

**Doctors With Borders:  
Occupational Licensing as an Implicit Barrier to High Skill Migration \***

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**Abstract:** Occupational licensing regulations are implicit barriers to skilled migrants' entry into the labor market. Regulations ostensibly serve the public interest by certifying competence but are simultaneously rent-preserving entry barriers. We analyze both the sources of US states' licensure requirements for international medical graduates (IMGs), and how these regulations influence migrant physicians' choice of US state in which to work over the period 1973-2010. Analysis of our original data shows that states with self-financing state medical licensing boards, which can more easily be captured by incumbent physicians, have more stringent IMG licensure requirements. Additionally, we find that states that require IMGs to complete longer periods of supervised training receive fewer migrants. Both analyses are robust to controls for states' physician labor market. This research identifies an overlooked dimension of international economic integration: implicit barriers to the cross-national mobility of human capital, and the public policy implications of such barriers.

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Do skilled Americans oppose the immigration of high skill foreigners? Political economists disagree. One set of explanations emphasizes material concerns – labor market competition and fiscal burdens associated with public services provision – as the primary driver of immigration preferences (Scheve and Slaughter 2001, Mayda 2006, Hanson, Scheve, Slaughter 2007, 2009, Facchini and Mayda 2012). Public opinion surveys show that skilled natives anticipate greater labor market competition from skilled migrants but these migrants’ other economic contributions – particularly their net tax contributions – somewhat offset employment concerns. A second line of research points to skilled Americans’ broad social and cultural beliefs to explain immigration attitudes (Hainmueller and Hiscox 2007, 2010, Hainmueller et al 2011). Survey experiments reveal skilled natives’ robust support for skilled immigration, suggesting that greater education fosters a cosmopolitan worldview that trumps economic concerns and “[m]aterial self-interest, at least as currently theorized, does not appear to be a powerful determinant of anti-immigrant sentiment” (Hainmueller and Hiscox 2010, 62).

Absent from this research is a recognition that most high skilled professions require specialized skills that cannot be readily redeployed into other professions. Skill specialization fragments labor markets by limiting the professions in which individuals can fully maximize returns to their specific skills. In a world of profession-specific skills, skilled natives’ economic concerns over skilled immigration are limited to migrants with skills that substitute for their own. For example, American dentists may strongly oppose immigration of foreign-trained dentists but support immigration of foreign-trained architects to lower the cost of architectural services. The omission of skill specificity from extant political economy models of immigration is striking given the central role of

asset specificity in identifying the distributive effects of other dimensions of economic integration (Frieden 1991, Alt et al 1996, Hiscox 2002). Similarly, comparative political economy scholars point to the importance of skill specificity in shaping the structure of national production (Estevez-Abe et al 2001).

In this paper we examine the consequences of skill specificity for immigration policies by analyzing occupational licensing regulations. These regulations limit the practice of certain professions to individuals who have been granted a license by a state regulatory body. Licensure requirements vary by profession but typically stipulate educational and training prerequisites and examinations. Occupational licensing is a prominent feature of modern labor markets. Nearly thirty percent of the US and European workforce requires a license to practice their occupation (Kleiner and Krueger 2010). In the US over 800 occupations are subject to licensure in at least one state (Kleiner 2000). Skilled migrants to the US are no exception. In 2000, approximately 23 percent of migrants that held at least a bachelors degree worked in an occupation that typically requires licensure; for migrants with professional degrees, this figure rose to over 52 percent.<sup>1</sup>

Why do these regulations exist? They ostensibly ensure public safety by furnishing information on practitioner quality that markets fail to supply (Leland 1979, Weingast 1980) but they can simultaneously be a vehicle for rent seeking (Friedman and Kuznets 1945, Stigler 1971). Under the cover of public safety, regulators can advance the interests of the professions that they oversee by using excessively stringent licensure rules to protect incumbent practitioners from competition. Indeed, many professions

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<sup>1</sup> Authors' calculations based on the 2000 Current Population Survey.

enjoy wide influence over rule setting and enforcement. In this regard, licensure rules pertaining to the recognition of foreign qualifications constitute profession-specific barriers to migrants' entry into the US labor market.

In this article we analyze both the sources and consequences of US states' licensing requirements for international medical graduates (IMGs), foreign-educated physicians seeking licensure in the US.<sup>2</sup> Approximately 25% of practicing US physicians received their medical education abroad (Akl et al 2007, 266). Although the issue of migrants' professional licensure arises across a broad range of occupations, we focus on physicians because the unique organization of the US medical profession allows us to distinguish between public interest and rent seeking motives for regulation.

In the US all medical graduates seeking licensure, regardless of where they were educated, must enter a period of supervised training known as residency. Prior professional experience in foreign countries does not count towards US requirements. In order to be eligible for residency, both international and US medical graduates must successfully complete a series of standardized exams and must be accepted into an accredited residency program.<sup>3</sup> These universal eligibility criteria address legitimate

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<sup>2</sup> "IMG" refers to non-US citizens who attended a medical school outside the US or Canada (all US states recognize Canadian credentials). "US medical graduate" includes graduates of all US and Canadian medical schools, regardless of their immigration status. IMGs who are US citizens/ residents are not included in our immigration data.

<sup>3</sup> IMGs must also pass language exams. The medical profession itself sets all exams and regulations. There is no federal government oversight of physician regulation.

public interest concerns over the adequacy of foreign medical training by establishing uniform standards that all would-be licensed physicians must meet.

Although IMG quality screening is nationwide, individual states grant medical licenses valid only for that state. States vary in the length of residency required for IMGs to receive a medical license. Figure 1 illustrates wide variation across states during the period 1973-2010. Cross-state variation is, on its face, a challenge to public interest motives for regulation which would predict relatively uniform regulations across states. Over time most states have raised their requirements, but variation among states persists throughout the sample period. A further challenge to public interest explanations comes from the fact that most states discriminate against IMGs, mandating longer residency requirements for physicians educated abroad than they do for US medical graduates, despite identical quality screening prior to residency. Figure 2 highlights this disparity by plotting the average length of residency requirements nationwide for the two types of applicants.

We explain this variation in states' IMG residency requirements by assessing the relative influence of rent-seeking and public interest motives on the stringency of state physician licensing regulation. Our empirical analysis features an original dataset of state medical licensing requirements gathered from the archives of the American Medical Association, America's largest professional organization for physicians. We estimate a set of ordinal logit models and show that states with self-financing medical boards—our measure of propensity to regulatory capture—require IMGs to complete lengthier residencies. We verify that characteristics of states' physician labor market and existing IMG population and requirements for US-educated physicians do not drive the result.

In a second set of analyses we investigate how variation in licensing requirements influences the state in which IMGs choose to work. We estimate a model of annual IMG flows into US states using newly available physician migration data from the US Department of Homeland Security (DHS). Our event count model estimates show that, even after controlling for state and year fixed effects, states with lengthier IMG residency requirements do in fact receive fewer migrant physicians. For each additional year of residency training required for state licensure, the average state receives approximately three fewer IMGs annually. Over our sample period, the typical state loses over a hundred IMG physicians due to higher than average licensure requirements.

Our study highlights the presence of implicit barriers to a global market for skills, a substantively important dimension of economic integration (Yu and Levy 2010).<sup>4</sup> First and foremost, we demonstrate the need to move beyond broad skill categories to precise labor market characteristics in order to accurately model the politics of migration. Studies of migration attitudes, which find widespread support for skilled migration among skilled workers, inquire about the desirability of immigration broadly but ignore the occupation-specific nature of labor market competition. Occupational regulations demonstrate, regardless of attitudes toward general skilled migration, that labor market barriers exist which explicitly target skilled migrants. Further, extant gravity models of migration proceed on the assumption that skilled migrants select destination countries, in part, to maximize expected income (Borjas 1994). These models incorporate wage differentials and destination unemployment rates to proxy the probability of finding employment

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<sup>4</sup> We note that our research also is relevant to American politics studies of regulatory capture and the consequences of resulting regulations (Wiseman and Ellig 2007).

(Mayda 2010) but do not account for structural barriers to employment, suggesting that existing gravity models may suffer from omitted variable bias.<sup>5</sup>

Our study also provides insights into barriers to international trade in services, an area of integration that political economy scholars have overlooked. Although a growing number of trade agreements liberalize trade in professional services, domestic OLR render these provisions meaningless. Extending the study of economic integration into new substantive areas like services requires scholars to think more expansively about the frontiers of economic integration and the associated barriers. This article is a step in that direction.

We organize this article into three parts. The next section presents and tests our claims about the sources of physician licensing regulation. The following section examines how licensing regulations influence migrant physicians' location choice within the US. We conclude by discussing the public policy consequences of physician licensing regulations.

## **Sources of Occupational Licensing Regulation**

### *Regulatory Capture and Foreign Physician Licensing*

The current framework for US physician oversight began in its earliest incarnations following WWII (Law and Kim 2005). Each state has a medical practice act that establishes its state board of medicine, an appointed regulatory body that oversees

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<sup>5</sup>A few studies employ broad measures of openness (Mayda 2010, Ortega and Peri 2009) An exception: Kleiner et al (1982) find that occupational licensing rules reduce between-US state migration in 14 occupations.

the medical profession. Licensure requirements vary somewhat by state but typically include educational and experiential prerequisites, written or oral exams, fees, periodic recertification, and evidence of moral character. Additionally, boards reserve for themselves wide discretion in interpreting licensure candidates' credentials. Historically, states frequently prohibited non-citizens from obtaining medical licenses regardless of where they were educated; however, most states eliminated these regulations in the 1970s after the US Supreme Court ruled them unconstitutional (Plascencia et al 2003). Figure 2 suggests that the disparity in residency requirements for IMGs and US medical graduates grew as a replacement for outlawed citizenship restrictions.

IMGs seeking licensure demonstrate their qualifications through exams and interviews. Quality screening occurs early: in 2008, only 42.6 percent of first-time IMG applicants passed all three components of the test and only 73 percent of those who passed all necessary exams eventually found a residency position (Jolly et al 2011).<sup>6</sup> This early screening is effective. Post-licensure, there are no differences between IMGs and US medical graduates in patient health outcomes (Mick and Comfort 1997, Norcini et al 2010), or in the frequency of disciplinary actions by state medical boards (Morrison and Wickersham 1998, Clay and Conatser 2003, Cardarelli et al 2004). Even if a safety rationale exists for stricter licensing requirements for IMGs, it is unclear why this seemingly universal concern translates into different levels of regulation across US states.

Political economy theories of regulation point to regulatory capture as a source of cross-state variation (Stigler 1971, Peltzman 1976). Regulatory capture occurs when the

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<sup>6</sup> These tests screen for quality just as effectively among US citizens, who tend to fail the licensure examinations at higher rates than those provided for IMGs.

regulated group actually controls the public rule-making process for its own benefit. Across occupations there are stricter licensing requirements in those states with more organized professional lobbies (Graddy 1991, Wheelan 1998, Tenn 2001). In the case of physician licensing, incumbent physicians prefer entry barriers that preserve monopoly rents, whereas consumers tend to favor the minimum regulation necessary for public safety, in order to facilitate a greater supply of physicians. Consistent with theories of regulatory capture, states whose medical boards contain a higher proportion of physician members impose more “non-educational” requirements such as licensure fees and interviews (Broscheid and Teske 2003). States with self-financing medical boards impose more onerous requirements than boards funded by the state government; a reflection of the former groups’ insulation from public pressure (Svorny and Toma 1998).<sup>7</sup> As further evidence of barriers to entry, jurisdictions with more onerous requirements have higher physician salaries and poorer quality medical service (Kugler and Sauer 2005).

*Regulator Independence and Stringency of Licensing Requirements: Evidence*

Does the variation in IMG licensing requirements reflect public interest concerns or regulatory capture by physicians seeking to limit competition? We measure the stringency of licensing requirements, *IMG Residency Requirement*, as the length of residency training that states require of IMGs as a prerequisite of licensure. We focus on the length of training requirements because it is the only licensure requirement in which

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<sup>7</sup> State legislatures tend to defer—even in matters of legislation—to their state medical boards and departments of health. Medical boards often assist in writing bills considered by lawmakers. Changes to a states’ medical practice act are very rarely contentious, though professional organizations do lobby (c.f 1999 Alaska Senate Bills 71 and 29).

states discriminate between US- and foreign-educated physicians. Residency requirements are also long-standing regulations that are comparable across states. During the period under study, 1973-2010, the length of residency required for licensure varies between 0-36 months. We assemble these data from the records of the American Medical Association.<sup>8</sup> Figures 1 and 2 summarize the cross-state variation in IMG training requirements and average temporal variation respectively.

We identify states with financially independent medical boards as more susceptible to capture by incumbent physicians' interests. Our binary measure, *Independent Board*, equals "1" if the state's board is self-financed based on fees and "0" if it relies on public funds. Self-financing boards are less accountable because they are exempt from scrutiny during budget allocation (Svorny and Toma 1998). All else equal, physicians can more easily capture self-financing medical boards because these boards face less countervailing public pressure to expand physician supply.

Board characteristics such as financing structure persist over time from prior institutional decisions and are therefore arguably exogenous to licensure requirements. States with self-financing medical boards tend to have self-financing licensing boards for other professions (Council of State Governments 1952, 91). Additionally, research on bureaucratic agency design emphasizes legislators' short- and medium-term concerns (Epstein and O'Halloran 1996, Lewis 2003), while agency characteristics persist over the

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<sup>8</sup> Data reported in *The Journal of the American Medical Association*, AMA Council on Medical Education Reports, or AMA's *State Medical Licensure Requirements and Statistics*. Earlier licensure data are available, as we report in Figure 2, but our sample is constrained by limits on the availability of other covariates.

longer-term. This persistence—especially since medical licensing legislation dates back to the turn of the 20<sup>th</sup> century (Council of State Governments 1952, 80)—suggests that board characteristics are orthogonal to other salient characteristics during our timeframe.

Data on board independence are from *The Exchange*, a publication of the Federation of State Medical Boards. Data availability limits our sample in this section to the intervals 1986-1989, 1992-1993 and 2003-2004. We find that two-thirds of state medical boards are self-financing and that the rules governing these boards exhibit little temporal variation over time. Accordingly, we do not include state fixed effects in our analysis.

We control for several other time-varying characteristics that influence the stringency of IMG licensing. First, we include a time trend to reflect the convergence across states in their licensing requirements over the last thirty years. Second, we control for the existing stock, lagged one year, of foreign-educated medical professionals using two variables: *New Admissions* counts the number of IMG physicians who arrived in state *i* in year *t*-1. *Adjustment of Status* captures the number of IMG physicians who became legal permanent residents in state *i* in year *t*-1. These variables control for unobserved factors that vary across both state and time that influence the length of a state's IMG residency requirement. States that are hostile towards immigrants or that privilege native over foreign-born professionals may have stricter licensing requirements for foreign professionals. These variables control, in part, for each state's climate towards foreigners. We expect that states with a more hostile climate would receive fewer new

arrivals and have fewer foreign physicians that become permanent US residents. These data are from DHS, which tracks all new migrant admissions and status adjustments.<sup>9</sup>

We also control for state-level features of the medical profession that shape regulators' incentives to erect licensure barriers. General demand for physicians can influence the expected returns to lobbying for regulation and public officials' willingness to tolerate strict entry requirements. *Log(Doctors Per 100K)* is the logged number of practicing physicians in the state, calculated from data provided by the US Department of Health and Human Services.<sup>10</sup> States suffering from physician shortages may be less likely to restrict IMG licensure in order to attract more qualified doctors. We also proxy for labor market demand for physicians by including the median annual salary for physicians (lagged one year) in the state, *Log(Physician Wage)*, as well as the total population in the state, *Log(Population)*. These data are from the US Census' Current Population Survey (King, et al 2010). Finally, trends in IMG licensing rules likely reflect general trends in licensing, including broad concerns about medical malpractice or other

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<sup>9</sup> These categories are identified by the DHS. New admittees enter on a temporary or permanent visa. Adjustments of status are conversions to permanent legal residence. DHS identifies the occupation of a legal migrant upon their entry into the US. For adjustments of status the DHS uses the immigrant's occupation prior to their becoming a legal permanent resident.

<sup>10</sup> Data for 2009 and 2010 were gathered separately and harmonized with this longer time series (AMA 2009, 2010, American Association of Medical Colleges 2009, 2011). State population figures from annual intercensal estimates (US Census Bureau 1996, 2002, 2009, 2011).

evolving aspects of the profession. We account for these general trends by controlling for the length of residency required of US medical graduates. This allows us to isolate the distinctive drivers of IMG licensure requirements.

We estimate our model of the length of *IMG Residency Requirement* as an ordered logit because this variable takes on four distinct values: 0, 12, 24, or 36 months.<sup>11</sup> We report robust standard errors clustered by state to account for unequal error variance. We report summary statistics for all variables in the appendix. Table 1, Column 1 provides model estimates in which *IMG Residency Requirement* is a function of only the independence of a state's medical board. States with financially independent medical boards are twenty percent more likely to have a 36-month requirement and fifteen percent less likely to require only 12 months of residency training. This is consistent with a simple cross-tabulation which shows the majority of states with self-financing medical boards require a far lengthier requirement for IMGs than those states which receive funding from the state government.

This correlation holds with the addition of control variables to the model. Estimates in Column 2 include a time trend to control for the convergence in requirements, median physician salary and the total state population. Surprisingly, the time trend is statistically insignificant at conventional levels and its inclusion only minimally diminishes the parameter estimate for our variable of interest, as is true of salary and population. We note that inclusion of these variables separately does not alter the finding of statistical insignificance. The expanded model results in Column 3 show

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<sup>11</sup> Models estimated via OLS provide identical results in terms of statistical significance and very similar results with regard to the substantive impact of board independence.

that the number of new admission in the previous year, physician stock, and the time trend have no statistically discernible effect on the length of states' IMG residency requirements. States with more IMG status adjustments in year  $t-1$  tend to have shorter requirements; each additional IMG status adjustment decreases the probability of a state having a thirty-six month requirement by 0.2 percentage points. The model estimates in Column 4 include US-educated physicians' licensing requirements. This variable is positive and statistically significant, indicating that requirements for foreign trained physicians tend to follow those of their domestic counterparts. Across these specifications the statistically significant coefficient for self-financing medical boards remains. The specification in Column 4 is a particularly challenging test of our claim because it controls for all variables that influence overall medical licensing, allowing us to focus solely on the drivers of additional requirements for foreigners.<sup>12</sup> The next obvious question is whether these restrictions actually play a role in protecting vested interests from foreign competition. We turn to this question next.

### **Consequences of Occupational Licensing Regulation For Migrant Behavior**

#### *Modeling IMG Location Choice*

Do occupational licensing requirements influence the distribution of IMGs across US states over time? We model IMGs' initial state of residence when they enter the US. In most instances, this is the state in which the IMG has secured a residency training position. In the US the National Resident Matching Program is the centralized process that matches medical graduates with certified hospital-based residency programs based

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<sup>12</sup> If we substitute the difference in requirements between foreign and domestically trained physicians we obtain a similar result.

on the ranked preferences of both the candidate and the program.<sup>13</sup> IMGs indicate location preferences and are legally bound to enter the program into which they have matched. When deciding where to apply, IMGs, like other residency applicants, consider financial and personal factors, as well as career objectives. Trainees tend to practice medicine in the same state in which they complete their residency because they benefit from a local network and sources of information about potential opportunities, which reduce the transaction costs involved in finding employment (Polsky et al 2002). Thus, these initial location decisions have significant long run consequences.

Lengthier training requirements lower IMGs' expected returns to medical training. Residency programs vary in length by medical specialty, with the shortest programs lasting 36 months. Completion of residency is necessary for voluntary certifications in medical specialties but in states with shorter training requirements IMGs receive unrestricted medical licenses prior to residency completion. Earlier licensure influences IMG income through at least two mechanisms.

First, resident physicians supplement their modest salaries by moonlighting. Moonlighting requires an unrestricted license, such that residents can practice medicine without supervision; as a result, delayed licensure closes off this extra source of income for IMGs.<sup>14</sup> On average, moonlighting residents double their annual earnings (Li et al

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<sup>13</sup> A small percentage of candidates are matched outside of this process.

<sup>14</sup> The legality of IMG moonlighting also depends on immigration status. IMGs who enter as permanent residents can moonlight without restrictions; H1B visa holders can moonlight within the residency hospital; J1 visa holders are typically barred from moonlighting of any kind.

2000, Coren 2007).<sup>15</sup> The practice is widespread: approximately 40 percent of internal medicine and 50 percent of emergency medicine residents moonlight (Silliman et al 1987, Li et al 2000).<sup>16</sup> Culler and Bazzoli (1985, 1986) find that IMGs more frequently moonlight despite the employment constraints of their US visas. This trend is consistent with higher rates of moonlighting among residents supporting dependents (see, e.g., Silliman et al 1987), as IMGs are more likely to have a spouse and children than US medical graduates (Gozu et al 2009).<sup>17</sup>

Second, lengthier training requirements delay employment of IMGs who choose to practice medicine without optional certifications available following residency completion. Over time these optional medical specialty board certifications have become more important as a prerequisite to Medicare and private insurance reimbursement.

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<sup>15</sup> Residents with higher debt burdens or who face other financial constraints are more likely to moonlight (Hunt et al 1992). Residents also cite educational and career-development benefits to moonlighting (Hunt et al 1992, Mehran Majidian et al 1993).

<sup>16</sup> Where residency programs prohibit or limit moonlighting, these rules tend to be weakly enforced, which has helped make the practice wider spread (Langdorf et al 1995, Li et al 2000).

<sup>17</sup> IMGs also tend to be older and less likely to have a family support network nearby (Gozu et al 2009), both suggestive of higher rates of moonlighting. At the same time, IMGs are less heavily indebted, which may make them less likely to moonlight (Gozu et al 2009, Silliman et al 1987).

Historically, however, a greater percentage of physicians began medical practices immediately upon receipt of a state license.<sup>18</sup>

Some physicians with unrestricted licenses leave residency early and practice clinical medicine in urgent care clinics, private rural practice, and correctional facilities. They are also able to work as temporary contract physicians, particularly in communities that suffer from physician shortages.<sup>19</sup> Additionally, medical school graduates have a variety of non-clinical employment options in which a license—though not necessarily required—can increase compensation or promotion opportunities, including preventive medicine, public health, medical information technology, managed care, medical consulting or pharmaceuticals.<sup>20</sup> Approximately 12 percent of residents leave their

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<sup>18</sup> The prominence of board certification arose in the late 1970s—in 1970 less than half of all physicians were board-certified, but by 1980 that proportion had risen to nearly three-quarters (Moore and Priebe 1991). This figure has not changed much since 1980. IMGs are less likely to be board certified than their US-trained counterparts (Akl et al 2007).

<sup>19</sup> Systematic data on physicians that did not complete residency is necessarily limited, likely because of the associated stigma. However, one survey of rural departments of emergency medicine indicated that approximately 20 percent of their staff physicians were residents-in-training. More importantly, a further 19 percent of staff physicians had not completed residency and were no longer enrolled in residency programs (authors' calculations based on McGirr et al 1998, 333-335).

<sup>20</sup> A variety of placement companies and websites cater to physicians that did not complete residency. These organizations list both non-clinical employment opportunities and a variety of clinical contract positions. Again, evidence is sparse but studies suggest

programs prior to completing their third year (Kindig and Libby 1994). In states with shorter licensing requirements, residents that fail to complete their program have more and better job opportunities.

Overall, in states where licensure occurs earlier, resident physicians enjoy significant benefits: earlier opportunities for moonlighting and better job prospects if they do not complete or need to delay completion of residency training. The stability that a medical license provides can be especially important for IMGs, since they are more likely to be placed into one year preliminary residency programs (see, e.g., Yoo et al 2009). These programs require resident physicians to re-apply to longer-term (categorical) programs after one or two years; if they are unsuccessful they can practice medicine either temporarily or permanently *if* their state allows licensure after a single year of residency training.

*Licensing Restrictions and IMG Location Choice: Empirics*

Our claim is that states with lengthier residency requirements receive fewer IMGs, because lengthier requirements reduce the expected returns to medical training. Existing gravity models of international migration establish that the single most important factor in location choice is wage maximization (Borjas 1994; Hatton and Williamson 2002). We cannot estimate a full gravity model of migration because our physician migrant data is not disaggregated by home country-US state dyad.<sup>21</sup>

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biomedical research and various allied health professions are common destinations for those who do not complete residency training (Yoo et al 2009).

<sup>21</sup> Even with disaggregated data we would be probably be unable to identify most of the parameters because most IMGs in the US originate from just a few foreign countries. Our

We return to the DHS migrant data to evaluate the effect of licensing requirements on IMG choice of US states. The dependent variable *Number of New Admissions* is the number of new admittees into the US who self-identify as physicians in state  $i$  at time  $t$ .<sup>22</sup> Over the sample period 1973-2010 the average state received 50 new IMGs per year with a low of zero (almost all states reported zeros at some point during the sample) and a high exceeding 1000 (New York in 1975-1977).

Our explanatory variable of interest is *Foreign Residency Requirement*, the measure of licensing regulation we introduce above. Our model includes three controls. *Log(Doctors Per 100K)* proxies for labor market demand for physicians in state  $i$  at year  $t$ . The expected sign of this variable is unclear because it can indicate oversupply but also rapid population growth. *Log(Median Physician Salary)* controls for cross-state variation in expected income. Of course migrants consider more than labor market conditions. As above, we rely on the number of status adjustments in the state in the previous year to account for states' social and cultural desirability to IMGs. This variable also proxies

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analysis of American Community Survey data from 2000-2010 indicates that the vast majority of IMGs come from approximately twenty countries.

<sup>22</sup> IMGs enter the US on a J1 or H1B visa. Entry on these educational/work visas, and the accompanying documentation from their US sponsors, ensures that these migrants are physicians as the occupation is defined in the US. It is possible that migrants entering on family reunification visas self-report as physicians and therefore appear in our data. Non-practicing physicians in our data do not bias our results because their state location choice should not correlate with the stringency of physician licensing.

chain migration, whereby co-ethnics cluster geographically, and any associated professional networks that lower the cost of finding employment.

Given that our dependent variable counts the number of new IMG admissions into state  $i$  at time  $t$ , we estimate a set of Poisson pseudo-maximum likelihood (PPML) count models that account for the large number of zeros in the dependent variable. We prefer this estimator, developed by Santos Silva and Tenreyro (2010), because we include a high number of dummy variables which can make standard Poisson models intractable. The PPML estimator outperforms the standard Poisson model when the conditional variance is proportional to the conditional mean. Santos Silva and Tenreyro (2010) show that this allows for both under- and over-dispersion in the data. Most important, the PPML estimator—unlike the Poisson and Negative Binomial—is scale invariant, which allows for consistent estimates of elasticities for our variable of interest. See appendix for summary statistics.

Table 2 presents our findings on the determinants of IMG migration across states. The first column provides pseudo-maximum likelihood results with robust standard errors in parentheses. Column 2 estimates include year fixed effects and Column 3 estimates include both state and year fixed effects. Controlling for state and year fixed effects, the average state with the strictest requirements—36 months—receives 4 fewer IMGs annually compared to an otherwise equivalent state with no residency requirement. Figure 3 illustrates cross-state variation in the costs of lengthier IMG requirements. We map the predicted increase in foreign trained physicians for the period 2005-2010 under the counterfactual condition that the IMG residency requirement is equal to that applied to US-educated physicians for all states in that period. Large states are the biggest

gainers under this scenario with California, New York and Illinois gaining an estimated 3321, 2816 and 1030 foreign trained physicians respectively *over six years*. Other states do not gain as substantively: we estimate Idaho and Wyoming to gain fewer than two physicians in this period.

Endogeneity is a concern if the number of new arrivals of foreign-educated doctors in a state influences the stringency of licensure requirements. The results in the previous section provide at least cursory evidence that this is not the case. The estimate on the previous year's new IMG admissions in the Table 1, Column 4 model of IMG residency requirements is far from statistically significant. As a safeguard we estimate an instrumental variables regression where we treat the foreign residency requirement as endogenous. These model estimates are presented in Table 3. We could not obtain convergence with an instrumental variables Poisson estimator due to the high dimensional nature of the fixed effects we include. Consequently we use two-stage least squares and provide OLS estimates for the sake of comparison in Column 1 of Table 3. The two-stage least squares model in Columns 2 and 3 is properly identified: our instrument for the foreign residency requirement, the domestic residency requirement, is a strong predictor with an F-statistic well above the rule of thumb of 10; auxiliary regressions show that it can be excluded from a model of foreign physician migration because it is statistically insignificant when added to the models in Table 2. The coefficient on the IMG residency requirement in the second stage of the instrumental variables regression is negative and statistically significant; that it is over ten times the size of the OLS estimates suggests that, if there is bias in the OLS estimates, it would be in the direction of dampening the estimated effect.

Amid the implementation of universal health insurance our findings on physician supply have distinct public policy implications. The federal government designates much of the US as suffering from physician shortages.<sup>23</sup> As we note in the introduction, over one quarter of US practicing physicians received their medical education outside of the U.S. This dependence on foreign trained physicians is poised to grow with the implementation of universal health care and an aging population (Dill and Salsberg 2008). IMGs are also more likely to become general practitioners, and work in localities suffering from physician shortages (Mick et al 2000, Hart et al 2007).<sup>24</sup>

How would equalizing IMG and US graduate residency requirements help states to remedy these shortages? Using the estimates from Table 2, Column 3, we calculate the expected increase in foreign-educated physicians summed over the period 2005-2009 if states' IMG residency requirements were equivalent to those of US-educated physicians. Figure 4 plots this estimate on the x-axis against the number of physicians required to erase the federal designation of a health professional shortage area in 2009 on

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<sup>23</sup> The official definition of shortage is a population-primary care doctor ratio of greater than 2000 to 1. Shortage areas are as designated by the Health Resources and Services Administration (HRSA), US Department of Health and Human Services. Growth rates calculated from HRSA data.

<sup>24</sup> Both findings suggest that IMGs fill structural gaps in the physician workforce. That IMGs enter general practice is particularly important, given the decline in general practice graduates over the last 15 years and the expected future growth in demand for non-specialty care (Colwill et al 2008).

the y-axis.<sup>25</sup> The top panel includes estimates for all states while the bottom panel excludes those states with the highest need for the sake of clarity. The diagonal line is a reference point: states on the line would receive foreign trained physicians sufficient to remove the underserved designation, those to the right of the line would receive additional physicians beyond the number needed to remove the designation, while those to the left would receive fewer physicians. Both plots confirm our initial findings that larger states are more likely to gain more physicians by decreasing their licensing requirement. The expected increase in foreign physicians into a state correlates highly with the degree of physician shortage it faces ( $\rho=.77$ ). While a decrease in the requirement would not completely satisfy need in most states, it is a straightforward, practical policy change that can result in measurable improvements in social welfare.<sup>26</sup>

## **Conclusion**

Occupational licensing regulations are ubiquitous, profession-specific barriers to high skill migration. In this article we investigate the origins and consequences of variation in US states' post-graduate training requirements for foreign-educated

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<sup>25</sup> These estimates must be interpreted with a grain of caution. We have no way of accounting for attrition if foreign trained physicians leave the state after completing their training or if additional physicians—either foreign or domestically trained—migrate to the state in question.

<sup>26</sup> It may be that states to the left of the line have political environments that are hostile to undocumented workers—something that may proxy for the overall desirability of a state from the point of a view of a foreign-born individual. This is an area for future research.

physicians by analyzing original data on the stringency of licensing requirements and foreign physician inflows for the period 1973-2010. We show that in states where physicians can more easily capture the state medical licensing board, IMGs face more stringent requirements, and that states with lengthier requirements receive fewer migrant physicians. Based on our estimates several US states could solve physician shortages entirely by eliminating the additional licensing requirements imposed on foreign-educated physicians.

As the locus of international economic integration shifts to human capital-intensive activities, national and even subnational regulations will increasingly be the site of distributive struggles over economic openness. Long-standing fixtures of the regulatory landscape take on new meaning in a globalized economy. As we demonstrate with the case of physicians, occupational licensing not only merits greater study by political economy scholars of migration. It also speaks to some of the most pressing public policy concerns that the US faces today.

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**Table 1: Determinants of Licensing  
Ordered Logit Model**

	(1)	(2)	(3)	(4)
Independent Board	0.820*** (0.19)	0.756*** (0.20)	0.795*** (0.22)	0.810*** (0.22)
Time Trend		0.014 (0.01)	0.019 (0.02)	0.014 (0.02)
Log(State Population)		-0.172 (0.11)	0.024 (0.14)	0.065 (0.14)
Log(Median Physician Salary)		-0.009 (0.04)	-0.010 (0.04)	-0.008 (0.04)
Number of New Admissions (t-1)			-0.001 (0.01)	-0.001 (0.01)
Number of Adjustments of Status(t-1)			-0.010*** (0.01)	-0.011*** (0.01)
Log(Doctors per 100K) (t-1)			0.208 (0.50)	0.169 (0.49)
Domestic Residency Requirement (t-1)				0.026** (0.01)
Cut Point 1	-0.690*** (0.15)	27.287 (29.17)	37.575 (31.62)	28.178 (32.06)
Cut Point 2	0.562*** (0.15)	28.542 (29.15)	38.850 (31.60)	29.461 (32.04)
N	386	386	386	386

Dependent variable is the licensing requirement (number of months) for foreign medical professionals in state  $i$  in year  $t$ . Cell entries are from an ordered logit model estimated by maximum likelihood with robust standard errors in parentheses. \*\*\* $p < .01$ , \*\* $p < .05$ , \* $p < .10$ .

**Table 2: Models of Physician Migration (PPML)**

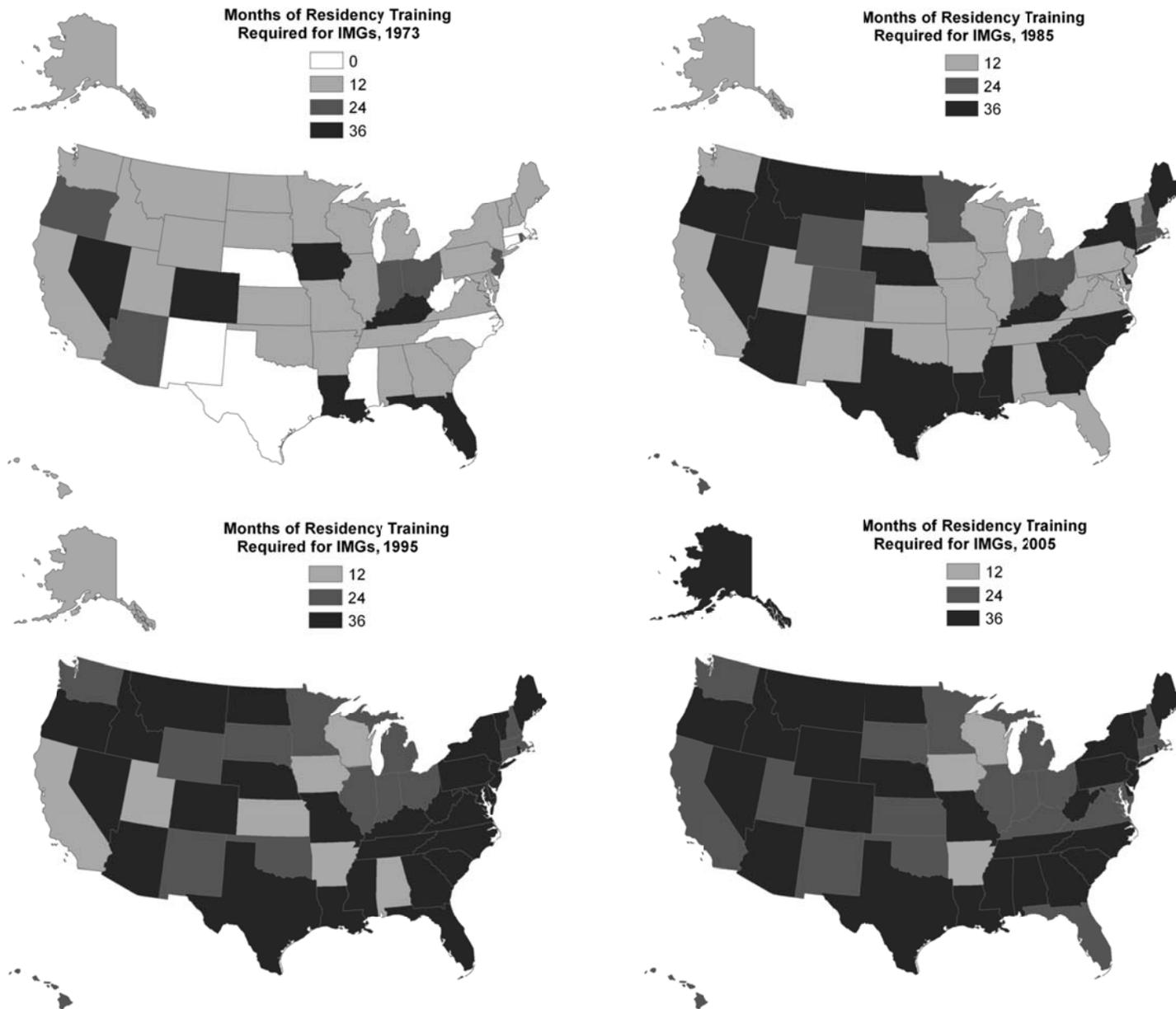
	No FE	Year FE	Year & State FE
Foreign Residency Requirement	-0.018*** (0.00)	-0.007** (0.00)	-0.003* (0.00)
Log(Adjustments of Status)	0.888*** (0.03)	1.046*** (0.02)	0.302*** (0.02)
Log(Doctors per 100K)	0.488*** (0.08)	0.514*** (0.09)	-0.856*** (0.17)
Log(Median Physician Salary)	0.002 (0.02)	-0.003 (0.01)	-0.004 (0.01)
Constant	-1.224*** (0.40)	-2.915*** (0.53)	2.553** (1.11)
N	1887	1887	1887

Dependent variable is the number of new foreign medical professionals admitted in state  $i$  in year  $t$ . Cell entries are estimated by poisson regression by pseudo maximum likelihood with robust standard errors in parentheses. \*\*\* $p < .01$ , \*\* $p < .05$ , \* $p < .10$ .

**Table 3: Models of Physician Migration (Robustness)**

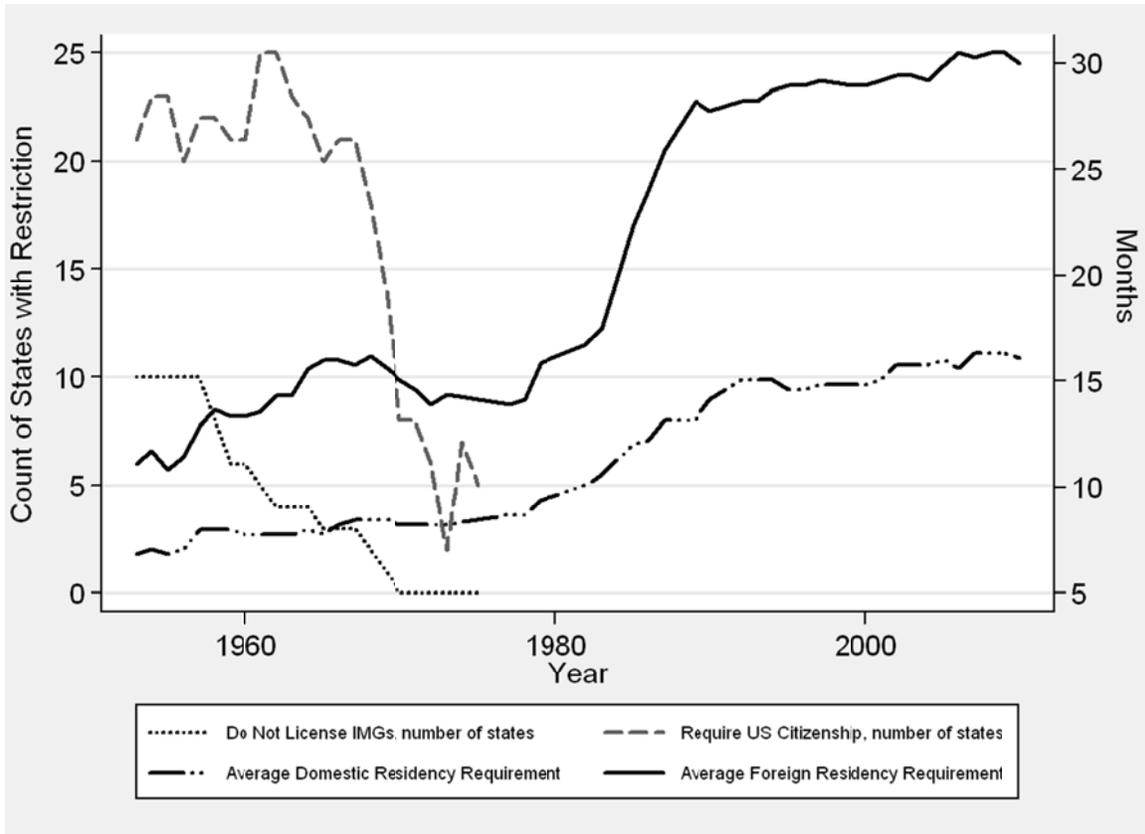
	OLS	2SLS	
		Second Stage	First Stage
Foreign Residency Requirement	-0.266* (0.14)	-3.955** (1.31)	
Log(Adjustments of Status)	8.965*** (1.25)	6.140*** (1.62)	-0.438*** (0.22)
Log(Doctors per 100K)	-18.490 (15.75)	37.927 (26.76)	13.47** (2.74)
Domestic Residency Requirement			0.205** (0.04)
Log(Median Physician Salary)	-0.272 (0.39)	0.252 (0.47)	-0.008 (0.07)
Constant	133.782 (86.90)	-107.08 (117.615)	-46.37** (14.29)
N	1887		1836

Dependent variable is the number of new foreign medical professionals admitted in state  $i$  in year  $t$ . Models estimated by OLS with robust standard errors in parentheses. Both models include a full battery of year and state fixed effects. F-test for the strength of the instrument (domestic residency requirement) in the first stage is 26.49 (prob>F = 0.0000). \*\*\* $p < .01$ , \*\* $p < .05$ , \* $p < .10$ .



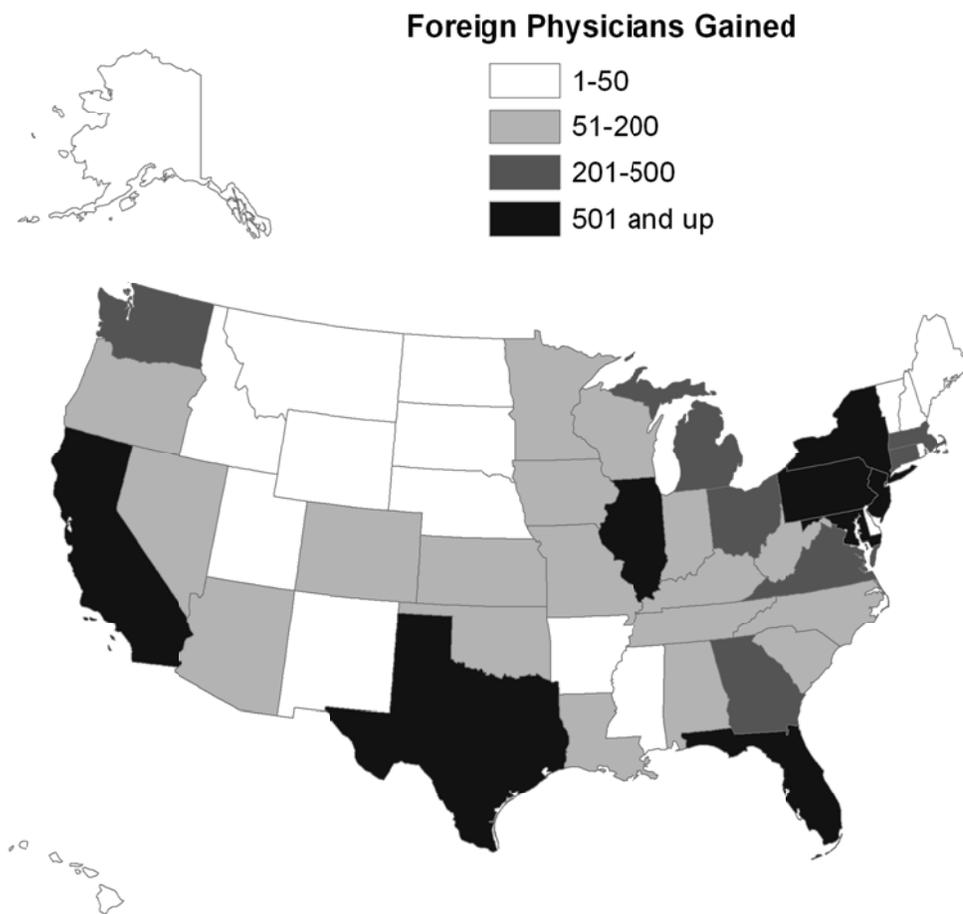
**Figure 1: IMG Residency Training Requirements by State, 1973-2005**

Residency training requirements for IMGs range from 0 (white) to 36 months (darker) in our sample period (1973 to 2010).



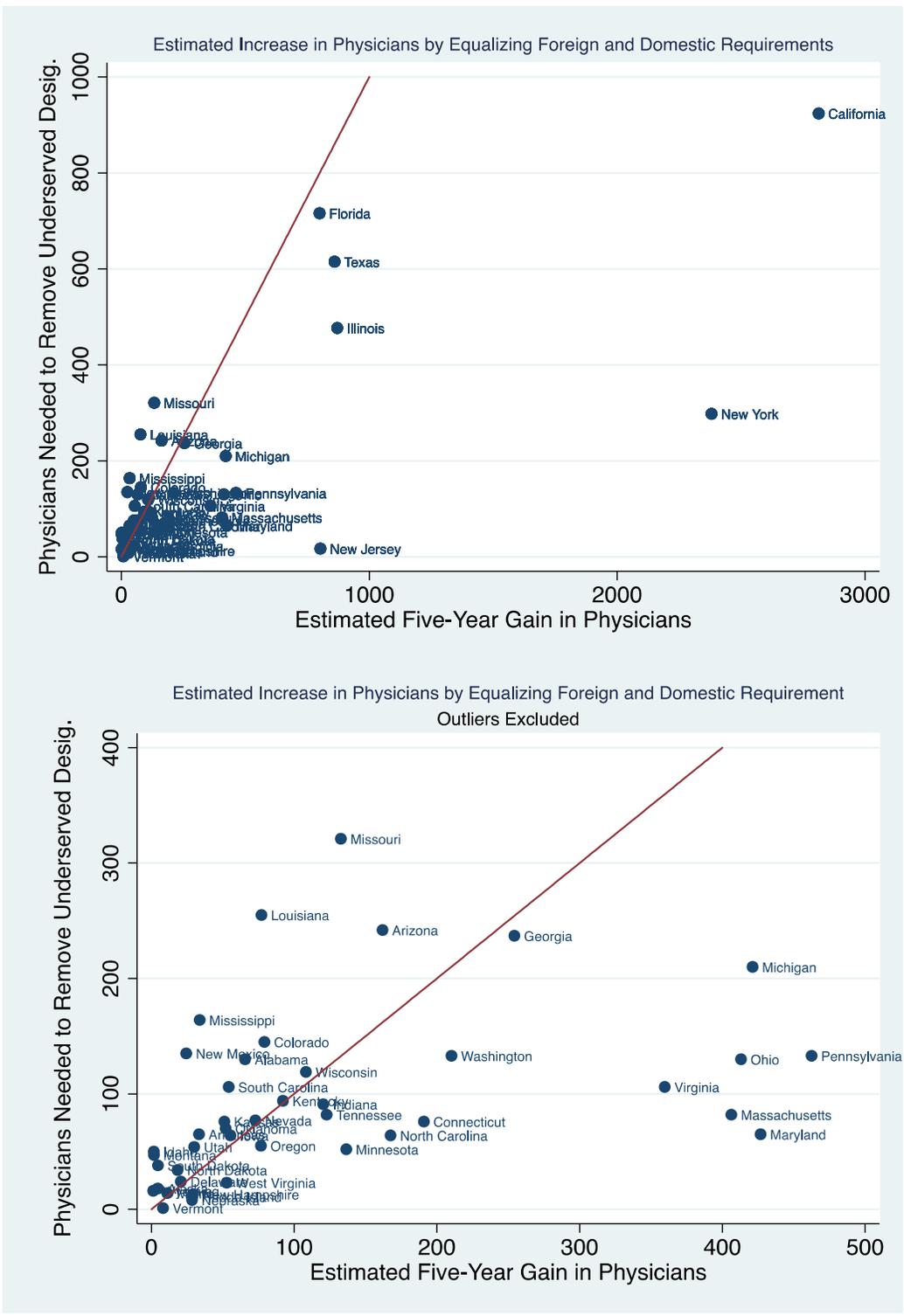
**Figure 2: Licensing Regulations for International Medical Graduates  
US Average 1953-2010**

Historical rules requiring US citizenship or imposing a blanket ban on all foreign-educated doctors are scaled on the left, as a count of states employing those restrictions. Average residency requirements across states are scaled on the right, as the mean months of residency required for IMGs (solid line) and US medical graduates (dash-dot line).



**Figure 3: Counterfactual Simulation of IMGs Gained, 2005-2010, by Reducing IMG Residency Requirements**

States are estimated to gain between 1.6 (Wyoming) and 3,321 (California) international medical graduates over the period 2005-2010 by reducing their IMG residency requirements to match the requirements for US medical graduates.



**Figure 4: Gain in Physicians by Equalizing Licensure Requirements, By State**  
 Y-axis = number of physicians needed to eliminate federal physician shortage designation (2009). X-axis = projected five-year increase in IMG inflows if residency requirement lowered from 36 to 12 months (Table 2, Column 3 estimates). Top panel includes all states. Bottom panel only states needing fewer than 500 physicians to remove federal physician shortage designation.

## Appendix

**Table A1: Summary Statistics**

**Licensing Sample**

Variable	Mean	Std. Dev.	Min	Max
IMG Residency Requirement	27.07772	9.777747	0	36
Domestic Residency Requirement	14.11399	6.177249	0	36
Independent Board	.6683938	.4714013	0	1
New Admissions	39.37824	88.04203	0	594
Adjustments of Status	14.64508	25.45372	0	224
Log(population)	14.965	1.015	4.79	6.65
Log(Median Physician Wage)	9.936	3.06	2.5680	12.748
Log(Doctors Per 100k)	5.309011	.2903892	4.793059	6.5595

N=386

**Migration Sample**

Variable	Mean	Std. Dev.	Min	Max
New Arrivals	50.2284	106.8089	0	1251
IMG Residency Requirement	24.46423	10.90733	0	36
Log(Adjustments of Status)	2.219972	1.665785	0	7.1325
Log(Median Physician Wage)	10.105	2.966	2.5680	13.009
Log(Doctors Per 100k)	5.250871	.379486	4.209656	6.6291

N=1887