-section rates between 1998 and 2015. In general, C-section rates are higher than recommended by the WHO in every state, though states in the South and East have the highest rates. Similarly, C-section rates increased in every state between 1998 and 2015, but there is no obvious regional pattern in this increase.

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188. I have also estimated all of the models reported below using deciles (i.e., ten individual groupings of states) instead of quartiles with little change in the overall results.

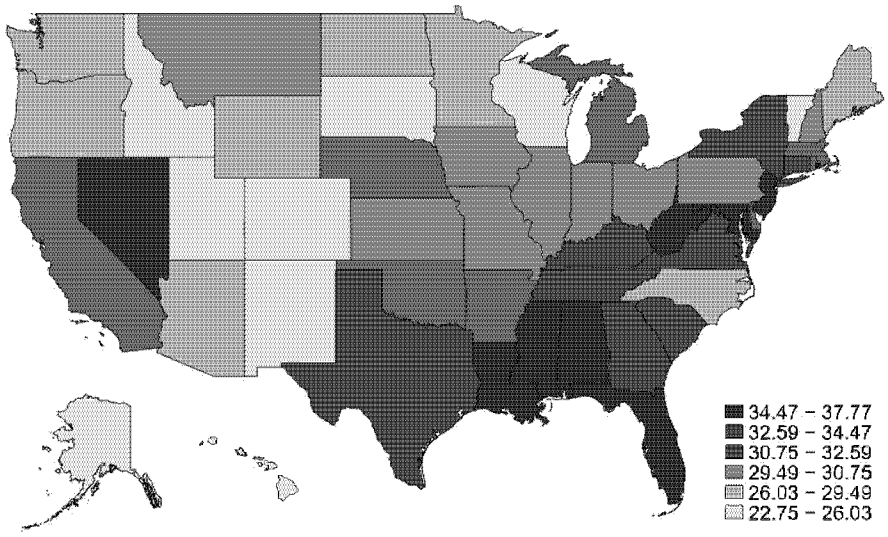
189. It also reduces the concern that inaccurately imputed data could be driving the results since the imputations would have to be so erroneous as to move a state from one quartile to another.

190. I limit my analysis to 1998–2015 for two reasons. First, prior work has identified some issues with respect to the malpractice premium data used here in the early 1990s. Black et al., *supra* note 175, at 242. Second, prior to 1998, Medicare did not directly reimburse APRNs and PAs for their services, instead paying them only for services provided incident to physician services—most private insurers maintained similar restrictions. Following the passage of the Balanced Budget Act of 1997, Medicare (and many private insurers) began directly reimbursing APRNs and PAs. Michael A. Frakes & Tracylain Evans, *An Overview of Medicare Reimbursement Regulations for Advanced Practice Nurses,* 24 NURSING ECON. 59, 59–65 (2006). Prior to this Act, APRNs and PAs were effectively tied to physicians under federal law, even if state law granted them more autonomy, meaning that the effects of any state law changes prior to 1998 would be substantially muted.

191. *See* JOYCE A. MARTIN, BRADY E. HAMILTON & MICHELLE J.K. OSTERMAN, NAT'L CTR. FOR HEALTH STAT., BIRTHS IN THE UNITED STATES, 2015, 1–5 (2016) (examining the same data as that examined here when deriving official statistics on births in the United States).

Figure 1: C-Section Rates by State

Panel A: C-Section Percentages in 2015



Panel B: Percent Change in C-Section Rates Between 1998 and 2015

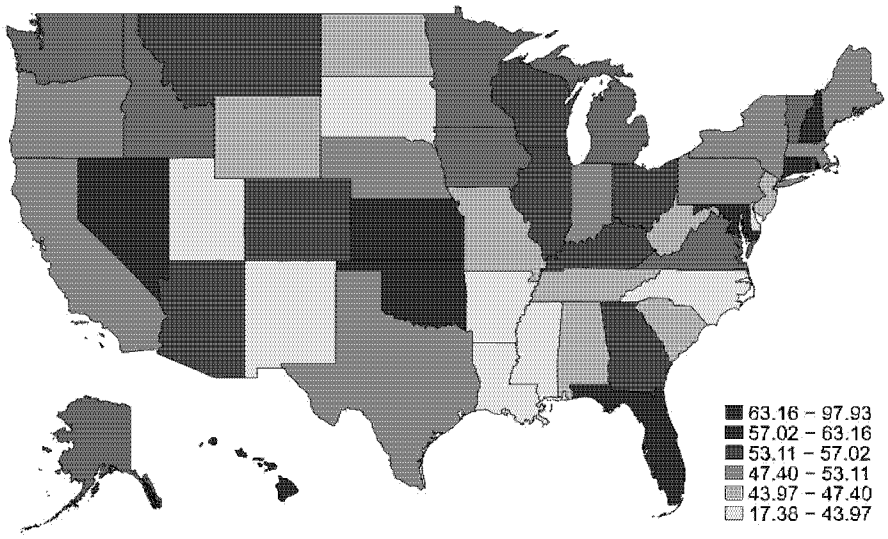
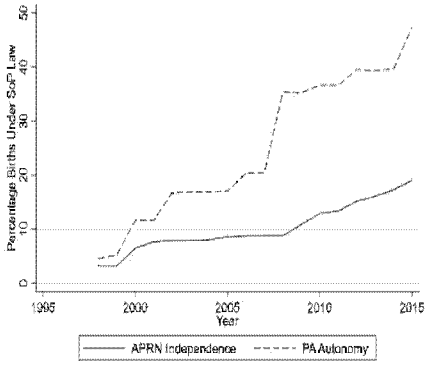


Figure 2 provides an overview of the medical and legal contexts in which the primary analysis occurs. Panel A reports the percentage of births each year that occurred in states that allowed APRNs to practice independently and PAs to practice autonomously. In general, there has been a marked trend towards relaxing SOP laws for both APRNs and PAs. In 1998, only about 3% of births occurred in states where APRNs could practice independently, but this number was approaching 20% by 2015. The trend for PAs is even more striking, with births in states allowing PA autonomy increasing from about 5% to almost 50% between 1998 and 2015. While

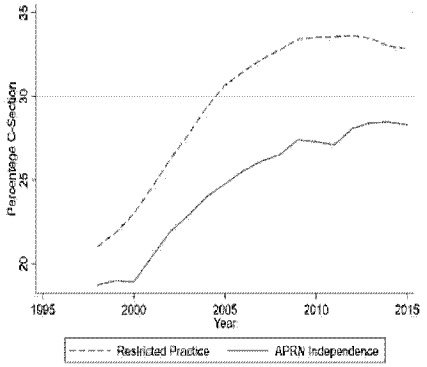
this pattern of SOP law changes is interesting, it also demonstrates that there has been substantial variation in SOP laws over time, which is critical for the empirical models discussed below.

Figure 2: Overview of SOP Laws and Obstetric Outcomes

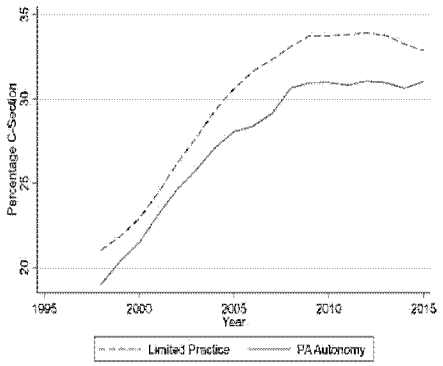
Panel A: Births and SOP Laws



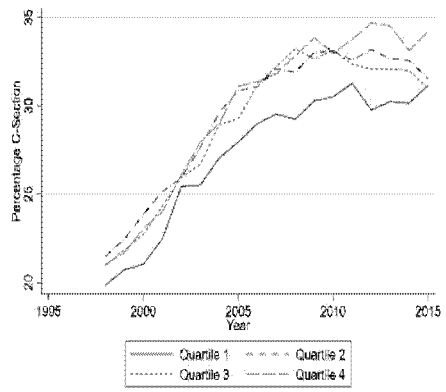
Panel B: APRN SOP Laws and C-Sections



Panel C: PA SOP Laws and C-Sections



Panel D: Malpractice Risk and C-Sections



While C-section rates in the United States have also followed an upward trajectory, these rates are not equal across states with different SOP laws, as demonstrated in Panels B and C. States that allow APRNs to practice independently and states that allow PAs to practice autonomously always have lower C-section rates, though the difference is greater for APRN SOP laws than PA SOP laws. C-section rates also vary by the amount of malpractice pressure faced by providers, and Panel D reports the percentage of births resulting in a C-section across the four quartiles of general surgeon malpractice premiums. While the differences in C-section rates reported in Panels B–D do not establish causal effects of SOP laws or malpractice pressure, they do suggest that providers respond to differences in the legal environment. Table A2 in the *Technical Appendix* reports a full set of summary statistics for all of the legal and obstetric outcomes of interest across all years of the

dataset, and Table A3 reports summary statistics across different SOP law regimes.[192]

B. Mechanisms of Effect and Expected Impacts of Legal Changes

In general, malpractice pressure and SOP laws may impact the provision of obstetric care through multiple pathways.[193] Beginning with malpractice pressure, I expect that greater pressure will induce the provision of more intensive care (i.e., providers will perform more C-sections, medically induce more patients, and perform fewer VBACs). While not every study to investigate malpractice liability and obstetric care has found results consistent with these effects,[194] the studies most similar to the analysis here—those that rely on malpractice premiums as their measure of malpractice pressure—have found evidence that an increase in malpractice pressure leads to the provision of more intensive care.[195] Though investigating the practice of defensive medicine is not the focus of my analysis, the effects identified in prior work and the effects I expect to find here may be consistent with defensive medicine, as providers perform C-sections primarily to avoid liability and not for sound medical reasons.[196]

Kim offers insight into the relationship between malpractice pressure and C-sections. She explains that providers generally take a "fetus first" view,[197] often defaulting to C-sections when they have doubts about the propriety of a vaginal delivery.[198] This philosophy may stem from the fact that physicians "are more likely to be suspected of negligence when the baby is delivered vaginally because of the limited control of progress compared with c-section[s.]"[199] Kim further notes that "[t]he complaint of failure to deliver by c-section is frequently listed as a reason for a malpractice claim,"[200] which may explain why physicians perform C-sections when they "ha[ve] any concerns that a vaginal delivery may threaten the health of [the] infant."[201]

Turning to SOP laws, I expect that relaxing the laws governing APRNs and PAs will induce the provision of less intensive care (i.e., providers will perform fewer C-sections, induce labor less often, and perform more VBACs). I also expect that CNMs will attend more births. In general, APRNs employ a model of care that relies less on medical technology and intensive treatments than physicians.[202] Instead of relying on these treatments, APRNs tend to spend more time with patients.[203] Thus,

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192. *Technical Appendix*, *supra* note 31.
193. For a full discussion of the existing literature, see *supra* Section II.A.
194. *See, e.g.*, Currie & MacLeod, *supra* note 16, at 816–24 (finding different effects).
195. Yang et al., *supra* note 90, at 237–240; Yang et al., *supra* note 22, at 236–37.
196. Yang et al., *supra* note 90, at 237–240.
197. Kim, *supra* note 89, at S82–83.
198. Ronald M. Cyr, *Myth of the Ideal Caesarean Section Rate: Commentary and Historic Perspective*, 194 AM. J. OBSTETRICS & GYNECOLOGY 932, 933 (2006).
199. Kim, *supra* note 89, at S82.
200. *Id.* at S83.
201. *Id.*
202. Markowitz et al., *supra* note 10, at 204.
203. *Id.*

to the extent APRNs provide more pre-, peri-, and postnatal care, the use of intensive procedures should decline. With respect to PAs, their model of care may hew closer to that of physicians than to APRNs—PAs are trained in the "medical model" similar to physicians, as opposed to the nursing model of APRNs.[204] However, they may still rely less on medical technology than physicians.[205] Moreover, physicians may rely on PAs *instead of* medical technology and the use of more intensive treatments, meaning that as the amount of pre-, peri-, and postnatal care provided by PAs increases, the use of intensive treatments should decrease.[206] In general, PAs may focus on more medically complex patients than APRNs, so the effect of changes in PA SOP laws may be more concentrated among these patients than the effects of changes in APRN SOP laws.

Overall, relaxed SOP laws should result in the provision of more care by APRNs and PAs and thus a decrease in the rate of intensive treatments (such as C-sections and inductions of labor).[207] This reduction may stem from three general mechanisms. First, granting APRNs and PAs more authority and autonomy can increase the number of these providers, particularly in areas that lack an adequate supply of physicians.[208] This mechanism may manifest as more CNMs attend births relative to their physician colleagues following the liberalization of APRN SOP laws. Second, relaxing SOP laws may better enable APRNs and PAs to meet patients' demand for their services, especially in isolated areas or settings where physicians have historically not practiced, because they are not as tightly tethered to physicians.[209] In general, both of these mechanisms directly result in APRNs and PAs providing more care and therefore lead to the effects described. Finally, a third mechanism may lead to the effects described above via a change in physician practice patterns. Under less strict SOP laws, APRNs and PAs can better compete with physicians.[210] This increased competition may induce physicians to practice more like APRNs and PAs to the extent patients demand the latter's practice styles (i.e., providing less intensive treatments).

In changing the provision of care through these mechanisms, relaxed SOP laws likely operate primarily through CNMs, as these providers are heavily involved in the provision of obstetric care. However, I include other APRNs (particularly NPs) and PAs in the analysis because, while they may be less involved in obstetric care

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204. Berkowitz & White, *supra* note 45, at 41.

205. *See id.* at 40 (explaining that relying on PAs as "laborists" can reduce the need for technology-heavy interventions such as C-sections and inductions).

206. *Id.*

207. *See* Markowitz et al., *supra* note 10, at 204 (offering a similar discussion of these effects).

208. McMichael, *supra* note 4, at 759–64.

209. GILMAN & KOSLOV, *supra* note 8, at 30 ("APRNs may find it particularly difficult to [secure physician supervision] in rural or other underserved areas where collaborating physicians are in short supply."); *see* Kleiner et al., *supra* note 10, at 274–77 (finding that APRNs are better able to control their own labor output when they can practice independently). GILMAN & KOSLOV, *supra* note 8, at 30 ("APRNs may find it particularly difficult to [secure physician supervision] in rural or other underserved areas where collaborating physicians are in short supply.").

210. GILMAN & KOSLOV, *supra* note 8, at 38–39.

than CNMs, relaxed SOP laws directly impact their ability to care for patients in contexts that affect obstetric outcomes. For example, if a women's health NP can provide more prenatal care under relaxed SOP laws, this care may obviate the need for a C-section later.[211] Relatedly, if PAs can better care for laboring mothers under relaxed SOP laws, then physicians may be under less pressure to provide C-sections.[212]

Turning next to the joint effect of SOP laws and malpractice pressure, these two legal regimes may interact to further affect healthcare beyond the independent effects of each regime. As APRNs and PAs gain more authority and autonomy with less restrictive SOP laws, they also bear more malpractice pressure because patients' ability to hold physicians vicariously or directly liable for medical errors involving APRNs and PAs is diminished.[213] And this may lead to differential effects of relaxing SOP laws on obstetric care, depending on the malpractice pressure faced by providers.

In particular, individual APRNs and PAs may make different treatment decisions when their SOP laws are relaxed depending on whether they face relatively high or low malpractice pressure. Because their malpractice risk is lower in states that require physician supervision—and physicians' malpractice risk is commensurately higher—APRNs and PAs may not consider the liability implications of their individual decisions. However, as they gain more autonomy and therefore see an increase in their malpractice risk—physicians see a commensurate decrease in their risk—APRNs and PAs may start to more carefully consider the liability implications of their decisions. Thus, granting APRNs and PAs more autonomy may have different effects on the decisions they make depending on the malpractice pressure they face.

Figure 3, which depicts a hypothetical (and representative) CNM, illustrates the differential effect of relaxing SOP laws across different levels of malpractice pressure. This CNM initially practices in a state with restrictive SOP laws. Based on these laws, her malpractice risk is quite low—patients can relatively easily pursue (direct or vicarious) claims against her supervising physician. Now suppose that the CNM's state grants APRNs independence, which both increases the ability of the CNM to provide care (including less intensive care) and increases her malpractice liability risk because patients can no longer as easily hold her supervising physician liable.

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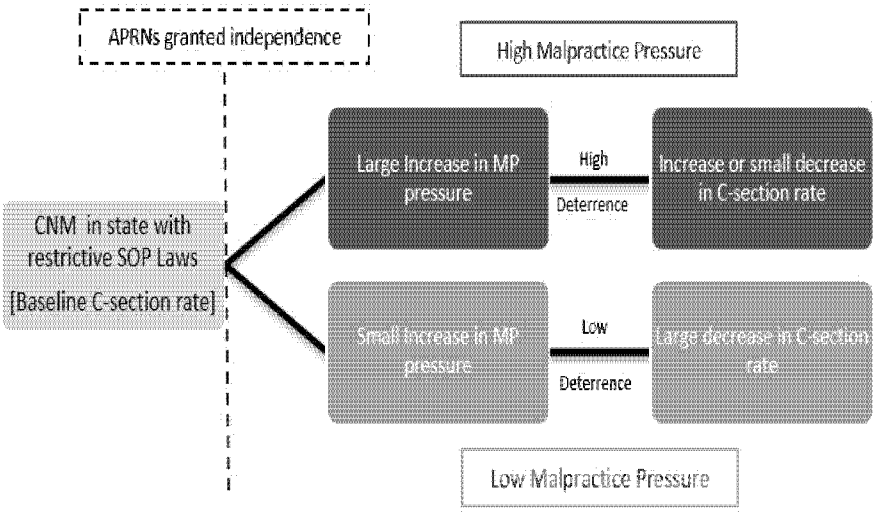
211. *See* Doyle & Silber, *supra* note 47, at 50–54.
212. Berkowitz & White, *supra* note 45, at 40.
213. McMichael et al., *supra* note 15, at 322–24; *see supra* Section II.B.

Figure 3: Effect of Malpractice Pressure and Scope-of-Practice Laws Generally



Suppose further that this state is one with low malpractice pressure generally—represented by the lower (light gray) path in Figure 3. This low level of malpractice pressure may be the result of tort reforms, a legal culture that generally disfavors litigation, a healthcare culture that generally encourages dispute resolution outside of the legal system, or any of myriad other reasons. If the CNM is granted independence in this type of state, the malpractice pressure she faces will increase relatively slightly. While patients will find it more difficult to hold her supervising physician liable after independence, the marginal increase in malpractice pressure the CNM will experience will not be substantial because her state generally has low malpractice pressure. Consistent with prior evidence, this newly independent CNM will recommend C-sections at lower rates, helping to lower the C-section rate overall.[214] Because the malpractice pressure is low in this state, the CNM will not face substantial pressure to recommend more C-sections in hopes of staving off malpractice claims. The net effect, therefore, will be a lower C-section rate.

On the other hand, suppose that the state where the CNM practices has high malpractice pressure—represented by the upper (dark gray) path in Figure 3—which may be the case for a variety of reasons. If the CNM is granted independence in this type of state, she will see a substantial jump in her malpractice pressure because, once their ability to pursue claims against physicians is curtailed, patients will pursue claims at relatively high rates against CNMs. Thus, the marginal increase in malpractice pressure faced by the CNM following independence will be substantial. Accordingly, although this CNM may wish to treat patients less intensively by recommending fewer C-sections, the malpractice pressure she faces will dissuade her from doing so. The net effect will be, at minimum, a smaller decrease in the C-

214. Markowitz et al., *supra* note 10, at 216–17.

section rate than if the state had low malpractice pressure. Potentially, the C-section rate may remain unchanged or even increase.

Magnifying these effects, which pertain to a representative CNM, is the potential for changes in SOP laws to impact the number of providers. Though the evidence is somewhat mixed, some work suggests that physicians avoid areas with high malpractice pressure.[215] Similarly, more APRNs and PAs work in areas that (1) have low malpractice pressure and (2) grant them more autonomy.[216] Accordingly, relaxing SOP laws in areas with low malpractice pressure may result in a larger marginal increase in the supply of APRNs and PAs relative to a similar relaxation of laws in areas with high malpractice pressure. This would have the effect of magnifying the impacts discussed above, with C-section rates decreasing even more in areas with low malpractice pressure and decreasing even less (or increasing) in areas with high malpractice pressure than would occur absent changes in the supply of providers.

In general, the interaction of SOP laws and malpractice pressure may have important effects on the healthcare workforce and, in turn, on the provision of healthcare. Despite the importance of these factors, no prior work has investigated how the interaction of SOP laws and malpractice pressure may impact the delivery of healthcare. This Article fills that gap in the literature by specifically investigating the impact of these different legal regimes on the provision of obstetric care.

C. Empirical Methodology

The goal of the empirical analysis is to generate evidence on the causal impact of SOP laws and malpractice pressure on the provision of obstetric care. Establishing a causal relationship between legal changes and healthcare outcomes—as opposed to merely an association between the two—is not straightforward. Ideally, 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.[217] This assignment would further vary so that some providers practiced subject to high malpractice pressure and others to low malpractice pressure. This type of random assignment would facilitate a straightforward statistical analysis that could reveal the causal impacts of these legal changes on the provision of obstetric care. While such a laboratory-type experiment is not possible for a variety of ethical, political, legal, and financial reasons, the goal of my empirical analysis is to mimic such an experiment as closely as possible,

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215. *See* David A. Matsa, *Does Malpractice Liability Keep the Doctor Away? Evidence from Tort Reform Damage Caps*, 36 J. LEGAL STUD. S143, S165 (2007) (finding that reducing malpractice pressure via tort reform does not increase the supply of physicians generally but does increase the supply of specialist physicians in rural areas).

216. McMichael, *supra* note 4, at 764–65.

217. *See* J. Shahar Dillbary, Griffin Edwards & Fredrick E. Vars, *Why Exempting Negligent Doctors May Reduce Suicide: An Empirical Analysis*, 93 IND. L.J. 457, 482 (2018) (referring to a laboratory experiment as the "gold standard"); Michael D. Frakes, *The Surprising Relevance of Medical Malpractice Law*, 82 U. CHI. L. REV. 317, 364 (2015) (discussing idealized laboratory settings when examining the impact of changes in laws).

eliminating as many potential confounding factors as possible in order to isolate the effects of the legal regimes under investigation.

One way to achieve this goal is to use what has been called a natural policy experiment to draw causal inferences about the effect of different legal regimes. Here, the primary "treatment" under investigation is whether an individual provider practices under a relaxed or restrictive SOP regime. Further, these regimes are layered on top of areas with high or low malpractice pressure. Because some states changed their SOP laws while others did not and because states experienced different levels of malpractice pressure, "treatment" (states with a particular type of SOP law or malpractice pressure) and "control" groups are readily available for analysis. However, while the adoption of new SOP laws at different points in time by different states, which also experienced different levels of malpractice pressure, offers convenient "treatment" and "control" groups, the assignment of any given state to one of these groups is almost certainly not random. Without random assignment to these groups, the simple statistical comparisons one might see in a laboratory setting are not sufficient to provide evidence of the causal effects of legal changes on the provision of healthcare.

Focusing on the effect of APRN SOP laws on C-sections as an example,[218] one straightforward way to examine this effect is to simply compare births in states that allow APRNs to practice independently with births in states that restrict APRNs' practices. By doing so, it is possible to calculate differences in the probability that a particular patient receives a C-section in the two different groups. However, this calculation does not yield evidence of a causal relationship because individual states differ along many dimensions beyond their APRN SOP laws (e.g., differences in myriad other laws and differences in the availability of healthcare or health insurance). These differences, many of which are hidden in even the best datasets, would almost certainly confound any attempt to estimate the effect of APRN SOP laws by simply comparing obstetric outcomes across states. To address these issues, another way to analyze the impact of APRN SOP laws is to compare obstetric outcomes within the same state before and after that state changes its SOP law. Unfortunately, this approach also suffers from problems, as provider treatment patterns, health care norms, legal norms, and many other factors are almost certainly changing over time for many different reasons. Even if information on all these factors were available—and often such information does not exist—disentangling the impacts of all these factors from the impact of APRN SOP laws on C-sections would be impossible.

The fundamental issue with both of these approaches is the absence of a valid control group. Using either approach, there are good reasons to believe that different factors may systematically affect births occurring both when APRNs can practice independently and when APRNs are restricted. To address these issues and construct a valid counterfactual against which to compare the "treatment" group, social scientists rely on difference-in-differences models. These models involve undertaking both of the calculations above simultaneously. Specifically, these models allow for the comparison of trends in C-sections over time across the treated

218. The discussion here is applicable to all of the legal regimes and obstetric outcomes under investigation. I focus on APRN SOP laws and C-sections solely for ease of explanation.

and control groups. By doing so, it is possible to account for factors that may influence C-sections—even if it is impossible to observe the factors themselves—and thereby isolate the amount of change in C-section rates that is attributable to APRN independence. In other words, difference-in-differences models "difference out" all of the unobserved factors that may affect birth outcomes over time and within individual states, thus isolating the causal effect of APRN independence (or any other legal regime under investigation).

As a hypothetical example, consider Kentucky and Tennessee. Suppose that Tennessee passed a law that took effect in 2013 granting APRNs independence, while Kentucky never passed such a law. Suppose further that the numbers of C-sections per 100 births in Kentucky and Tennessee in 2012 were 35 and 50, respectively. In 2013, these rates each decreased to 25 and 30, respectively. Assume that, had Tennessee never passed its new SOP law, C-section rates there would have followed the same trend they followed in Kentucky. Simply comparing Kentucky and Tennessee in 2013 would suggest that allowing APRNs to practice independently results in 5 fewer C-sections. Comparing Tennessee to itself before and after it passed the new law would suggest that APRN independence is associated with 20 fewer C-sections. However, neither of these calculations isolates the role of APRN independence in C-section rates. To isolate this effect, calculating a difference-in-differences is necessary. First, I calculate the differences in C-sections in both Kentucky (25 – 35 = -10) and Tennessee (30 – 50 = -20) before and after Tennessee passed its new law. Second, I calculate the difference between the two differences from step one (i.e. -20 – (-10) = -10) to conclude that APRN independence reduces C-sections by 10. Because this calculation effectively nets out the idiosyncratic, unobservable factors unique to Tennessee, as well as factors that change over time in both states, it isolates the effect of APRN independence on C-section rates.

Extending this approach to examine whether granting APRNs independence has a differential effect across different levels of malpractice pressure, suppose that North Carolina also began allowing APRNs to practice independently in 2013 and that North Carolina experiences higher levels of malpractice pressure than Tennessee. Assume that C-section rates per 100 births in North Carolina were 40 and 28 in 2012 and 2013, respectively. Repeating the difference-in-differences calculation for North Carolina, again using Kentucky as the control state, implies that APRN independence decreases C-sections by 2.[219] Comparing this result to the earlier result—a decrease of 10—implies that, while granting APRNs independence always results in lower C-section rates, the size of this decrease is larger in states with low malpractice pressure than states with high malpractice pressure.

While this straightforward example focusing on APRN independence, two levels of malpractice pressure, and C-section rates captures the essence of my empirical approach, the actual empirical models are substantially more complex. These models exploit the staggered adoption of changes in both APRN and PA SOP laws across

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219. First, I calculate the differences in C-section rates in Kentucky (25 – 35 = –10) and North Carolina (28 – 40 = –12) before and after North Carolina passed its new law. Second, I calculate the differences from step one (–12 – (–10) = –2) to conclude that APRN independence decreases C-section rates by 2.

four different levels of malpractice pressure. And they extend to outcomes beyond C-sections. With over sixty-nine million observations included in the primary models, they take advantage of a rich set of information to arrive at robust estimates of the roles that SOP laws and malpractice pressure play in obstetric outcomes.

Throughout the analysis, I estimate ordinary least squares (OLS) regression models. Complete technical details on these models, including the full econometric specification, are provided in the *Technical Appendix*.[220] The dependent variable in each model is an indicator variable that equals one when a specified outcome occurs and zero otherwise. The mean of an indicator variable is an estimate of the probability with which the relevant outcome occurs.[221] For example, an indicator variable for C-sections equals one when a C-section is performed in a given birth. Among 200 births, 60 of which involved a C-section, the mean of the relevant indicator would be 0.3,[222] implying a C-section rate of 30%. Because regression models estimate the change in the conditional mean of the dependent variable attributable to different independent variables, the models I estimate can provide estimates of the change in the probability of a given outcome occurring attributable to different independent variables.

Across multiple models, I examine several different outcomes. First, when examining C-sections, the dependent variable in each model is an indicator for whether a C-section was performed. The primary model focuses on all births and C-sections. Subsequent models maintain the same dependent variable but are limited to low-risk births and high-risk births. I also separately examine elective C-sections and VBACs, and in those models, the dependent variable is an indicator for whether an elective C-section or VBAC was performed, respectively. Second, when examining inductions, the primary models include as the dependent variable an indicator for whether labor was medically induced. Subsequent models include an indicator for whether an elective induction was performed. Finally, to examine the effect of APRN SOP laws on the rate at which CNMs attend births, I estimate models that include an indicator for whether a CNM was the provider responsible for the birth as the dependent variable.[223]

Throughout the analysis, I estimate linear probability models (LPM).[224] In each model focusing on APRN SOP laws and malpractice pressure, I include an indicator

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220. McMichael, *supra* note 31.

221. *See* Currie & MacLeod, *supra* note 16, at 818, 821 (interpreting the results of models with indicator variables as the dependent variables as changes in probabilities); McMichael et al., *supra* note 144, at 372–75 (making the same interpretation).

222. Here, the mean is: $\frac{(60\times1)+(140\times0)}{200} = 0.3$.

223. Because PA laws do not directly impact the ability of CNMs to attend births, I limit my analysis of CNM-attended births to consider only APRN SOP laws.

224. LPMs are OLS regression models that include an indicator as the dependent variable. I estimate LPMs instead of nonlinear models, such as probit and logit models, in my analysis because this analysis focuses on the interaction between indicator variables. As prior work has noted, interpreting interaction terms in nonlinear models is not straightforward. Chunrong Ai & Edward C. Norton, *Interaction Terms in Logit and Probit Models*, 80 ECON. LETTERS 123, 123–30 (2003). Prior work focusing on similar outcomes has likewise employed LPMs instead of nonlinear models. Markowitz et al., *supra* note 10, at 207; Currie & MacLeod, *supra* note 16, at 818.

variable for whether a birth took place in a state and year in which APRNs were allowed to practice independently, separate indicator variables for different levels of malpractice pressure, and an interaction between the APRN independence indicator variable and the malpractice pressure indicators. When focusing on PA SOP laws and malpractice pressure, an indicator for PA autonomy replaces the indicator for APRN independence.

Because the primary models involve multiple indicator variables and interactions between them, I report the primary results graphically to facilitate interpretation. Specifically, after estimating the regression models, I use the estimated coefficients to calculate the effect of APRN independence (or PA autonomy) across different levels of malpractice pressure. In all cases, I use states with restrictive SOP laws—restricted practice for APRNs and limited practice for PAs—and the lowest levels of malpractice pressure as the baseline case. The effects of liberalizing SOP laws across different levels of malpractice pressure are then reported as differences from this baseline. Complete details on these calculations are provided in the *Technical Appendix* along with complete regression results.[225]

In addition *to* the independent variables of interest, each model includes a series of variables to control for factors that may affect the decision of how to deliver the infant. Because the mother's age can influence delivery method, I include a series of indicator variables for the mother's age in five-year increments from fifteen to fifty. I also include a series of indicators for the mother's race (African American or black, Asian, Native American, and Hispanic with white as the omitted category) and education level (unknown education level, less than high school, high school, some college, and college with more than college as the omitted category). Finally, I include an indicator for whether the infant is female and a series of indicators for multiple births. Collectively, these variables control for demographic and medical factors that prior work has shown can influence obstetric outcomes, thereby better allowing the models to isolate the impact of SOP laws and malpractice pressure from these other factors.[226] Importantly, all of the models include indicator variables for states and years. The inclusion of these variables is the key to estimating difference-in-differences models as described above. These state and year indicators control for idiosyncratic, unobserved factors specific to each state and linear and nonlinear trends in the outcomes of interest over time, respectively. Throughout the analysis, I cluster the standard errors at the state and year levels to account for the possibility of serial autocorrelation.[227]

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225. McMichael, *supra* note 31.

226. *See* Frakes, *supra* note 99, at 262 n.11 (noting that his models focusing on obstetric outcomes include similar control variables).

227. To address the possibility that obstetric outcomes are correlated within particular states and years, I estimate standard errors clustered at the state and year levels. *See* Marianne Bertrand, Esther Duflo & Sendhil Mullainathan, *How Much Should We Trust Differences-In-Differences Estimates?*, 119 Q.J. ECON. 249, 254 (2004) (noting that clustering can address the problem of serial autocorrelation).

D. Results and Discussion

Before delving into the different effects of SOP laws across different levels of malpractice pressure, I first examine SOP laws in isolation to determine whether, using my classification scheme, the estimated effects of these laws are consistent with prior work.[228] Figure 4 reports results for the effects of different SOP laws on obstetric outcomes. Panel A reports the results from a series of regressions that focus on the effect of allowing APRNs to practice independently, and Panel B provides similar results focusing on the effect of allowing PAs to practice autonomously.[229] Each point represents the effect of the relevant SOP law on the given obstetric outcome,[230] and the bars represent the 90% confidence intervals.[231] Focusing on the APRN SOP law results in Panel A, allowing APRNs to practice independently results in a 0.8 percentage point increase in the probability of having a CNM attend a birth. While this may seem like a small change, it represents an 11% increase relative to states that do not allow APRNs to practice independently, implying that relaxing SOP laws better allows APRNs to provide care to patients.

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228. *See* Markowitz et al., *supra* note 10, at 209–16 (reporting the results of models that used a different classification of SOP laws).

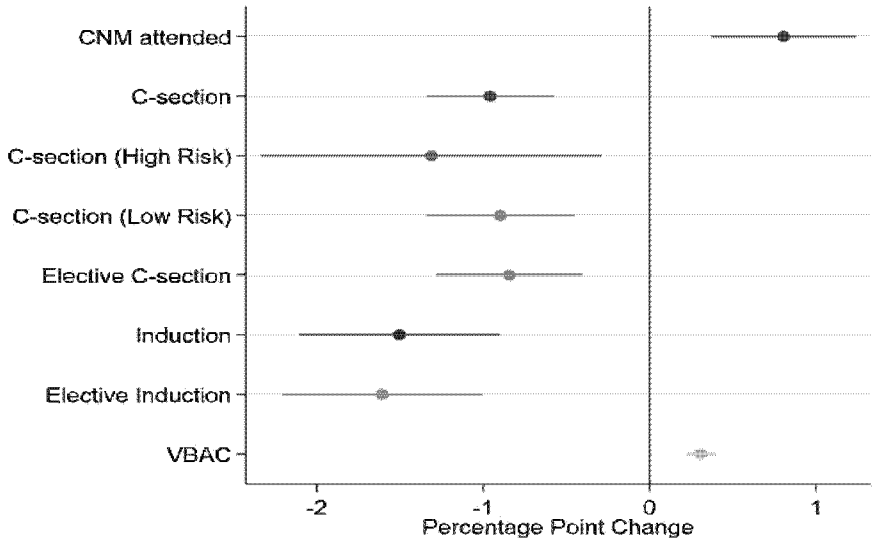
229. Each point represents a coefficient estimate derived from a separate regression model. Individual models include an indicator variable for whether APRNs may practice independently, a full set of control variables, and a full set of state and year fixed effects. Full regression results are available in the *Technical Appendix*, *supra* note 31.

230. Because all of the regression models have an indicator as the dependent variable, each coefficient may be interpreted as a percentage point change in the probability that the outcome of interest occurs. To facilitate interpretation, Figure 2 reports the marginal effects (in terms of percentage point changes) instead of the raw coefficient estimates.

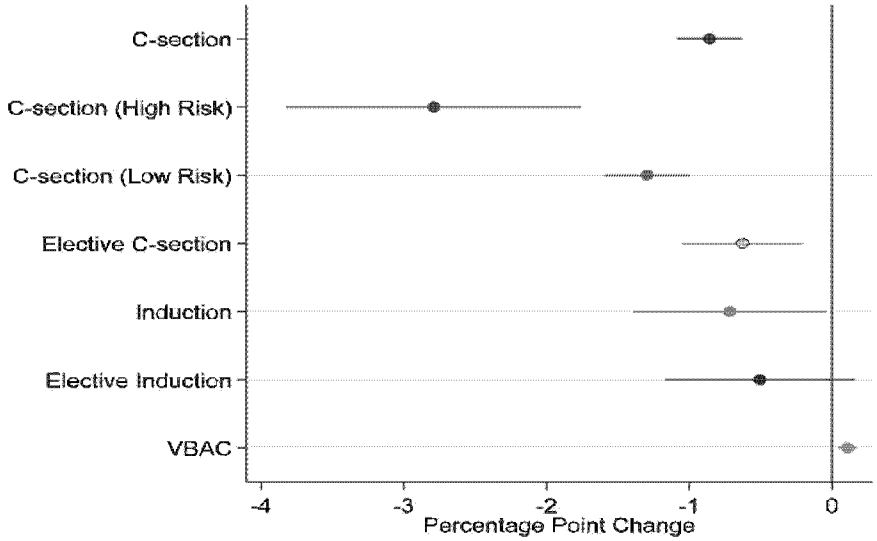
231. When the bar representing the confidence interval does not intersect with the vertical line indicating zero, the effect associated with that bar is statistically significant.

Figure 4: Effect of Scope-of-Practice Laws on Labor and Delivery Procedures

Panel A: Effect of APRN Scope-of-Practice Laws



Panel B: Effect of PA Scope-of-Practice Laws



Note: Each point represents the coefficient on *APRN independence* (Panel A) or *PA autonomy* (Panel B). Error bars represent the 90% confidence intervals and are calculated based on standard errors clustered at the state and year levels. Each point is derived from a separate regression model. The dependent variable in each model is an indicator for whether the birth involved the outcome listed on the left. All regression models include a full set of control variables and state and year fixed effects.

As with the probability that a CNM attends a birth, APRN SOP laws have their anticipated effect on the other labor and delivery outcomes. The probability a patient receives a C-section decreases by 1 percentage point—a 3% decline relative to states that restrict the practices of APRNs. C-sections on high- and low-risk patients decline by 1.3 and 0.9 percentage points, respectively, and elective C-sections decrease by 0.8 percentage points. Similarly, allowing APRNs to practice independently reduces inductions and elective inductions by 1.5 and 1.6 percentage points, respectively. Consistent with the reduction in C-sections, the rate of VBACs increases slightly by 0.3 percentage points.[232]

As the results reported in Panel B indicate, [233] allowing PAs to practice with autonomy has the anticipated effects on labor and delivery outcomes.[234] PA autonomy has approximately the same impact on C-sections and low-risk C-sections as APRN independence. However, at a 2.8 percentage point reduction in high-risk C-sections, PA autonomy has a larger impact than APRN independence. This larger impact is consistent with PAs focusing on more medically complex patients than APRNs. The effect of PA autonomy on inductions and elective inductions is less than half the magnitude of the effect of APRN independence, and the effect on elective inductions is not statistically significant. Again, these effects are consistent with PAs focusing more on medically complex patients and APRNs having a broader impact on less complex patients. Finally, PA autonomy slightly increases VBAC rates, but not as much as APRN independence.

Overall, the results for APRN SOP laws are consistent with prior work,[235] despite the use of somewhat different classifications of these laws. And the results for PA laws, while smaller in magnitude than those for APRN laws, demonstrate that allowing PAs to practice with more autonomy can impact the delivery of healthcare. Importantly, the results in Panel B represent the first empirical evidence of an effect of PA SOP laws on the provision of obstetric care.

Extending the analysis to examine the joint effect of SOP laws and malpractice liability, Figures 5–7 present the effect of SOP laws across different levels of malpractice pressure. These figures summarize a series of regression results to illustrate the joint impact of SOP laws and malpractice pressure on obstetric care. In particular, each point in these figures represents the effect of the specified SOP law in the specified malpractice quartile.[236] In all figures, the baseline (for purposes of

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232. A reduction in C-section rates has countervailing effects on VBAC rates. On one hand, fewer C-sections means more vaginal births, which should increase VBAC rates. On the other hand, fewer C-sections means that there are fewer patients who have previously had a C-section and thus fewer patients who can vaginally deliver after a C-section. The estimates reported here represent the combined effect of these two mechanisms.

233. Because PA SOP laws do not legally affect the practices of CNMs, the specification with an indicator for whether PA autonomy impacts the probability that a CNM attends a birth is omitted. In general, PA autonomy does not have a statistically significant effect on this outcome.

234. Full regression results are available in the *Technical Appendix*, *supra* note 31.

235. *See* Markowitz et al., *supra* note 10, at 209–16 (reporting similar results).

236. Each point represents the effect of the given SOP law within the given malpractice pressure quartile and is calculated from the individual coefficient estimates from a regression

comparison) is the most restrictive SOP law in the first malpractice pressure quartile. The bars connected to each point represent the 90% confidence intervals.[237]

Figure 5 reports the joint effect of APRN SOP laws and malpractice pressure on the probability that a CNM attends a birth (Panel A) and the probability that the patient undergoes a C-section (Panel B). At low levels of malpractice pressure, allowing APRNs to practice independently has the anticipated effect—CNM-attended births increase and C-sections decrease. However, these effects clearly dissipate as malpractice pressure increases. The probability of undergoing a C-section in a state that allows APRNs to practice independently and has the highest level of malpractice pressure is almost exactly the same as the probability of undergoing a C-section in a state that restricts the practices of APRNs but has the lowest level of malpractice pressure.[238] Similarly, while the probability of having a CNM attend a birth increases by 2 percentage points in states with the lowest levels of malpractice pressure once APRNs can practice independently, CNMs are slightly *less* likely to attend a birth in states that allow independent practice and have the highest levels of malpractice pressure.

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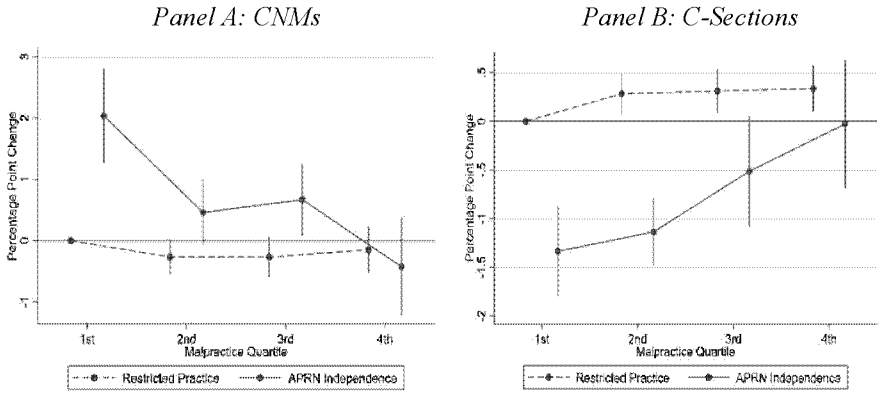
model that includes an indicator for APRN independence, indicators for different malpractice pressure quartiles, and interactions between the APRN independence indicator and the malpractice pressure quartile indicators. Full details of this calculation are provided in the *Technical Appendix*, *supra* note 31.

237. When the bar representing the confidence interval does not intersect with the vertical line indicating zero, the effect associated with that bar is statistically significant.

238. Of note is the fact that the restricted-practice and APRN-independence lines never cross in Figure 5. Thus, while the probability of undergoing a C-section is approximately the same in the highest malpractice pressure quartile in independence states and the lowest malpractice pressure quartile in restricted-practice states, allowing APRNs to practice independently always reduces C-section rates. Comparing independence states and restricted-practice states in the highest malpractice pressure quartile (the two rightmost points) demonstrates that the independence states have lower C-section rates.

Figure 5: Effect of APRN Scope-of-Practice Laws on Delivery Outcomes



Note: Each point represents the effect of the given SOP law within the given malpractice pressure quartile. Each point is calculated from the individual coefficient estimates from a regression model that includes a full set of control variables and state and year fixed effects. Error bars represent the 90% confidence intervals, which are based on standard errors clustered at the state and year levels.

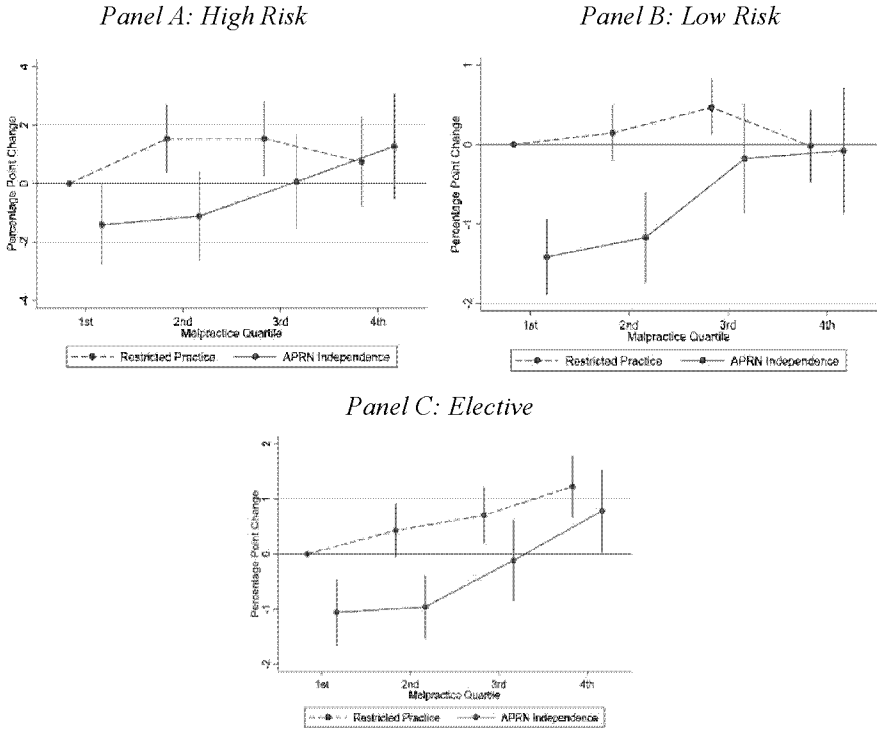
Collectively, these CNM and C-section results demonstrate that the effect of SOP laws is not constant across different levels of malpractice pressure. And, importantly, these results are consistent with the threat of liability impacting the decisions made by individual healthcare providers. They suggest that CNMs are less willing to attend births after being granted independence in areas with high malpractice pressure. Instead, CNMs continue to rely on physician supervision and the shifting of liability (toward physicians) that this entails. As demonstrated by the relatively flat line (and lack of statistical significance) for CNM-attended births in states that restrict APRN practices, CNMs do not generally respond to malpractice pressure in states that require physician supervision. However, they clearly respond—by attending fewer births—to malpractice pressure in states where they can practice independently and bear more responsibility for their own malpractice.

A similar pattern is present in the C-section results. While allowing APRNs to practice independently results in a relatively large decrease in the probability of a C-section when malpractice pressure is low, it has essentially no effect when malpractice pressure is high. At the same time, C-section rates remain relatively stable across different levels of malpractice pressure in states that restrict APRN practices. Thus, these results suggest that APRNs respond to malpractice pressure when they can practice independently and therefore bear greater malpractice risk. This is consistent with malpractice liability exerting a greater deterrent effect when APRNs can practice independently.[239]

239. While these results demonstrate that malpractice pressure exerts greater deterrence when APRNs can practice independently, that does not necessarily mean that it induces the optimal level of C-sections. Rather, the results only imply that APRNs respond more strongly to malpractice pressure when they can practice independently.

The results in Figure 6 tell a similar story, with APRN independence having the greatest effect on the use of C-sections in high-risk and low-risk pregnancies at the lowest levels of malpractice pressure (Panels A and B). APRN independence also has a larger negative effect on elective C-sections at low levels of malpractice pressure and, interestingly, has a positive effect on elective C-section rates at the highest levels of malpractice liability (Panel C). Since elective C-sections are, by definition, not medically indicated and therefore most susceptible to the influence of nonmedical factors, such as malpractice liability, the positive and statistically significant effect of high malpractice pressure and APRN independence suggest that APRNs respond to malpractice pressure more strongly when they face higher malpractice liability risk for their own acts and omissions.

Figure 6: Effect of APRN Scope-of-Practice Laws on C-sections



Note: Each point represents the effect of the given SOP law within the given malpractice pressure quartile. Each point is calculated from the individual coefficient estimates from a regression model that includes a full set of control variables and state and year fixed effects. Error bars represent the 90% confidence intervals, which are based on standard errors clustered at the state and year levels.

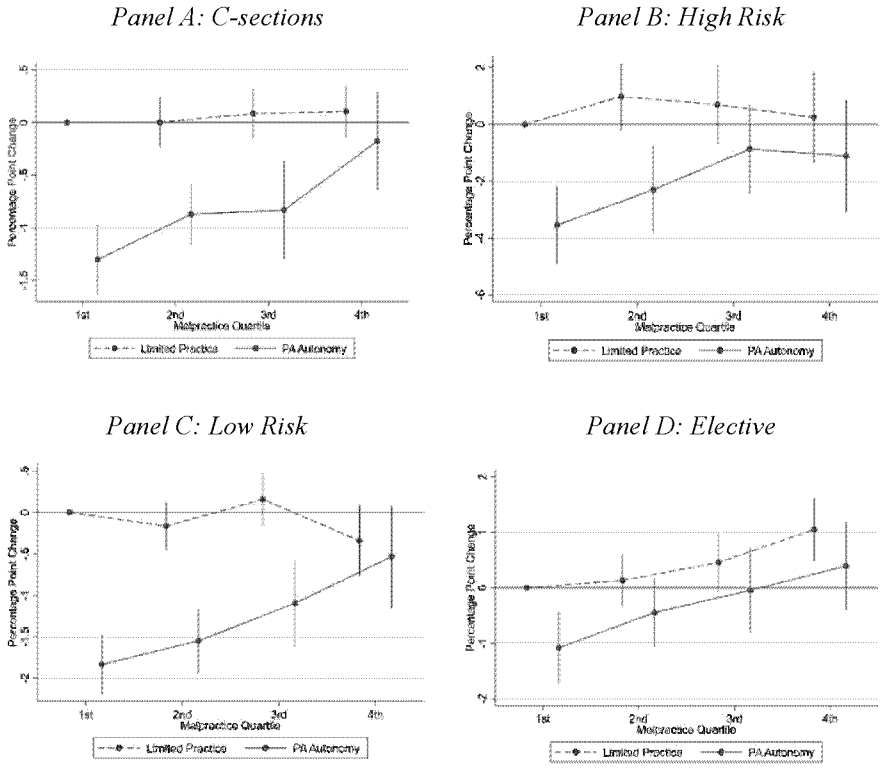
In the interest of succinctness, the effects of APRN SOP laws across different levels of malpractice pressure on inductions and VBACs are reported in Figure A1

in the *Technical Appendix*.[240] In general, the joint effect of APRN SOP laws and malpractice pressure on these outcomes is not as clear as on C-sections. Figure A1 provides evidence that SOP laws alone affect these outcomes, but the lines for restricted practice and independent practice generally follow similar patterns. Unlike the C-section results, in which the two lines converged, the relatively parallel paths in Figure A1 suggest that the effect of APRN independence does not vary substantially across different levels of malpractice pressure. This lack of an effect, however, provides some support for the conclusion that healthcare providers respond to the threat of liability, as inductions and VBACs do not involve the same risk calculations (in terms of liability) as C-sections.

With respect to PAs and the SOP laws that govern them, a similar pattern of effects emerges. Figure 7 reports the joint effect of malpractice pressure and PA laws on C-sections. As reported in Panel A, which focuses on all C-sections, allowing PAs to practice autonomously generally lowers C-section rates. However, as with allowing APRNs to practice independently, this negative effect dissipates as malpractice pressure increases. This pattern of effects is most obvious in C-section rates among low-risk pregnancies (reported in Panel C), though it is apparent in C-sections generally (Panel A) and C-section rates among high-risk pregnancies (Panel B) as well. However, the limited practice and autonomous practice lines in Panel D of Figure 7 are nearly parallel, suggesting that the effect of allowing PAs to practice autonomously on elective C-sections does not vary substantially across different levels of malpractice pressure. Since elective C-sections would be particularly sensitive to malpractice pressure, these results imply PA SOP laws do not interact as strongly with malpractice pressure as APRN SOP laws. This, however, is not surprising because physicians always bear some responsibility for the actions of PAs, meaning the marginal effect of changing SOP laws across different levels of malpractice pressure is smaller for PAs than APRNs.

240. *Technical Appendix*, *supra* note 31, at A10.

Figure 7: Effect of PA Scope-of-Practice Laws on C-sections



Note: Each point represents the effect of the given SOP law within the given malpractice pressure quartile. Each point is calculated from the individual coefficient estimates from a regression model that includes a full set of control variables and state and year fixed effects. Error bars represent the 90% confidence intervals, which are based on standard errors clustered at the state and year levels.

Again, in the interest of succinctness, Figure A2 in the *Technical Appendix* reports the joint effect of PA SOP laws and malpractice pressure on inductions, elective inductions, and VBACs.[241] With respect to inductions and elective inductions, no obvious pattern emerges—either one that supports a clear effect of SOP laws individually, a clear effect of malpractice liability individually, or a clear joint effect. This lack of a clear effect is consistent with PAs not playing substantial roles in inductions. With respect to VBACs, there is a slight convergence in the limited practice and autonomous practice lines, particularly in the fourth quartile of malpractice pressure, but this convergence is relatively subtle compared to the other procedures examined here.

Overall, the results demonstrate that SOP laws impact the delivery of healthcare but that this impact is not constant across different levels of malpractice pressure. Allowing APRNs and PAs to practice independently and autonomously generally

241. *Id.* at A11.

lowers the probability with which an infant is delivered via C-section, but this decline is most pronounced in areas with low malpractice pressure. As malpractice pressure increases, this decline becomes less pronounced, and in some cases, even becomes an increase. This change in effect is consistent with APRNs, PAs, physicians, and other providers responding to the threat of malpractice liability. Attributing this change in effect to liability is supported by the general lack of a difference in effect of SOP laws across different levels of malpractice pressure on inductions. Relative to C-sections (and VBACs), inductions are generally less risky in terms of malpractice liability. Thus, the evidence that SOP laws have a relatively constant effect on inductions across different levels of malpractice pressure suggests that the different effects observed for C-sections stem from the threat of liability. Given these effects, a relevant question is whether the observed differences in choice of procedure attributable to SOP laws and malpractice pressure lead to different health outcomes.

Results for the joint effect of SOP laws and malpractice pressure on health outcomes are reported in the *Technical Appendix*.[242] Focusing just on SOP laws, I find that these laws either improve the health outcomes of both mothers and infants or have no statistically significant effect, with APRN SOP laws generally having stronger effects than PA SOP laws. This suggests that the results above indicating a decrease in the intensity of treatment for millions of women do not imply that these women or their infants suffer poorer health outcomes. Indeed, if anything, the decrease in treatment intensity results in improved health outcomes for both mothers and infants.[243] Extending the analysis to examine the joint effect of SOP laws and malpractice pressure, I find some evidence of a joint effect. However, this evidence is generally weaker than that reported above, suggesting that, while the choice of delivery method is highly sensitive to SOP laws and malpractice pressure, health outcomes are less so.

IV. POLICY IMPLICATIONS AND A NEW APPROACH TO PATIENT SAFETY

Across multiple models focusing on different obstetric outcomes, I find strong and consistent evidence that relaxing the SOP laws governing APRNs and PAs affects obstetric outcomes and that this effect varies depending on the level of malpractice pressure faced by providers. This differential effect across different levels of malpractice pressure is consistent with the anticipated effects described above. It also suggests that restrictive SOP laws increase the malpractice risk faced by physicians and lower this risk for APRNs and PAs because, without this risk shifting in the first instance, there is no reasonable way to explain the differential effect of liberalizing SOP laws across different levels of malpractice pressure. This Part explores the policy implications of these results.[244] It first discusses how these

242. *Id.*

243. These results are consistent with the WHO's conclusions that C-section rates above 10% do not generally improve population health outcomes and may actually result in poorer outcomes. *See* Betrán et al., *supra* note 25.

244. One set of important implications not fully explored here is how gender affects the results reported above in at least two specific ways. First, with respect to malpractice liability, Jamie Abrams has argued that gender expectations distort tort law as applied to obstetric care

results fit into the current understanding of licensing laws. Next, it explores how the results, combined with prior evidence, suggest a new understanding of the role of malpractice liability in the provision of healthcare. Finally, it uses the consistent evidence of a joint effect of SOP laws and malpractice pressure to suggest a novel way to resolve the ongoing debate over SOP laws by incorporating malpractice liability and tort law into this debate.

A. The Role of Licensing Laws in the Provision of Healthcare

In general, the results of my empirical analysis add to a growing body of evidence that allowing APRNs to practice independently generates important benefits for patients. The results for APRN SOP laws are consistent with prior work and build on the existing body of evidence in two important ways. First, while prior work has narrowly focused on the laws governing CNMs,[245] the analysis here examines the laws governing APRNs more generally (including CNMs).[246] Second, in examining APRNs more broadly, the analysis here considers a different classification of APRN SOP laws than that used by the Markowitz study and other prior work.[247] This classification scheme focuses more specifically on individual laws and can therefore provide policymakers important information about which laws to amend if they wish to achieve lower C-section rates and treatment intensity consistent with WHO guidelines.

With respect to PA SOP laws, the results reported here are the first empirical evidence concerning the effect of these laws on obstetric outcomes and some of the first rigorous empirical evidence on PA SOP laws more generally. In general, PA SOP laws have not received the same amount of attention in the academic literature as have APRN SOP laws. This may stem from the facts that APRNs outnumber PAs, classifications of PA SOP laws are less readily available, and PAs can never practice independently (meaning the differences in PA SOP laws are subtler). Whatever the reason, PAs can clearly impact the provision of healthcare and the evidence

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because of its tendency to emphasize fetal harm over maternal harm. Jamie R. Abrams, *Distorted and Diminished Tort Claims for Women*, 34 CARDOZO L. REV. 1955, 1995–97 (2013). Second, Nancy Lugo has argued that SOP laws also raise gender implications because APRNs are more often women, though her argument is not specific to obstetric care. Nancy Rudner Lugo, *Full Practice Authority for Advanced Practice Registered Nurses Is a Gender Issue*, ONLINE J. ISSUES NURSING (May 2016), http://ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/TableofContents/Vol-21-2016/No2-May-2016/Articles-Previous-Topics/Full-Practice-Authority-for-APRN.html [https://perma.cc/M6QD-RM5Z]. While exploring the gendered implications of the results is beyond the scope of this Article, future work could fruitfully explore these important issues.

245. *See, e.g.*, Markowitz et al., *supra* note 10, at 209–16; D. Mark Anderson, Ryan Brown, Kerwin Kofi Charles & Daniel I. Rees, *The Effect of Occupational Licensing on Consumer Welfare: Early Midwifery Laws and Maternal Mortality* 6–9 (Nat'l Bureau of Econ. Research, Working Paper No. 22456, 2016).

246. While CNMs certainly play a central role in the delivery of obstetric care, other types of APRNs may directly and indirectly impact the provision of obstetric care (e.g., by providing prenatal care that obviates the need for a more intensive intervention at the time of delivery).

247. Markowitz et al., *supra* note 10, at 203–04; *see also, e.g.*, Kleiner et al., *supra* note 10, at 263–66.

presented here begins to fill an important gap in the understanding of healthcare workforce regulations and the effects of these regulations on healthcare outcomes.

The results for PA SOP laws suggest that, while amending these laws may not lead to as large or as pervasive of an effect on obstetric care as amending those governing APRNs, PA SOP laws can nonetheless impact the delivery of obstetric care. The effects of PA laws are generally concentrated on individual procedure choices—and less on outcomes affected by the availability of nonsurgical care—but the size and statistical significance of these effects demonstrates that reducing the restrictiveness of PA SOP laws should be considered alongside other strategies as a viable option to impact the provision of healthcare.

B. A New Understanding of Malpractice Liability

In addition to providing new evidence on the role of SOP laws, the results presented here offer new insight into the role malpractice liability plays in the healthcare system, particularly its propensity to interact with other legal regimes. Before delving into the implications of those interactions, however, it is worth noting that the results elucidate an underappreciated aspect of malpractice liability in healthcare. Specifically, the results reported here, when combined with existing empirical evidence, suggest that the size of the payments providers must make to resolve claims does not drive changes in their behavior. Rather, the prevalence and allocation of these payments appear to play more salient roles in determining how providers deliver care.

Much of the existing research on the role of tort liability in healthcare has focused on tort reforms designed specifically to reduce the size of malpractice awards and settlements. Caps on noneconomic damages have been at the center of many studies.[248] However, the evidence of the effectiveness of these caps, which focus explicitly on the size of awards, is mixed.[249] On the other hand, the evidence on the effect of legal changes that reallocate liability consistently shows that this reallocation impacts healthcare delivery. For example, Currie and MacLeod found that joint and several liability reform, which results in a reallocation of liability among physicians and hospitals, has a significant impact on obstetric care.[250] Frakes found that changing the standard of care (which determines whether a provider is liable in the first place) similarly has a significant effect on obstetric care.[251] The results presented here demonstrate that changes to SOP laws, which can affect the ability of patients to hold physicians liable and therefore affect the allocation of liability between physicians, APRNs, and PAs, result in changes in the delivery of obstetric care. Collectively, this evidence suggests that changes in how malpractice liability is allocated or determined in the first instance may result in more substantial

248. *See* MELLO & KACHALIA, *supra* note 18, at 33–39 (reviewing many of these studies).

249. *See id.* at 36 ("A reasonable conclusion to draw from this group of studies is that noneconomic damages caps have been shown to be associated with reductions in some, albeit not all, indicators of defensive medicine. The evidence about effects on healthcare spending is too varied to support a strong conclusion."); *see also* Paik et al., *supra* note 112, at 85 (explaining that they find mixed evidence on the effect of noneconomic damages caps).

250. Currie & MacLeod, *supra* note 16, at 819–21.

251. Frakes, *supra* note 99, at 268–71.

changes in the behavior of healthcare providers than reforms that affect the size of damages awards. As policymakers continue to debate the contours of tort law and malpractice liability, this evidence can inform the decisions that will determine the functioning of tort law going forward.

Turning next to the more specific contribution of the empirical analysis, the results demonstrate that providers respond to malpractice liability differently depending on the SOP laws in place, as the effects of restrictive SOP laws vary across different levels of malpractice pressure. This variation is consistent with SOP laws shifting risk among providers, increasing the risk of liability for physicians, and reducing it for APRNs and PAs. If restrictive SOP laws did not shift risk in this way, then there would be no differential response to different levels of malpractice pressure when SOP laws are relaxed. Instead, relaxing a particular SOP law would generate the same change in the outcome of interest across all levels of malpractice pressure. Thus, by demonstrating that relaxing SOP laws has different effects at different levels of malpractice pressure, the analysis demonstrates that maintaining restrictive SOP laws necessarily involves shifting liability risk from some providers to others.

Far from simply illustrating an intriguing quirk of the legal and healthcare systems, the evidence of liability shifting in the presence of restrictive SOP laws and of a differential response to malpractice liability when SOP laws are relaxed has important implications for the delivery of healthcare. First, the results demonstrate that APRNs and PAs, like physicians, respond to the threat of liability by changing how they provide care.[252] CNMs attend fewer births when malpractice pressure is high and when they face this pressure without the risk shifting of restrictive SOP laws. Similarly, APRNs and PAs do less to reduce treatment intensity (as measured by C-section and induction rates) when their liability risk increases. While this evidence alone is probably not sufficient to conclude that APRNs and PAs practice defensive medicine, it may be suggestive of that conclusion.[253] And it is certainly consistent with the conclusion that APRNs and PAs respond to the threat of malpractice liability. In other words, the evidence demonstrates that tort law can exert a deterrent effect on APRNs and PAs.

Second, the empirical evidence suggests that, by shifting liability risk among providers, restrictive SOP laws add a layer of complication to the legal and healthcare systems to the detriment of patients. Prior research has indicated that C-section rates in the United States are too high and that high levels of malpractice liability risk can exacerbate this problem.[254] By adding an additional layer of liability considerations (such as whether a particular SOP law increases the chances that a physician will be held vicariously liable or be subject to liability for negligent supervision) on top of existing considerations (such as whether performing C-sections reduces liability risk), restrictive SOP laws further complicate and obfuscate the already complex incentives created by malpractice liability. This additional layer

252. For an analysis of tort law's deterrent effect on physicians, see Black et al., *supra* note 17, at 109–12.

253. A full analysis of whether and to what extent APRNs and PAs practice defensive medicine is beyond the scope of the analysis presented here. However, future work should explore these questions.

254. Betrán et al., *supra* note 25, at 667; Boerma et al., *supra* note 154, at 1341.

of complication may further exacerbate both the underlying problem of too many C-sections and impede policymakers' ability to address this problem by reforming the laws governing malpractice liability.

For example, the evidence suggests that malpractice liability overdeters physicians when states maintain restrictive SOP laws because, in addition to their own liability risk, they bear direct and vicarious liability risks generated by APRNs and PAs. Because physicians are primarily responsible for C-sections, the fact that they are overdeterred by malpractice liability in the presence of restrictive SOP laws may further exacerbate the problem of high C-section rates. While physicians are overdeterred, malpractice liability commensurately underdeters APRNs and PAs since some patients will choose to pursue claims against supervising physicians instead of the APRNs and PAs who were directly involved in the underlying malpractice incident. Thus, within the same malpractice regime, different providers face markedly different incentives.

To the extent that policymakers wish to address inappropriately high C-section rates by reforming the laws around malpractice liability, they will face uniquely difficult challenges in doing so based on the different incentives created by malpractice liability for different types of providers. Any policy that realigns the malpractice risk for one group of providers necessarily misaligns it for another group of providers. Unless lawmakers can formulate policies that differentially affect physicians and APRNs/PAs in ways that precisely offset the difference in incentives created by restrictive SOP laws, addressing the malpractice-risk aspect of C-section rates will be next to impossible. While this insight and the empirical results that support it may, at first glance, seem discouraging from the perspective of advancing the debate over malpractice reform, they have encouraging implications for the debate over SOP laws. Indeed, they offer a path to resolving this ongoing and heated debate, and the next section follows this path in detail.

C. Liability as a Solution to the Scope-of-Practice Problem

In general, states justify SOP laws as necessary to encourage the provision of high-quality care and ensure patient safety more generally.[255] While these goals are certainly important and SOP laws may serve to promote them, overly restrictive SOP laws can be both "arbitrary"[256] and "anticompetitive,"[257] as the available evidence does not suggest that restrictive laws are necessary to ensure (or even generally promote) patient safety.[258] Indeed, "[t]he rationale for restrictive . . . SOP [laws] frequently invokes the differential training" completed by APRNs and PAs relative

255. GILMAN & KOSLOV, *supra* note 8, at 11 ("Together, licensure and scope of practice regulations for APRNs and other health care professionals serve important consumer protection objectives, including safety and quality.").

256. Kleiner et al., *supra* note 10, at 264.

257. GILMAN & KOSLOV, *supra* note 8, at 15.

258. *See* GILMAN & KOSLOV, *supra* note 8, at 7–16, 38 (reviewing the available evidence and concluding that restrictive SOP laws are not necessary to promote patient safety); *see also* DUNKER ET AL., *supra* note 11, at 3–9 (reaching the same conclusion for PA SOP laws); SCHIFF, *supra* note 11, at 4–10 (focusing on APRN SOP laws and reaching the same conclusion).

to that completed by physicians, as opposed to direct appeals to evidence suggesting that granting APRNs and PAs more authority or autonomy will result in greater risks to patient safety.[259] Contrary to promoting patient safety, SOP laws often serve as anticompetitive barriers that insulate physicians from APRN and PA competition in markets for healthcare services.[260] As such, these laws can reduce access to care,[261] increase the price of care,[262] and lead to inappropriate consumption of care.[263]

Based on the weight of the evidence demonstrating that restrictive SOP laws do little to promote patient safety and generate identifiable harms typically associated with anticompetitive restrictions, multiple groups have issued calls for states to relax their restrictive laws.[264] The National Academy of Medicine stated in 2011 that "[n]urses [including APRNs] should practice to the full extent of their education and training."[265] The National Governors Association issued a series of reports several years later echoing this call for both APRNs and PAs.[266] Following these calls, staff at the Federal Trade Commission issued a report highlighting the anticompetitive harms associated with restrictive SOP laws and urging states to reconsider these restrictions.[267]

Some states have heeded these calls, but the majority still maintain restrictive SOP laws, with less than half of all states allowing APRNs to practice independently and no state allowing PAs to do so.[268] Prior work has suggested that states may maintain their restrictive laws for political reasons. For example, the National Academy of Medicine explained 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."[269] Evaluating the role of political spending in state legislatures, McMichael

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259. Barbara A. Mark & Esita Patel, *Nurse Practitioner Scope of Practice: What Do We Know and Where Do We Go?*, 41 W.J. NURSING RES. 483, 484 (2019).

260. GILMAN & KOSLOV, *supra* note 8, at 15; *see also* ADAMS & MARKOWITZ, *supra* note 9, at 6 ("Currently, there are strong anticompetitive barriers to making more use of advanced practice providers (APPs) in the health-care sector.").

261. McMichael, *supra* note 4, at 759–64.

262. *See* Kleiner et al., *supra* note 10, at 276–77.

263. *See* Traczynski & Udalova, *supra* note 77, at 95–100; *see also supra* Part I (discussing the harms associated with restrictive SOP laws).

264. One potential resolution to the debate over SOP laws that is attractive because it does not require the active participation of state legislatures is the application of federal antitrust law. The Supreme Court of the United States recently extended antitrust scrutiny to some forms of occupational licensing laws, and this scrutiny could extend to certain SOP laws that are based on state regulations. N.C. State Bd. of Dental Exam'rs v. FTC, 135 S. Ct. 1101, 1110–16 (2015). However, the SOP laws that have the greatest effects on APRNs and PAs (i.e., those governing physician supervision) are statutory and are thus not subject to antitrust scrutiny. *See id.* at 1116–17; *see also* McMichael, *supra* note 13, at 298 (addressing the effect of antitrust law on state SOP laws). Accordingly, the SOP law debate continues to occur in the halls and chambers of state capitols.

265. INST. OF MED., *supra* note 11, at 4.

266. *See* DUNKER ET AL., *supra* note 11, at 9–10; SCHIFF, *supra* note 11, at 10–11.

267. *See* GILMAN & KOSLOV, *supra* note 8, at 38.

268. *See supra* Part I.

269. INST. OF MED., *supra* note 11, at 5.

concluded that "increased political spending by physician interest groups decreases the probability that states allow [APRNs] and PAs to practice with more autonomy . . . ."[270] While McMichael's analysis included political spending through 2013, the political battle over SOP laws has only become more intense since.[271] Indeed, the American Medical Association (AMA) adopted a resolution in 2017 committing itself to "[e]ffectively oppose the continual, nationwide efforts to grant independent practice . . . to non-physician practitioners [such as APRNs and PAs, among others]."[272] Other physician groups, such as the American Academy of Family Physicians, have similarly dedicated themselves to opposing the relaxation of SOP laws,[273] which is not surprising given the clear pecuniary interest of physicians in restricting the ability of other providers to compete with them in healthcare services markets.[274] Groups associated with APRNs and PAs have, unsurprisingly, resisted these efforts by physician groups.[275]

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270. McMichael, *supra* note 13, at 298.

271. Interestingly, the results presented here, when coupled with the results from previous studies, suggest that physician groups may wish to mollify their stance against relaxing SOP laws. While physician groups generally oppose expanding the authority of APRNs and PAs, they also vigorously advocate in favor of reforms that will reduce physicians' liability risk. *See, e.g.*, AMA, MEDICAL LIABILITY REFORM NOW! 1 (2019) (outlining the AMA's strong support of tort reforms and other measures designed to decrease physicians' liability risk). Prior work has found that physicians' liability risk increases when states maintain restrictive SOP laws, and the empirical analysis here similarly reveals a pattern of effects consistent with restrictive SOP laws shifting malpractice pressure away from APRNs and PAs and towards physicians. *See* McMichael et al., *supra* note 15, at 321 (finding that the number of malpractice claims paid by physicians can increase by as much as 31% when states maintain restrictive SOP laws). Thus, opposing the relaxation of SOP laws necessarily places physician groups directly at odds with reducing physicians' liability exposure. To the extent that physician groups wish to achieve their goal of reducing physician liability exposure, they should consider moderating their stance on restrictive SOP laws.

272. AMA, *supra* note 14, at 238. *See also id.* ("Our AMA, 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.").

273. *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., Pa. House of Reprentatives & Hon. Harry Readshaw, Minority Chairman, Prof'l Licensure Comm., Pa. House of Representatives (Oct. 18, 2017), https://www.aafp.org/dam/AAFP/documents/advocacy/workforce/scope/LT-ProfessionalLicensure-OpposingPAAPRNScopeExpansion-101817.pdf [https://perma.cc/ZT9N-87EZ] (urging the Pennsylvania House of Representatives to reject an expansion of APRN authority).

274. *See* Kleiner et al., *supra* note 10, at 261 (noting that, consistent with an erosion of market power, allowing APRNs to practice independently reduces the wages of physicians).

275. *See, e.g.*, Letter from Juliann G. Sebastian, Chair of the Bd. of Dirs., Am. Ass'n of Colls. of Nursing & Deborah E. Trautman, President and Chief Exec. Officer, Am. Ass'n Colls. of Nursing, to David O. Barbe, President, AMA & James L. Madara, Chief Exec. Officer, AMA (Nov. 28, 2017), https://www.aacnnursing.org/News-Information/News/View/ArticleId/20827/Rounds-with-Leadership-11-29-17 [https://perma.cc/87F5-RPJZ] (responding vigorously to the AMA's announced opposition to relaxing the SOP laws governing APRNs).

While the conflict over restrictive SOP laws is certainly political, it is not partisan. Both the Obama and Trump administrations issued reports noting concerns with SOP laws, emphasizing the harms these laws inflict on patients, and calling for the relaxation of the laws governing APRNs and PAs.[276] Similarly, the left-leaning Brookings Institution and right-leaning American Enterprise Institute have both issued reports calling for the relaxation of SOP laws.[277] The libertarian-leaning Cato Institute and Mercatus Center also support relaxing these laws.[278]

The bipartisan and widespread support for relaxing SOP laws invites the obvious question of why states continue to maintain these restrictive laws. Political support from the AMA and other physician organizations can certainly explain much of states' reluctance to reform these laws;[279] however, states may also hesitate to relax their SOP laws based on the nature of the reform proposals to date. While available evidence suggests that states use the protection of patient safety as a pretext to maintain restrictive SOP laws that serve as anticompetitive barriers to protect physician market power, that evidence does not establish that states are wholly unconcerned with patient safety.[280] To the extent that legitimate concerns about ensuring the provision of high-quality care and protecting patient safety enter states' decisions to maintain restrictive SOP laws, existing proposals to relax these laws may simply be insufficient.

In general, these proposals include straightforward recommendations that states eliminate restrictive SOP laws without any suggestion as to alternative legal regimes that may serve similar patient-safety goals as SOP laws.[281] If state legislatures maintain a high evidentiary bar when deciding whether to amend laws that protect patient safety—an unsurprising and justifiable position given the paramount importance of patient safety in healthcare—they may balk at the opportunity to adopt previous proposals for relaxation because those proposals generally offer no

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276. *See* U.S. DEP'T HEALTH & HUM. SERVS. ET AL., *supra* note 12 at 31–36; U.S. DEP'T TREASURY, *supra* note at 1213–14.

277. *See* ADAMS & MARKOWITZ, *supra* note 9, at 5–6 (urging the relaxation of APRN and PA SOP laws in a report issued by the Hamilton Project which is an initiative within the Brookings Institution); PETER BUERHAUS, AM. ENTER. INST., NURSE PRACTITIONERS: A SOLUTION TO AMERICA'S PRIMARY CARE CRISIS 1–2 (2018) (urging the relaxation of APRN SOP laws).

278. *See* Charles Hughes, *These Scope of Practice Laws Don't Improve Health Outcomes, Serve Mainly as Barriers to Entry*, CATO INST.: CATO AT LIBERTY (Nov. 2, 2016, 12:31 PM), https://www.cato.org/blog/these-scope-practice-laws-dont-improve-health-outcomes-serve-mainly-barriers-entry [https://perma.cc/93WU-SVNZ] (noting the harms associated with restrictive SOP laws); *Scope-of-Practice Laws*, MERCATUS CTR. (Mar. 22, 2017), https://www.mercatus.org/scopeofpractice [https://perma.cc/YB93-DUKA] (emphasizing the harms of restrictive SOP laws and arguing in favor of relaxation).

279. *See* McMichael, *supra* note 13, at 298.

280. ADAMS & MARKOWITZ, *supra* note 9, at 6; GILMAN & KOSLOV, *supra* note 8, at 1 (noting that state legislators are "rightly concerned with patient health and safety").

281. *See, e.g.*, ADAMS & MARKOWITZ, *supra* note 9, at 6 ("We argue that shifting spending away from physician to [APRN and PA] services through a loosening of anticompetitive SOP barriers is a viable and desirable policy route for the United States.").

alternative mechanism to promote patient safety.[282] This Article fills that salient gap in existing proposals by identifying a separate legal regime that can work to promote patient safety.

Specifically, it offers tort law as an alternative mechanism to promote patient safety, and two strands of empirical research support the use of tort law in this context. First, prior research has demonstrated that malpractice liability deters the provision of low-quality and unsafe care.[283] For example, Iizuka concluded "that higher liability pressure reduces preventable medical complications . . . ."[284] Similarly, Frakes and Jena emphasized the deterrence role fulfilled by malpractice liability, noting that "medical liability forces . . . hold the potential to elevate the quality [of care]."[285] Considering the significance of malpractice liability more generally, Frakes noted that this liability "remain[s] a quite relevant influence on physician practices in a more universal sense."[286] Finally, examining the specific deterrence that malpractice claims exert—as opposed to malpractice pressure more generally—two studies found evidence that individual physicians change how they provide care after malpractice claims are filed against them.[287]

Second, the empirical evidence provided here demonstrates that tort law can effectively deter APRNs and PAs just as it can physicians. As the results above indicate, providers respond differently following the relaxation of SOP laws depending on the malpractice pressure present in their state. While these different responses provide important evidence of an interaction between SOP laws and malpractice liability, they also offer evidence of the deterrent effect of malpractice liability on the provision of obstetric care. For example, when malpractice pressure is high, providers may perform more C-sections.[288] Relaxing APRN and PA SOP laws reduces C-sections significantly more when malpractice pressure is low, demonstrating that APRNs and PAs respond to malpractice pressure as physicians do. Given this clear and predictable response to malpractice pressure following the relaxation of SOP laws, states can be confident that eliminating restrictive laws will not result in a vacuum in which providers can freely deliver substandard and unsafe care. Instead, once exposed to liability risk traceable to their own actions, APRNs and PAs will respond to the deterrence exerted by malpractice liability.

Moreover, the analysis and evidence provided here suggests that, by eliminating the complications imposed on the functioning of malpractice liability by restrictive SOP laws, states may better enable tort law to exert deterrence on individual providers. As discussed above, restrictive laws shift liability from APRNs and PAs to physicians.[289] Accordingly, tort law overdeters the latter and underdeters the

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282. *See* Mark & Patel, *supra* note 259, at 485 ("Another possibility is that state legislators do not have enough evidence to inform legislative priorities.").

283. This prior evidence is entirely consistent with the empirical results reported here which indicate that providers (of all types) change how they deliver care in response to malpractice pressure. *See supra* Part III.

284. Iizuka, *supra* note 17, at 164.

285. Frakes & Jena, *supra* note 18, at 144.

286. Frakes, *supra* note 217, at 385.

287. *See* Dranove & Watanabe, *supra* note 93, at 85–91; Shurtz, *supra* note 91, at 339–40.

288. Yang et al., *supra* note 22, at 239.

289. *See supra* Section IV.B.

former.[290] By relaxing SOP laws, thereby eliminating this liability shifting, states can allow malpractice liability to deter physicians, APRNs, and PAs directly. Facing liability risk commensurate with their own actions and only their own actions, providers of all types can respond directly to the incentives to provide safe care created by tort law. Thus, not only does tort law provide an alternative mechanism to accomplish patient-safety goals, it functions better in achieving these goals once restrictive SOP laws—and the complications they impose—are removed.

I do not mean to suggest, however, that tort law or medical malpractice liability as currently conceived and practiced represents an ideal approach. Legal, medical, and economic scholars—myself included—have articulated specific criticisms of the current tort system,[291] and the results presented above suggest that malpractice pressure may encourage the overuse of C-sections (i.e., overdeter providers). By offering tort law as an alternative mechanism to accomplish patient-safety goals, I am not arguing that policymakers and scholars should abandon attempts to address the shortcomings of medical malpractice liability.[292] Instead, I argue only that tort law, despite its shortcomings, can effectively deter healthcare providers and that this deterrence (imperfect as it may be) can accomplish the patient-safety goals that currently support maintaining restrictive SOP laws.

Importantly, tort law can achieve these goals without imposing the substantial and pervasive harms that prior work has shown accompany restrictive SOP laws. Indeed, the results presented above demonstrate that the increase in the intensity of care attributable to malpractice pressure is only a fraction of the increase attributable to SOP laws. Tort law can also better ensure patient safety once restrictive SOP laws, and the liability shifting they facilitate, are eliminated. Finally, it is worth noting that, with restrictive SOP laws eliminated, efforts to reform tort law to better calibrate the deterrence it exerts can move forward without needing to address the complicated liability shifting induced by restrictive SOP laws.

CONCLUSION

Examining all births in the United States between 1998 and 2015, I find consistent evidence that allowing APRNs and PAs to practice with more autonomy reduces the use of medically intensive procedures. Extending the analysis, I also find evidence that the effect of relaxing SOP laws differs depending on the malpractice pressure faced by providers. This evidence is consistent both with liability shifting among providers when restrictive SOP laws are in place and with tort law exerting a stronger deterrent effect on APRNs and PAs when they can practice with more autonomy.

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290. *Id.*

291. *See, e.g.*, Avraham & Schanzenbach, *supra* note 16, at 278–84 (finding evidence that defensive medicine results in the inefficient provision of care); Frakes, *supra* note 217, at 378–85 (noting new avenues for reform to address current problems in the medical malpractice system); McMichael et al., *supra* note 144, at 393–94 (arguing that apology laws are a new generation of tort reform that exacerbate the problems they are designed to solve); Mello et al., *supra* note 113 (exploring opportunities for tort reform at the federal level).

292. Indeed, the evidence presented here, while not specific to defensive medicine, suggests that providers may be overdeterred by the current malpractice system and may practice defensively.

These results have important implications for the current understanding of how both SOP laws and malpractice liability impact the provision of healthcare. Additionally, the empirical evidence presented here suggests a possible resolution to the increasingly heated debate over SOP laws. States maintain these laws on the basis of protecting patient safety. To the extent this justification is not a pretext to protect physicians from competition in healthcare services markets, the results here suggest that eliminating restrictive SOP laws will not undermine patient safety. With these laws abrogated, tort law can better deter individual providers—physicians, APRNs, and PAs, alike—and thereby discourage the delivery of unsafe care. Indeed, the evidence and analysis presented here suggests that eliminating restrictive SOP laws may better promote patient safety. Doing so would eliminate the complicated ways in which these laws interact with malpractice liability and thereby inhibit the ability of tort law to deter individual providers. Overall, the empirical evidence presented in this Article favors relaxing restrictive SOP laws and suggests that doing so will improve healthcare delivery, access to care, and patient safety.