

Does Scope of Practice Affect Mobility of Nurse Practitioners Serving Medicare Beneficiaries?

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Abstract

The shortage of nurse practitioners (NPs) in the United States has broadly decreased access, decreased quality, and increased cost of care for an aging population in both metro and rural areas. Some state policy makers are trying to address the shortage by expanding NPs' scope of practice (that is, their autonomy to order tests, to prescribe medications, to diagnose patients, and to initiate and manage treatments). We estimate the impact of expanded NP scope of practice on the mobility decisions of NPs serving Medicare beneficiaries. Since these expansions have been at the state level, it is important for policy evaluation to know whether the legal differences in NPs' roles affect where they decide to both live and practice. We identify NPs' location decisions between 2014 and 2017 by gleaning their National Provider Identifiers from Part D Prescriber Public Use File data. Then we examine whether NPs' movement from restrictive-practice to full-practice states increased over time. We find that in a given year, NPs in restrictive-practice states are both 0.46 percent more likely to move out of state (compared to NPs in other states) and 5.33 percent less likely to move to other restrictive states than to nonrestrictive states. Our estimates demonstrate NPs' preference for practicing in states with full scope of practice.

Keywords: Scope of practice, nurse practitioners, regulation, mobility

JEL Classification: J44, I18, H75

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1 Introduction

The shortage of nurse practitioners (NPs) in the United States has broadly limited access, reduced quality, and increased cost for an aging population in both metro and rural areas. The NP shortage is a key part of the more general and ever-increasing shortage of primary care. Accordingly, some states have expanded NPs' scope of practice (SOP). In these states, NPs can use all of their training and education in various primary care roles, such as ordering testing, prescribing medication, diagnosing patients, and initiating and maintaining patient treatment. However, little is known about whether these policy changes are incentivizing NPs to relocate to areas where they have full SOP.

We estimate the impact of expanded NP SOP on the mobility decisions of NPs who serve Medicare beneficiaries enrolled in the Part D prescription-drug program. These expansions occurred at the state level. Therefore it is important for policy evaluation to know whether the legal differences in the job roles of NPs affect where they decide to both live and practice. We identify the location decisions of individual NPs between 2014 and 2017 by gleaning their National Provider Identifiers (NPI) from the Part D Prescriber Public Use File data.

Using a regression framework, we then determine whether NPs in states with restricted or full SOP are more likely to move out of state. We find that NPs in restrictive-SOP states are 0.46 percent more likely to relocate than nurses working in states with full job autonomy. Though this is insightful, we are interested also in learning where NPs are moving. This is essential information for policy makers and researchers because it indicates whether the policy differences are driving the location decisions of NPs. Using our regression framework, we find that NPs are 5.33 percent less likely to relocate to restrictive-SOP states than to full-SOP states. Thus, broadening SOP and thereby allowing NPs to act independently and without complicated contracts with primary care physicians can attract NPs. Expanding SOP is an effective way to remedy primary care shortages.

Section 2 reviews the relevant literature. Section 3 describes our data sources, methodology, and research framework. Section 4 outlines our results. Section 5 discusses policy implications and concludes.

2 Literature

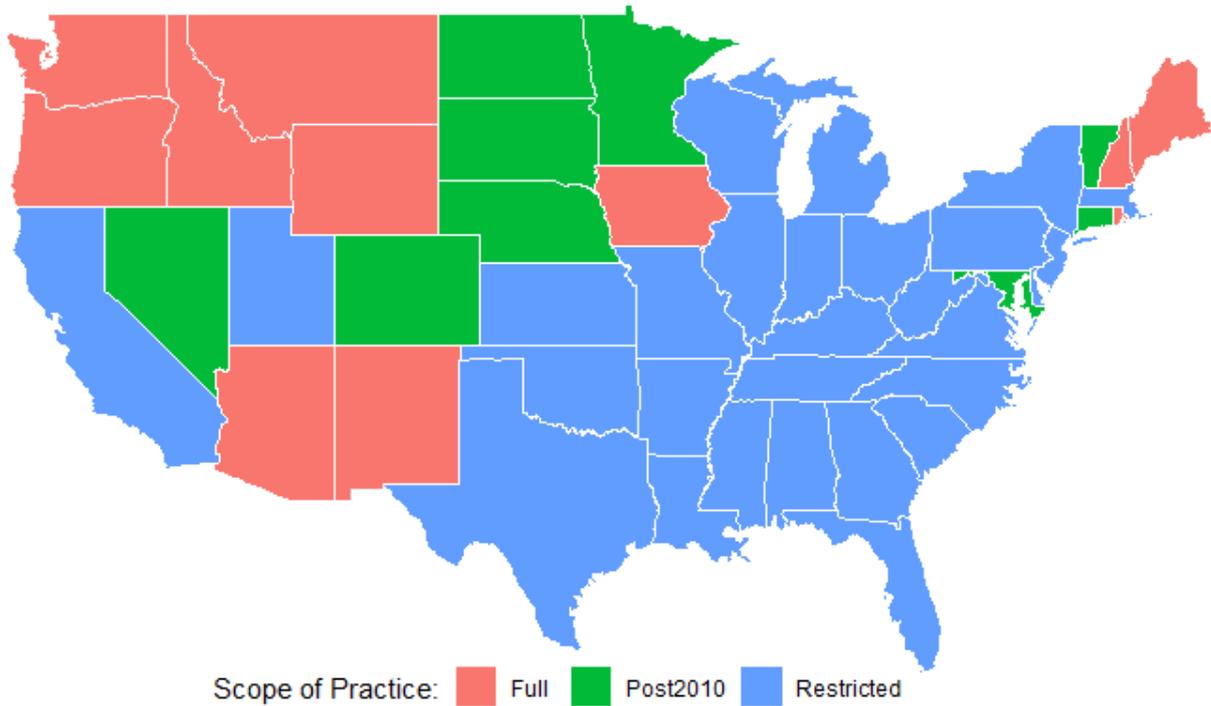
Pigou (1938) and Stigler (1971) lay competing theoretical foundations for studying the causes and consequences of regulation.¹ Pigou (1938) describes regulation as a policy tool that can address market failures, monopoly powers, and externalities, along with achieving other goals of benevolent policy makers, to engender socially superior outcomes. Stigler (1971), however, contradicts Pigou by describing regulation as an outcome of rent-seeking behavior that serves the interests of industry leaders, often at the expense of other groups such as workers, entrants, and other industries. Regulations give industry incumbents more market power. The outcomes of regulation are socially inefficient.

The Association of Medical Colleges has consistently reported that the demand for physician care is outpacing medical school enrollments, and it projects the shortage of physicians will reach 100,000 by 2030 (AMC, 2020). With the increased demand for primary care and accompanying labor shortages, more NPs are acting as primary caregivers, particularly in states where they have full practice authority. Full practice authority means they are able to work to the extent that their education level, training, and licenses allow Kandrack et al. (2019). Figure 1 depicts the states with full or restrictive SOP. Table 1 defines restricted, reduced, and full SOP for NPs (these definitions come from the American Association of Nurse Practitioners (Klein, 2005)). In states with full SOP, NPs are allowed to order testing, prescribe medication and controlled substances, initiate diagnoses, and manage treatment of patients. Restricted- or reduced-SOP states erect barriers that restrict the scope of services NPs may provide, which can lead to many additional problems in the health care market such as difficulty scheduling appointments, longer waiting periods for routine visits, higher health care costs, and higher administrative costs for some physician practices (Fairman et al., 2011; Pittman and Williams, 2012; Traczynski and Udalova, 2018).

NPs are considered advanced-practice clinicians, meaning that much like physician assistants and advanced-practice registered nurses, they have postgraduate medical training, with the degree either of master of science in nursing or doctor of nursing practice, but do not attend medical school or go through the same residency process as physicians. Both physicians and NPs

¹Hall and Shakya (2019) try to reconcile these two theories and demonstrate an inverted-U-shaped relation of regulation to industry growth. In contrast, Scarcioffolo et al. (2020) show that some regulations can be expressive without the significant effects in the industry.

Figure 1: Scope of Practice for Nurse Practitioners



Notes: Post2010 represents the states that expanded SOP after 2010. These states are Colorado (2010), Hawaii (2010), North Dakota (2011), Vermont (2011), Nevada (2013), Connecticut (2014), Minnesota (2014), Nebraska (2015), Maryland (2015), and South Dakota (2018). The years in parentheses are when the states became full SOP.

Table 1: Definitions of Scope-of-Practice Regimes

Restricted Practice	Reduced Practice	Full Practice
State laws regarding the practice and licensure of nurse practitioners (NPs) require supervision and delegation of team management by another health provider in order for an NP to engage in at least one element of NP practice.	State laws regarding the practice and licensure of NPs require collaboration or written practice agreements between an NP and another health provider in order for an NP to engage in at least one element of NP practice.	State laws regarding the practice and licensure of NPs allow all NPs to order testing, prescribe medications, prescribe controlled substances, diagnose, and initiate and manage treatment of patients.

can choose specializations in medicine, but while most physicians specialize in lucrative fields such as pediatrics, cardiology, or obstetrics, over 80 percent of NPs focus on general-practice medicine in the primary care setting (AANP). Congress’s Office of Technology Assessment first began assessing the quality of NP care in 1986 and at that time found that “NPs performed as well as physicians with respect to patient outcomes, proper diagnoses, management of ‘indicator’ medical conditions, frequency of patient hospitalization, and patient satisfaction” (US Congress, Office of Technology Assessment, 1986).

Increased political spending by physician interest groups raises the probability that a state will maintain restrictive NP SOP regulations (McMichael, 2017). Even the American Medical Association argues strongly against expanding NP SOP, citing its concern that NPs operating without physician oversight will risk patient safety (Iglehart, 2013). Various medical studies have found, however, that NPs provide a level of care that is similar in quality to what physicians provide (Laurant et al., 2005; Lenz et al., 2004; Munding et al., 2000; Swan et al., 2015). Hughes et al. (2015) use Medicare-patient data to compare the performance of NPs and physician assistants to assess the hypothesis that NPs are sufficient for simple general care but unprepared for more complicated medical needs. They find that NPs provide similar care to physicians in all but the rarest cases.

Stronger regulation of NPs is associated with higher prices for general medical visits for children, but is not associated with a difference in infant mortality of malpractice, a measure of health care quality (Kleiner, 2016). NP SOP expansions may also help states cut costs, as states with a higher ratio of primary care providers to patients spend less on Medicare and Medicaid (Starfield et al., 2005; Timmons, 2017). With recent labor-market shortages, the number of registered nurses who obtain graduate degrees and NP licenses has swollen. In the early 1990s, they were granted the ability to bill Medicare at 85 percent of physician fees (Balanced Budget Act of 1997, 1997; Spratley et al., 2002). Areas with the least access to primary care, such as rural or impoverished counties, are better able to afford the wage rate of NPs relative to physicians' wage rate, meaning that increased NP SOP provides crucial sources of primary care to underserved areas and reduces obesity and diabetes (Gaglioti et al., 2016; Grumbach et al., 2003; Lenz et al., 2004; Martin, 2000; Perry, 2009; Stange, 2014).

Policy discussions regarding SOP expansions extend beyond NPs to include dental hygienists, midwives, and physician assistants. Using dental records of Air Force personnel over years, Kleiner and Kurlle (2000) finds that stricter SOP regulations for dental hygienists raise the price of dental services and the income of dentists but do not lead to improved oral health. Lanfelier et al. (2016) finds improved dental health in areas with less restrictive SOP, as people in these areas used more dental care and were less likely to need teeth removal for decay or disease. This leads to the claim that SOP restrictions are preventing dental hygienists from using their full education and training, which is limiting access to oral health care for many un-

derrepresented populations (Manski et al., 2015). Similar studies of midwifery find that states with full SOP for certified midwives see improvements in infant birth weight (Markowitz et al., 2017).

3 Data and Methods

3.1 Data

We track the state-level mobility of NPs from 2013 to 2017 using National Provider Identifiers from the Part D Prescriber Public Use File. Our analysis only covers the subset of NPs who serve beneficiaries enrolled in the Medicare Part D prescription-drug program (approximately two-thirds of all Medicare beneficiaries).

First, we merge the data from 2013 and 2014 and keep only the data on NPs whose data is available in both years. We drop the cases in which NPs changed their specialty from 2013 to 2014. We compare each NP’s state of practice from 2013 to 2014 to create the mobility indicator variable $Move_{it+1}$. If the state is the same in both years, then we infer that the NP did not move out of state; if it differs, we infer that the NP did move to a different state. Second, we use the definitions of restricted, reduced, and full NP SOP in table (1) to identify each state’s SOP. Restricted-SOP states in our regressions include states identified as either fully restricted or reduced practice as defined in table (1). We use the variables $Regime_{it}$ and $Regime_{it+1}$ to indicate the SOP regime for each year and succeeding year. Third, we repeat this second step for the paired years 2014–15, 2015–16, and 2016–17 to develop a panel data set.

3.2 Model

We consider NPs in two periods, t and $t + 1$. In period t , an NP, indexed as i , is in a restrictive-SOP state or a full-SOP state. The variable $Regime_{it}$ can take the following values:

$$Regime_{it} = \begin{cases} 1 & \text{Restrictive-SOP state at time } t \\ 0 & \text{Full-SOP state at time } t \end{cases}$$

Each NP decides to move to a different state in the next period, $t + 1$, or remain in the same state, a decision reflected in the variable $Move_{it+1}$.

$$\text{Move}_{it+1} = \begin{cases} 1 & \text{if individual } i \text{ moved to different state at time } t + 1 \\ 0 & \text{if individual } i \text{ remained in the same state at time } t + 1 \end{cases}$$

In period $t + 1$, an NP can be in the same state or a different state than previously while the SOP regime can change from or remain the same as the previous period. A state's SOP regime in the second period, Regime_{it+1} , takes one of the following values:

$$\text{Regime}_{it+1} = \begin{cases} 1 & \text{Restrictive SOP at time } t + 1 \\ 0 & \text{Full SOP at time } t + 1 \end{cases}$$

We assume that Regime_{it} can predict Move_{it+1} and Move_{it+1} can predict Regime_{it+1} :

$$\text{Regime}_{it} \longrightarrow \text{Move}_{it+1} \longrightarrow \text{Regime}_{it+1}$$

3.3 Effect of SOP Regime on the Mobility of NPs

We are interested in determining whether the SOP regime affects the mobility of NPs. If occupational licensing restricts the SOP of NPs, then NPs are more likely to move to a different state than if it does not. Therefore, we expect the following quantity to be positive:

$$E[\text{Move}_{it+1} = 1 | \text{Regime}_{it} = 1] - E[\text{Move}_{it+1} = 1 | \text{Regime}_{it} = 0] \quad (1)$$

The quantity in equation (1) can be estimated using the regression below.

$$\text{Move}_{it+1} = \alpha + \beta \text{Regime}_{it} + \gamma_i + \zeta_t + \varepsilon_{it} \quad (2)$$

β estimates the quantity in equation (1) while γ_i and ζ_t are additive individual state and year fixed effects used to account for the unobserved heterogeneity associated with state and year. These estimates are robust to heteroskedasticity.

3.4 Where do NPs Move?

Equation (2) allows us to estimate the effect of SOP regime on NP mobility. But do NPs move to states that allow full SOP or to other states? To answer this, we can estimate the following

quantity:

$$E [\text{Regime}_{it+1} = 1 | \text{Move}_{it} = 1] - E [\text{Regime}_{it+1} = 1 | \text{Move}_{it} = 0] \quad (3)$$

The quantity in equation (3) can be estimated using the regression below.

$$\text{Regime}_{it+1} = \alpha + \beta \text{Move}_{it} + \gamma_i + \zeta_t + \varepsilon_{it} \quad (4)$$

β estimates the quantity in equation (1) while γ_i and ζ_t are additive individual state and year fixed effects used to account for the unobserved heterogeneity associated with state and year. These estimates are robust to heteroskedasticity.

4 Results

We begin our analysis with the time-series overview of NPs in table (2). Column (2) provides total NPs for each year, and column (3) provides the number of NPs with a match in the following year. The records might not match for several reasons: NPs may have stopped practicing, retired, died, or changed their specialty from 2013 to 2014; and new NPs may have entered the market in 2014.

Table 2: Mobility of Nurse Practitioners Serving Medicare Beneficiaries

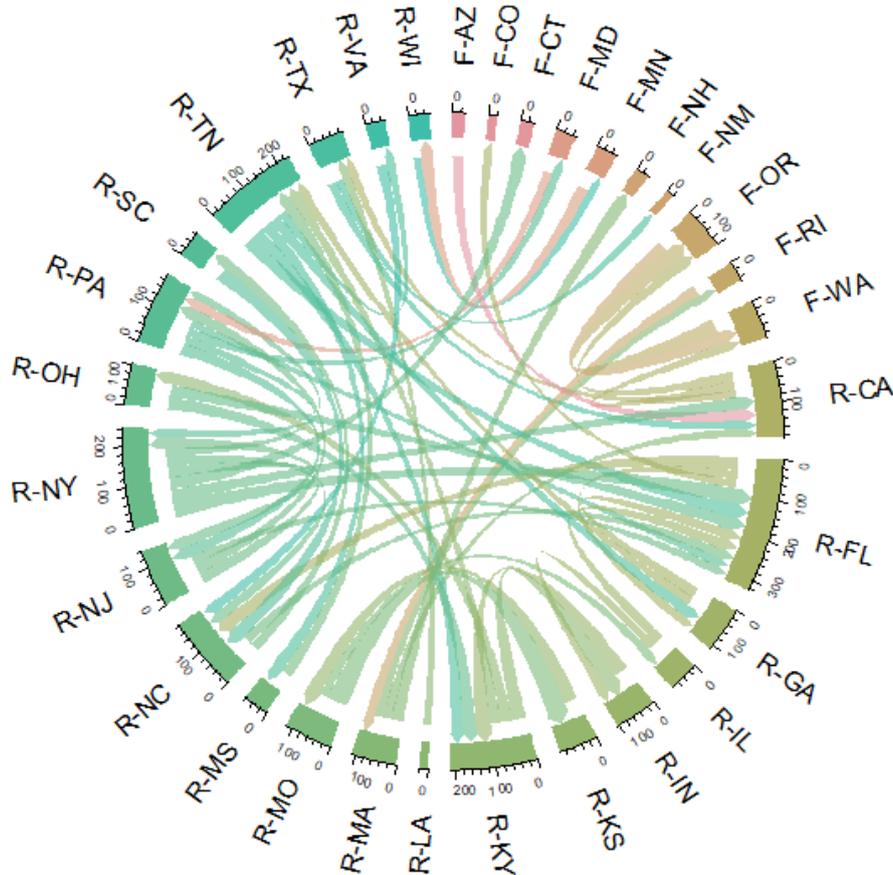
Year (1)	Total NPs (2)	Matched NPs (3)	Restricted (4)	Move (5)	F→F (6)	F→R (7)	R→F (8)	R→R (9)
2013	97,693	-	-	-	-	-	-	-
2014	109,105	90,406	76,572	1,518	130	154	318	916
2015	122,793	101,145	82,092	1,647	183	232	365	867
2016	137,777	113,999	90,265	1,538	179	233	326	800
2017	153,922	128,145	101,949	1,833	218	285	392	938

Notes: In columns (6) to (9), “F” indicates states that allow full scope of practice and “R” represents states with restrictive scope of practice.

Table (2), column (4) shows the numbers of matched nurses in restrictive-SOP states. Column (5) shows the numbers of matched NPs who moved from one year to the next. For example, out of 90,406 matched NPs, 76,572 were in restrictive-SOP states in 2014 and 1,518 moved to different states from 2013 to 2014. Columns (6) to (9) show the details of NPs’ mobility. For example, in column (6), out of 1,518 NPs in 2013, 130 moved from a full-SOP state to an-

other full-SOP state. Column (7) shows that 154 NPs practiced in full-SOP states in 2013 and moved to restrictive-SOP states in 2014. Column (8) shows that 318 NPs in restrictive-SOP states in 2013 moved to full-SOP states in 2014. Finally, column (9) shows that 916 NPs in restrictive-SOP states in 2013 moved to other restrictive-SOP states in 2014.

Figure 2: Mobility of NPs at State Level (2013–17)



Notes: “F-” indicates states that allow full scope of practice, and “R-” indicates states with restrictive scope of practice. If fewer than thirty nurse practitioners move from one state to another, we suppress those records to simplify the illustration.

Figure 2 complements table (2) by depicting aggregated interstate movement of NPs from 2013 to 2017. In this chord diagram, the two-letter abbreviation of a state with full SOP takes a prefix of “F-” and restricted-SOP states take a prefix of “R-.” Arrow heads that touch the chord label represent inflows.

For example, R-FL indicates that Florida has a restricted-SOP regime. Many NPs move into Florida, but few leave. New York (R-NY), which also has restricted SOP, sees more NPs move out than move in. Observe also that many NPs move among the restrictive-SOP states

and that few NPs leave the full-SOP states.

4.1 Impacts of SOP Regime on NPs' Mobility

In table (3), columns (1)-(5) provide five regression specifications of NPs' decision to move in the next period based on the SOP regime during the current period. The regression output in column (5) exhibits the results of equation (2). Column (1) is a simple regression. Column (2) is a simple regression with heteroskedasticity-robust standard errors. Column (3) includes year fixed effects. All these estimates are negative, suggesting NPs who practice in restrictive states are less likely to move, compared to NPs in full-SOP states. However, this does not account for underlying state-level differences. When we include state fixed effects in column (4) and both state and year fixed effects in column (5), the sign flips, which suggests that NPs who practice in restrictive states are more likely to move than NPs in full-SOP states.

Table 3: Effect of Scope-of-Practice Regime on the Mobility of Nurse Practitioners (2013–17)

	Mobility of Nurse Practitioners, $Move_{it+1}$				
	(1)	(2)	(3)	(4)	(5)
Regime _{it}	-0.0055*** (0.0005)	-0.0055*** (0.0005)	-0.0056*** (0.0005)	0.0067*** (0.0020)	0.0046** (0.0021)
Constant	0.0195*** (0.0004)	0.0195*** (0.0005)			
R^2	0.0003	0.0003	0.0005	0.0016	0.0017
Adj- R^2	0.0003	0.0003	0.0004	0.0015	0.0016
F -stat	134.7*** (1; 433693)	110.4888 (1; 433693)	117.4888 (1; 433690)	11.40*** (1; 433643)	5.028** (1; 433640)
HC2		✓	✓	✓	✓
Year FE			✓		✓
State FE				✓	✓

Notes: The 1%, 5%, and 10% levels of significance are given as ***, **, and * respectively. Regime_{it} = 1 indicates that a state has restrictive scope of practice for nurse practitioners in period t . Move_{it+1} = 1 indicates a nurse practitioner's decision to move to a different state in period $t + 1$. HC2 represents heteroskedasticity-consistent standard errors. The number of observations is 433,695.

4.2 Where Do NPs Move?

Next, we show the estimates of whether NPs who move are likely to move to states that allow full SOP. Table (4) follows the same structure as table (3). The estimates in columns (1) to (3)

show that NPs are about 11.8 percent less likely to move to states with restrictive SOP than other states. The estimates of columns (4) and (5) suggest that NPs are 5.33 percent less likely to move to states with restrictive SOP than full-SOP states.

Table 4: Mobility Choices of Nurse Practitioners (2013–17)

	States Chosen by Nurse Practitioners, Regime _{it+1}				
	(1)	(2)	(3)	(4)	(5)
Move _{it}	-0.1179*** (0.005)	-0.1179*** (0.006)	-0.118*** (0.006)	-0.0527 (0.0073)	-0.0533*** (0.0073)
Constant	0.7950*** (0.0006)	0.7950*** (0.0006)			
R^2	0.0013	0.0013	0.002	0.939	0.939
Adj- R^2	0.0013	0.0013	0.002	0.939	0.939
F -stat	546.5*** (1; 433693)	411*** (1; 433693)	413.4*** (1; 433690)	52.56*** (1; 433643)	53.38*** (1; 433640)
HC2		✓	✓	✓	✓
Year FE			✓		✓
State FE				✓	✓

Notes: The 1%, 5%, and 10% levels of significance are given as ***, **, and * respectively. Regime_{it+1} = 1 represents states with restrictive scope of practice for nurse practitioners in period t . Move_{it+1} = 1 indicates an NP's decision to move to a different state in period $t + 1$. HC2 represents heteroskedasticity-consistent standard errors. The number of observations is 433,695.

5 Conclusion

We analyzed how a state's NP SOP regime influences NPs' location decisions. Although a significant body of research has studied the effects of SOP on practitioner quality and wages, to our knowledge no studies have focused on the interstate movement of NPs in response to differences in their legal ability to work independently of physicians. Our regression framework, coupled with Medicare Part D information on NPs serving Medicare beneficiaries, allowed us to track and analyze individual NPs between 2013 and 2017.

We found that NPs in states with laws that require them to work in complicated relationships with physicians were 0.46 percent more likely to move in a given year. NPs residing in such restrictive-SOP states were also 5.33 percent less likely to relocate to similarly restrictive states than to states with full SOP.

The United States is facing a drastic shortage of primary care physicians that is only pro-

jected to increase over the next decade as physicians are likely to pursue more lucrative specializations. To address the shortage, some states have granted NPs full SOP, which allows NPs to work independently and to use their education and training to their full extent. Our study found that states with increased SOP are enticing to NPs working in restrictive states.

Much of the current literature has found that NPs provide similar quality of primary care across various metrics in all but the rarest of cases. States faced with the primary care shortage that have not adopted full SOP for NPs would benefit from changing their policies both by allowing NPs in their own state to work to the full extent of their ability and by disincentivizing NPs from moving out of state and attracting NPs from restrictive states. This reform is crucial for impoverished and rural areas that are not able to sustain the wages of primary care physicians.

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