

# *Doctors with borders: occupational licensing as an implicit barrier to high skill migration*

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## Doctors with borders: occupational licensing as an implicit barrier to high skill migration

Brenton D. Peterson · Sonal S. Pandya · David Leblang

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**Abstract** Research on the political economy of immigration overlooks the specificity of human capital in skilled occupations and its implications for immigration preferences and policymaking. Conclusions that skilled Americans are unconcerned about labor market competition from skilled migrants build on a simple dichotomy between high and low skill migrants. In this article we show that natives turn to occupational licensing regulations as occupation-specific protectionist barriers to skilled migrant labor competition. In practice, high skill natives face labor market competition only from those high-skill migrants who share their occupation-specific skills. Licensure regulations ostensibly serve the public interest by certifying competence, but they can simultaneously be formidable barriers to entry by skilled migrants. From a collective action perspective, skilled natives can more easily secure sub-national, occupation-specific policies than influence national immigration policy. We exploit the unique structure of the American medical profession that allows us to distinguish between public interest and protectionist motives for migrant physician licensure regulations. We show that over the 1973–2010 period states with greater physician control over licensure requirements imposed more stringent requirements for migrant physician licensure and, as a consequence, received fewer new migrant physicians. By our estimates over a third of all US states could reduce their physician shortages by at least 10 percent within 5 years just by equalizing migrant and native licensure requirements. This article advances research on the political economy of immigration and highlights an overlooked dimension of international economic integration: regulatory rent-seeking as a barrier to the cross-national mobility of human capital, and the public policy implications of such barriers.

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## 1 Introduction

Occupational licensing is a central feature of modern labor markets. Nearly 30 % of the US and European workforce requires a state-granted license to practice one's occupation (Kleiner and Krueger 2010). In the United States, over 800 occupations are subject to licensure in at least one state (Kleiner 2000). Licensing regulations ostensibly ensure public safety by providing quality information markets fail to supply (Leland 1979; Weingast 1980). Simultaneously, regulations often serve as protectionist entry barriers (Friedman and Kuznets 1945; Stigler 1971). Under the cover of public safety, regulators may advance the interests of the professions they oversee, by using excessively stringent licensure rules to protect incumbent practitioners from competition.

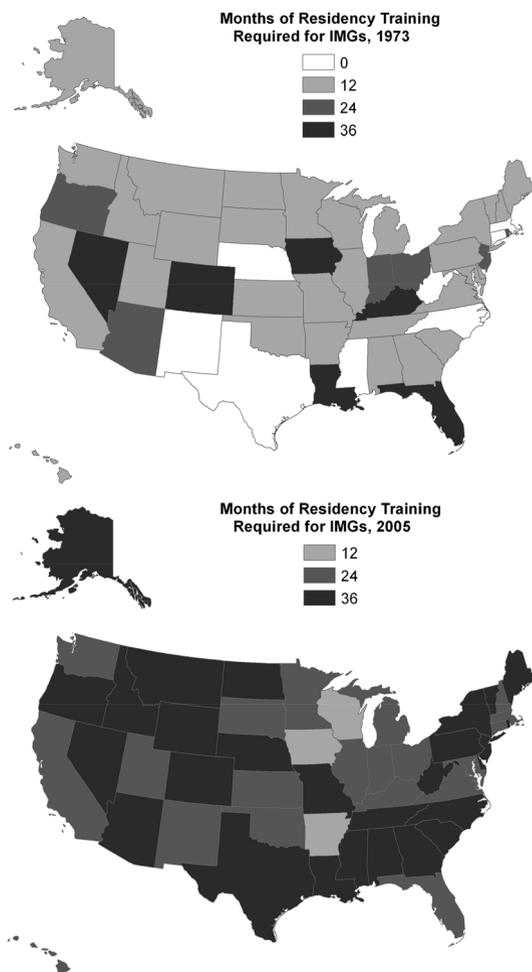
In this article, we show that occupational licensure rules function as implicit, non-visa policy barriers to skilled immigration. Our analysis of US physician licensure exploits the unique structure of US physician training to distinguish between public interest and protectionist motives. International medical graduates (IMGs) seeking licensure in the United States must complete the same standardized tests as US medical graduates and compete for limited post-graduate residency positions. These extensive, universal requirements address the obvious public interest in physician licensure.

Although there is national standardized quality screening, individual US states set physician licensure requirements. In the United States, unelected, occupation-specific state regulatory boards establish criteria for the assessment and recognition of occupational qualifications earned in foreign countries. A public safety rationale suggests relatively uniform requirements, but, as Fig. 1 demonstrates, cross-state variation in the stringency of IMG licensure requirements has been considerable over the past four decades. States require up to two additional years of residency training for IMGs as compared to US-educated physicians. Given the extensive quality checks prior to the point of licensure, we interpret states' varying requirements as evidence of protectionism.

In the first part of this article, we analyze an original dataset of state licensure requirements for immigrant physicians for 1973–2010 to show that states with self-financing medical boards—our measure of propensity for regulatory capture by native physicians—delay immigrant physicians' entry into the US physician labor market by mandating lengthier US medical residency training prior to licensure. We verify that characteristics of states' physician labor markets, immigrant populations and licensure requirements for native US physicians do not drive our finding. Additionally, we find no correlation between medical board type and the licensure standards for US-trained physicians, indicating protectionism that specifically targets immigrants.

In the second half of this article, we investigate how licensing requirements influence where migrant physicians settle within the United States. We estimate a count model of annual IMG flows into US states, using newly available immigration records from the US Department of Homeland Security (DHS). States with more stringent licensure requirements receive fewer migrant physicians, a finding statistically robust to controls for state and year characteristics. To address possible reverse causality, we instrument for migrant

**Fig. 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 (1973–2010)



licensure requirements using licensure requirements for US-educated physicians. Our results are unchanged.

This research introduces two innovations to political economy models of immigration. First, we highlight how the occupational specificity of skills shapes the distributive effects of skilled immigration. Like most economic assets, skills are specialized. Dentists cannot argue legal cases nor can accountants design buildings, even if acquiring the respective skill sets takes the same length of time. In a world of occupation-specific skills, skilled natives compete for jobs only with those migrants with the same skill sets.

Skill specificity explains the contradictory findings in existing research on immigration preferences. One set of findings emphasizes the financial impact of skilled immigration—heightened labor market competition and net tax contributions—as the primary driver of preferences for skilled immigration (Hanson et al. 2007, 2009; Facchini and Mayda 2012). A competing explanation is that skilled natives support skilled immigration because they have a cosmopolitan worldview that trumps material concerns (Hainmueller and Hiscox 2007, 2010).

Without an accurate model of labor market competition, advancing claims about the relative importance of material concerns in the formation of immigration preferences is impossible. Existing studies rely on survey questions that pose a simple dichotomy between skilled and unskilled immigrants. This broad framing conceals the concentrated costs of immigration when skills are occupation specific—effects that should profoundly shape attitudes toward skilled migration. We expect skilled natives to oppose skilled migration into their own occupation but otherwise support it for a variety of reasons cited in the existing literature, including higher net tax contributions and enhanced cultural diversity.

Second, unlike the vast majority of existing studies we develop a model of immigration policy rather than immigration preference by identifying occupational licensure rules as implicit, non-visa policy barriers to skilled immigration. Licensure rules do not govern migrants' entry into a country, but they dictate the ease with which migrants can enter the labor market for their specialized skills. During 1994–2012, ~15 % of migrants holding bachelor's degrees and nearly half of all migrants with professional degrees work in licensed occupations.<sup>1</sup> From a collective action perspective, lobbying subnational, occupation-specific boards to impose stricter licensure criteria on immigrants is less costly for skilled natives than influencing broad national-level immigration policies.

This study highlights barriers to the international flow of human capital more generally. Protectionist licensing rules also threaten the nascent market for international trade in professional services. Technological advances expose segments of traditionally non-traded service professions such as medicine, accounting, and engineering to foreign competition.<sup>2</sup> Amid growing multilateral and regional efforts to liberalize trade in services, the power of unelected, sub-national regulators to dictate the international mobility of skills is poised to grow.

The protectionist use of licensure regulation is also of exceptional public policy importance, particularly in the US medical profession. One-fourth of practicing US physicians are IMGs (Dill and Salsberg 2008). Researchers already anticipate a severe increase in physician shortages with the aging of the US population and the creation of universal health insurance under the Affordable Care Act (Goodson 2010; Dorsey et al. 2011).<sup>3</sup> Based on the counterfactual estimates that we provide in the final section of the article, over a third of all US states could reduce their current physician shortages by at least 10 percent within 5 years simply by equalizing licensure requirements for native and foreign-educated doctors.

We present our claims and findings in three sections. In the next section, we identify the distributive costs of specific-skilled immigrant inflows as a driver of protectionist licensure requirements. In the following section, we examine how licensing regulations influence migrant physicians' location choices within the United States. We conclude by discussing

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<sup>1</sup> See supplemental appendix for a list of licensed occupations.

<sup>2</sup> Mattoo and Carzaniga (2003). For example, for US hospitals to offshore diagnostic radiology services, foreign radiologists must hold a valid medical license for the state in which the hospital is located. Public safety concerns notwithstanding, countries including the United Kingdom and Singapore impose less stringent licensure requirements for the same activities (Yu and Levy 2010).

<sup>3</sup> The US Department of Health and Human Services defines physician shortage areas as those with a population-to-primary-care-physician ratio of greater than 3,500/1. Several factors contribute to shortages, including inadequate federal funding for graduate medical education, and weak incentives to enter primary care medical specialties and to locate in rural areas. See the supplemental appendix for further details on the measurement of physician shortages ([https://dl.dropboxusercontent.com/u/3771432/doctors\\_licensing\\_SuppApp.pdf](https://dl.dropboxusercontent.com/u/3771432/doctors_licensing_SuppApp.pdf)).

the policy implications of our findings for resolving physician shortages and containing healthcare costs.

## 2 Occupation-specific skills and motives for occupational licensing

When economic assets are specialized, their value is limited to specific economic activities. Skill specificity is an example of this more general phenomenon of asset specificity. Skills are investments in human capital (Becker 2009); occupation-specific skills, acquired through education and training, are investments in expertise particular to a certain occupation. Returns to the investment in skills occur only in a few activities, and future technological or policy changes may render these skills obsolete (Iversen 2005). Scholars of international economic integration have long emphasized how asset specificity shapes preferences for trade and monetary policies (Frieden 1991; Hiscox 2002).

Existing theories of immigration preferences overlook skill *specificity*, focusing instead on skill *level*. Skill level refers to the duration of human capital investment as measured by educational attainment, whereas skill specificity describes the content of human capital and its portability across economic activities. This omission is problematic because high-skill occupations tend to require specific skills. According to the International Labor Organization's 2008 International Standard Classification of Occupations (ISCO-08), professionals are the only occupational group that requires a college or postgraduate degree, the conventional definition of high-skill labor.<sup>4</sup> The ISCO-08 also supplies information on skill specificity by disaggregating occupations into categories with unique occupational tasks. By this metric, professional occupations are not only the single high-skill occupational category, but they also have the most specific skills of any occupational group.<sup>5</sup>

It thus follows that the distributive consequences of skilled immigration depend on the specificity of skills. Natives experience labor market competition only from immigrants who share their specific skills, not from immigrants with the same number of years of schooling.<sup>6</sup> Existing research on immigration preferences is based on factor-proportions models that implausibly assume high-skill labor that is perfectly mobile across economic activities.<sup>7</sup>

An emphasis on skill specificity draws attention to a variety of occupation-specific regulations that provide skilled natives with precisely targeted protection.<sup>8</sup> Owners of

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<sup>4</sup> Official ISCO-08 statistical definition of professional occupation: "Professionals increase the existing stock of knowledge, apply scientific or artistic concepts and theories, teach about the foregoing in a systematic manner, or engage in any combination of these activities."

<sup>5</sup> Iversen and Soskice (2001) use an earlier version of the classification to measure skill specificity in a similar manner.

<sup>6</sup> Some skill sets can more easily translate across borders than others. The technical skills of an engineer or a doctor, for example, are likely more portable across national boundaries than those of a lawyer or accountant whose professional expertise is jurisdiction specific.

<sup>7</sup> Facchini and Mayda (2008) and Milner and Tingley (2011) assume factor mobility in their analyses of migration attitudes and policies. Hainmueller and Hiscox (2010) dismiss factor specificity by assuming a small open economy in which all goods are traded such that consumption effects could outweigh wage competition. Their reasoning does not hold when skill-specific protection is possible. Further, as we note, the only high-skill occupations are professional services, which frequently are nontraded. Inattention to skill specificity is probably also responsible for indeterminate findings on the labor market effects of migration.

<sup>8</sup> To some extent, the definition of occupational categories for the purposes of regulation is endogenous to lobbying because regulatory boards issue "scope of practice guidelines" that draw boundaries where functional overlap occurs in occupational tasks (e.g., nurse practitioners and physicians).

specific assets lobby their governments more frequently (Grossman and Helpman 2001). When distributive costs are narrowly circumscribed within an industry or occupation, barriers to collective action are lower (Olson 1965). Relatively small, homogeneous occupations—such as state-level professional organizations—can more easily overcome the free-rider problem. The costs of licensing requirements typically are diffuse, reducing the possibility of countervailing public pressure for liberalization (Stigler 1971; Peltzman 1976). Across occupations, stricter licensing requirements exist in those states with more organized professional lobbies (Graddy 1991; Tenn 2001). The delegation of licensure standards to state regulatory boards minimizes public debate on the costs and benefits of strict licensure policies, and occupation-specific regulatory boards do not internalize the negative externalities of stronger regulations. By contrast, national immigration debates encompass a wider range of stakeholders and issues, inviting discussion over the tradeoffs of particular policies.

We argue that states with financially independent medical boards are more susceptible to capture whereby native physicians lobby for regulations that advance their interests.<sup>9</sup> Rule making by appointed boards reduces collective action costs by concentrating authority in groups much smaller than state legislatures. Members of state medical boards tend to be from the medical profession rather than being career politicians or bureaucrats. As such, board members have connections to other physicians and to medical professional organizations. Native physicians, having personal experience with medical boards through the licensure process, are more familiar with the regulatory process than potential opponents of strict licensure rules.

By avoiding legislative votes on their budgets, self-financed boards avoid the direct scrutiny of legislators. State legislators have greater incentives to consider the public's demand for low-cost healthcare than board members, because they are accountable to voters. All else equal, elected legislators should oppose licensing requirements that do not tangibly increase public safety. Without the power of the purse, legislatures have less leverage to impose the public's preferences on the board (Svorny and Toma 1998). Additionally, self-financing boards do not compete with other agencies for scarce government revenues, so they avoid scrutiny from other agencies that compete for the same resources (Weingast and Moran 1983).

## 2.1 Regulatory capture and foreign-physician licensing

The current framework for US physician training and licensure emerged after 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 the medical profession. Licensure requirements vary somewhat by state but typically include educational and experiential prerequisites, the passing of written or oral exams, paying fees, periodic recertification, and evidence of moral character. Additionally, boards reserve for themselves wide discretion in interpreting licensure candidates' credentials.<sup>10</sup>

<sup>9</sup> See Carpenter (1996) and Wood and Waterman (1991) on funding as a form of legislative control over agencies.

<sup>10</sup> 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 IMG licensure requirements grew more stringent as a replacement for outlawed citizenship requirements.

Given the potentially large cross-national variation in the content and quality of medical education, rigorous screening of IMGs is necessary to ensure public safety. Prior to licensure, several standardized checks exist for IMG quality. They must first pass the US Medical Licensing Exam (USMLE), a set of three written exams all US medical graduates must pass in order to be eligible for post-graduate training.<sup>11</sup> The objective of the USMLE is to “ensure that IMGs demonstrate the ability to gather and interpret clinical patient data and communicate effectively at a level comparable to a standard reasonably expected of students graduating from US and Canadian medical schools” (Whelan et al. 2002, p 1080). The exams have a low pass rate, suggesting significant quality sorting at this stage. In 2008, only 42.6 % of first-time, non-US-citizen IMG applicants passed all three components of the test (Jolly et al. 2011).

IMGs that pass the USMLE face a second, more stringent quality check: they must obtain a US medical residency position. In the United States, all medical graduates seeking licensure, regardless of where they were educated, must do a residency, a period of supervised post-graduate training.<sup>12</sup> A centralized, nationwide residency match exists in which IMGs compete with US medical graduates for a fixed number of slots. The demand for residency training always exceeds the supply of positions.<sup>13</sup>

This process is a further screen for critical skills, such as ease of communication, which standardized exams cannot readily ascertain. Over the period 1995–2003, an average of 40 % of IMGs did not earn a residency position (Boulet et al. 2006). Post-licensure performance indicates that quality screening is effective. No differences exist between non-US-citizen IMGs and US medical graduates in patient health outcomes or in the frequency of disciplinary actions by state medical boards.<sup>14</sup>

Although standardized 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. Interestingly, as Fig. 1 shows, wide variation exists across states during 1973–2010. Over time, most states have raised their requirements, but variation among states persists throughout this period. Cross-state variation is, on its face, a challenge to public-interest motives for regulation that would predict relatively uniform regulations across states. Additionally, most states mandate longer residency requirements for IMGs than for US medical graduates, despite identical quality screening prior to residency. Figure 2 illustrates this disparity by plotting the average length of residency requirements nationwide for US medical graduates and IMGs. As further evidence of barriers to entry, jurisdictions with more onerous requirements have higher physician salaries and poorer quality medical services (Kugler and Sauer 2005).

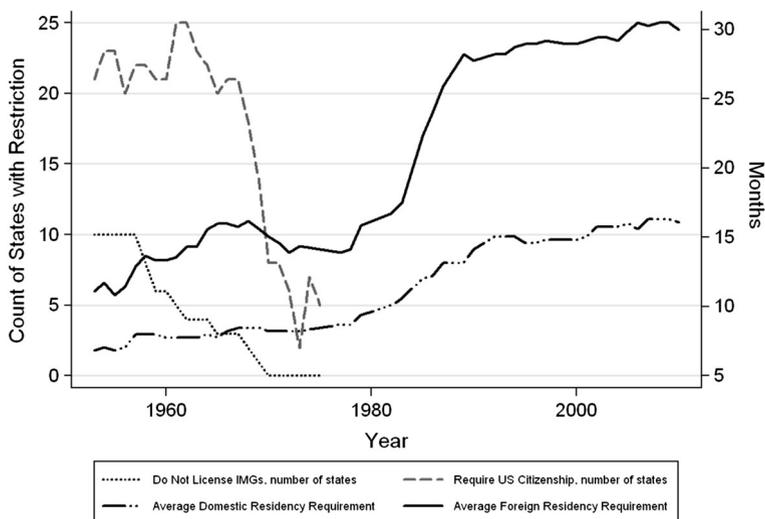
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<sup>11</sup> To take the exams, IMGs must provide proof that they graduated from a foreign medical school listed in the International Medical Education Directory, a list maintained by the US Educational Commission for Foreign Medical Graduates. The directory includes foreign medical schools that are accredited by their respective governments. This requirement provides another quality screen.

<sup>12</sup> With the exception of Canada, prior experience in foreign countries does not count toward this requirement.

<sup>13</sup> The system of post-graduate residency is almost entirely federally funded. The number of slots has been somewhat fixed since 1996, when Congress froze funding for additional slots.

<sup>14</sup> On patient health outcomes, see Norcini et al. (2010). On disciplinary actions, see Morrison and Wickersham (1998). Indeed, non-citizen IMGs consistently outperform US citizen/permanent resident IMGs at every stage of assessment described. To the extent that the latter group more clearly signals poor quality by the inability to gain admission to a US school, this pattern further establishes the effectiveness of foreign IMG quality screening.



**Fig. 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*)

## 2.2 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 argue that incumbent physicians prefer entry barriers that preserve monopoly rents. 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.<sup>15</sup>

We measure the stringency of licensing requirements, *IMG Residency Requirement*, as the length of residency training states require of IMGs. We focus on the length of residency requirements because it is the most common way in which states discriminate between US- and foreign-educated physicians. Residency requirements are also long-standing rules that are comparable across states and years. During the period we study, 1973–2010, the length of residency required for IMG licensure varies between zero and 36 months. We assemble these data from the records of the American Medical Association.<sup>16</sup> Figures 1 and 2 summarize the average cross-state and temporal variation in IMG training requirements, respectively.

<sup>15</sup> Svorny and Toma (1998). 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 state’s medical practice act rarely are contentious, though professional organizations do lobby (see, e.g., c.f 1999 Alaska Senate Bills 71 and 29).

<sup>16</sup> Earlier licensure data are available, but our sample is constrained by the availability of other variables. See the supplemental appendix for details regarding data sources. [https://dl.dropboxusercontent.com/u/3771432/doctors\\_licensing\\_SuppApp.pdf](https://dl.dropboxusercontent.com/u/3771432/doctors_licensing_SuppApp.pdf).

Our binary measure, *Independent Board*, equals 1 if the state's board is self-financed based on physician-paid fees, and 0 if it relies on public funds. 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. Financing rules are relatively fixed over time, so we do not include state fixed effects in our analysis.<sup>17</sup>

We control for several other time-varying characteristics that may influence the stringency of IMG licensing. We include a time trend to reflect the convergence in licensure requirements across states over the last 30 years. We control for the existing stock, lagged 1 year, of foreign-educated medical professionals in each state 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 and that influence the length of a state's IMG residency requirement. States that are hostile toward 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 toward foreigners. We expect states with more hostile climates to 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>18</sup>

We also control for state-level features of the medical profession that shape regulators' incentives to establish licensure barriers. The market 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 natural logarithm of the number of practicing physicians in the state, calculated from data provided by the US Department of Health and Human Services (DHHS).<sup>19</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 the labor market demand for physicians by including the median annual salary for physicians, lagged 1 year, in the state, *Log(Median Physician Salary)*, as well as the total population in the state, *Log(Population)*. These data are from the US Census's Current Population Survey (King et al. 2010). Finally, trends in IMG licensing rules likely

<sup>17</sup> Although institutional features are not randomly assigned, medium- and long-term concerns guide legislators in bureaucratic agency design (Epstein and O'Halloran 1996; Lewis 2003). The vast majority of state medical boards were created between 1870 and 1915. Because financing structures established early in a board's history persist over time, they should be orthogonal to other salient board and state characteristics during our sample period. As an example of this persistence, a strong correlation exists between self-financing in 1952 and during our sample period (Council of State Governments 1952: p. 80). More broadly, states with self-financed licensing boards for *other* professions are more likely to have self-financed medical boards, suggesting that idiosyncratic factors early in a board's history shape institutional design, rather than profession-specific considerations (ibid.).

<sup>18</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 his or her entry into the United States. For adjustments of status, the DHS uses the immigrant's occupation prior to the individual becoming a legal permanent resident.

<sup>19</sup> We utilized data covering 1973–2008 from DHHS. Data for 2009 and 2010 were gathered separately and harmonized with this longer time series. See the supplemental appendix for a detailed discussion of data sources used to construct our variables. [https://dl.dropboxusercontent.com/u/3771432/doctors\\_licensing\\_SuppApp.pdf](https://dl.dropboxusercontent.com/u/3771432/doctors_licensing_SuppApp.pdf).

reflect general trends in licensing, including broad concerns about malpractice or other evolving aspects of the profession. We account for these general trends by controlling for the length of residency required of US medical graduates, which 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>20</sup> We report robust standard errors clustered by state to account for unequal error variance.<sup>21</sup> Table 1, column 1 provides model estimates in which *IMG Residency Requirement* is a function only of the independence of a state's medical board. States with financially independent medical boards are 20 % more likely to have a 36-month requirement and 15 % less likely to require just 12 months of residency training. This finding is consistent with a simple cross-tabulation showing that the majority of states with self-financing medical boards require a far lengthier residency for IMGs than those states that receive funding from their state governments.

This correlation holds when we enter other control variables into 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 significance. The expanded model results in column 3 show that the number of new admissions 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 reduces the probability of a state having a 36-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 coefficient for self-financing medical boards remains statistically significant. 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>22</sup> In additional analyses, we estimate a model of US-medical-graduate licensure requirements to further assess whether our findings are specific to immigrants or indicate efforts to block the entry of both foreign- and US-educated physicians. We find no correlation between the stringency of US-medical-graduate licensure requirements and the independence of state medical boards.<sup>23</sup>

The next obvious question to ask is whether these restrictions are effective in protecting vested interests from foreign competition. We turn to this question next.

<sup>20</sup> Models estimated by OLS provide identical results in terms of statistical significance and very similar results with regard to the substantive impact of board independence.

<sup>21</sup> See supplemental appendix for all summary statistics.

<sup>22</sup> We obtain similar results if we use the difference in requirements between IMGs and US medical graduates as our dependent variable.

<sup>23</sup> Results available upon request.

**Table 1** Determinants of international medical graduate licensing rules, ordered logit models

	(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 100 K) ( $t - 1$ )			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)
<i>N</i>	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

\*\*\*  $p < .01$ ; \*\*  $p < .05$ ; \*  $p < .10$

### 3 Consequences of occupational licensing regulation for migrant behavior

#### 3.1 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 United States. In most instances, this state is the one in which the IMG has secured a residency training position. In the United States, the National Resident Matching Program is the centralized process that pairs medical graduates with certified hospital-based residency programs based on the ranked preferences of both the candidate and the program.<sup>24</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. These initial location choices have long-run consequences because trainees tend to practice medicine in the state in

<sup>24</sup> A small percentage of candidates are matched outside of this process.

which they complete their residency.<sup>25</sup> Lengthier training requirements lower IMGs' expected returns to medical training. Residency programs vary in length by medical specialty, but in states with shorter training requirements, IMGs receive unrestricted medical licenses prior to residency completion. Earlier licensure influences IMGs' incomes 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. On average, moonlighting residents double their annual earnings.<sup>26</sup> The practice is widespread: approximately 40 % of internal medicine and 50 % of emergency medicine residents moonlight.<sup>27</sup> Culler and Bazzoli (1985) find that IMGs moonlight more frequently despite the employment constraints of their US visas. This trend is consistent with higher rates of moonlighting among residents supporting dependents or facing other financial constraints, because IMGs are more likely to have spouses and children than US medical graduates.<sup>28</sup>

Second, lengthier training requirements delay or restrict 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 for Medicare and private insurance reimbursement. Historically, however, a larger percentage of physicians begin medical practices immediately upon receipt of a state license.<sup>29</sup> Some physicians with unrestricted licenses leave residency early and practice in clinical settings such as urgent care clinics and correctional facilities, work as temporary contract physicians, or pursue non-clinical opportunities.<sup>30</sup>

### 3.2 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 most important factor in location choice is wage maximization (Borjas 1994). We cannot estimate a full gravity model of

<sup>25</sup> Polsky et al. (2002). Medical licenses are not transferrable across states. In order to practice in another state, physicians must apply for a new medical license. Trainees benefit from a network and sources of information about potential opportunities, which reduce the transaction costs involved in finding employment locally.

<sup>26</sup> See Li et al. (2000) and Coren (2007). Residents also cite educational and career-development benefits from moonlighting (Hunt et al. 1992).

<sup>27</sup> Silliman et al. (1987) and Li et al. (2000). Even where residency programs prohibit or limit moonlighting, these rules tend to be enforced weakly (Li, Tabor and Martinez 2000).

<sup>28</sup> See, e.g., Silliman et al. (1987). IMGs typically are older, more likely to have dependents, and less likely to have a family support network nearby, which suggests that IMGs would moonlight at high rates (Gozu et al. 2009). 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).

<sup>29</sup> IMGs are less likely to be board certified than their US-trained counterparts (Akl et al. 2007).

<sup>30</sup> Systematic data on physicians who did not complete residency are limited, but one survey of rural departments of emergency medicine indicated that approximately 20 % of their staff physicians were residents-in-training. More importantly, a further 19 % of staff physicians had not completed residency and were no longer enrolled in residency programs (authors' calculations based on McGirr et al. 1998: pp. 333–335). A variety of placement companies and websites cater to physicians who did not complete residency. These organizations list both clinical and non-clinical positions, particularly in biomedical research and allied health professions (Yoo et al. 2009).

migration, because our physician migrant data are not disaggregated by home country-US state dyad.<sup>31</sup>

We return to the DHS migrant data to evaluate the effect of licensing requirements on IMGs' choices of US states. The dependent variable *Number of New Admissions* is the number of new admittees into the United States who self-identify as physicians in state  $i$  at time  $t$ .<sup>32</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 1,000 (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 the labor market demand for physicians in state  $i$  at year  $t$ . *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 chain migration, whereby co-ethnics cluster geographically, and for 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 Tenreiro, because we include a large number of dummy variables that can make standard Poisson models intractable (Santos Silva and Tenreiro 2010). The PPML estimator outperforms the standard Poisson model when the conditional variance is proportional to the conditional mean. Santos Silva and Tenreiro show that their estimator allows for both under- and over-dispersion in the data (ibid). Most importantly, 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 the supplemental appendix for summary statistics.<sup>33</sup>

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's estimates include year fixed effects and column 3's estimates include both state and year fixed effects. Unsurprisingly, the parameter estimate for the residency requirement shrinks when we include these fixed effects, yet the substantive impact of increasing residency requirements on IMG migration is dramatic. Controlling for state and year fixed effects, the average state with the strictest requirements—36 months—receives four fewer IMGs annually than an otherwise equivalent state with no residency requirement. Figure 3 illustrates cross-state variation in the costs of lengthier IMG requirements. We plot the predicted inflows of foreign-trained physicians for the 2005–2009 period under the counterfactual condition that the IMG residency requirement is equal to that of US-educated physicians for all states during that period. Large states are the biggest gainers under this scenario, with New York, California, and Texas gaining an

<sup>31</sup> Even with disaggregated data, we would probably be unable to identify most of the parameters because most IMGs in the United States originate from approximately 20 countries.

<sup>32</sup> Entry into the United States through educational/work visas, and the accompanying documentation from their US sponsors, ensures that these migrants are physicians as the occupation is defined in the United States. 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 state physician licensing.

<sup>33</sup> [https://dl.dropboxusercontent.com/u/3771432/doctors\\_licensing\\_SuppApp.pdf](https://dl.dropboxusercontent.com/u/3771432/doctors_licensing_SuppApp.pdf).

**Table 2** Poisson models of physician migration (PPML)

	No FE	Year FE	Year and 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 100 K)	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)
<i>N</i>	1,887	1,887	1,887

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 clustered by state in parentheses

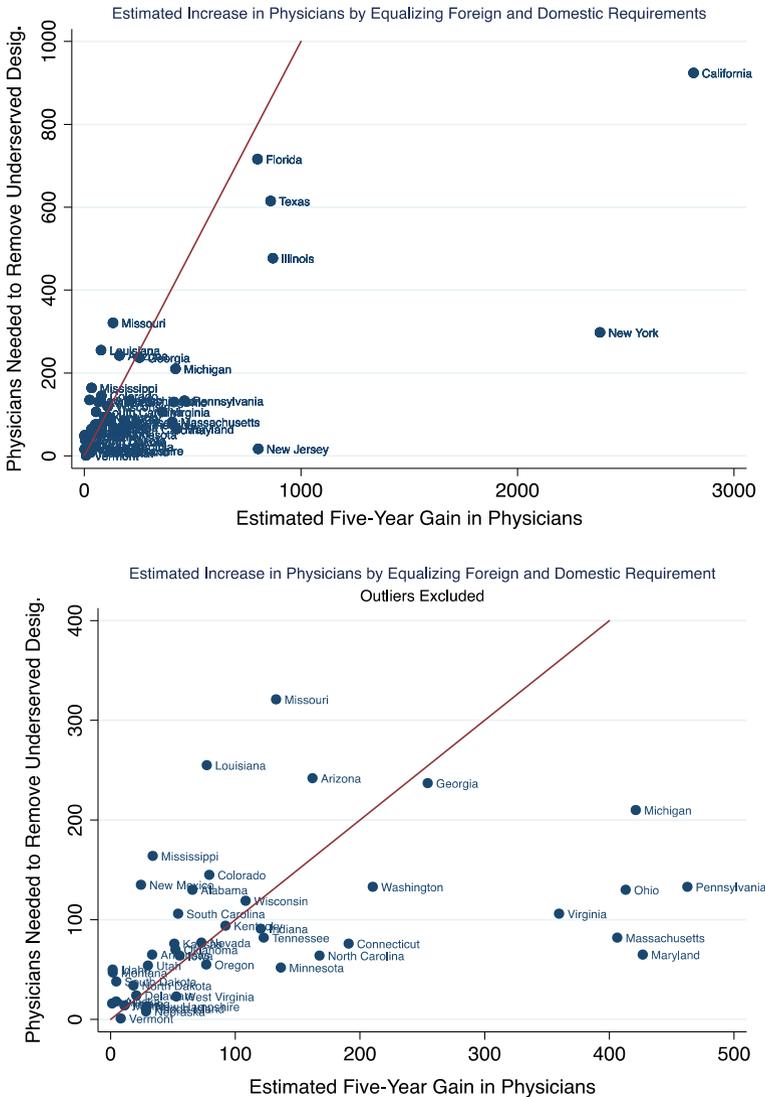
\*\*\*  $p < .01$ ; \*\*  $p < .05$ ; \*  $p < .10$

*additional* 183, 112, and 67 physicians, respectively, over 5 years by adjusting their policies. Other states do not gain as substantively: we estimate that Wyoming and Montana gain less than a single additional physician 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 of 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 variable Poisson estimator owing 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. Because the estimates in Table 3 are based on OLS, they are not directly comparable to maximum likelihood estimates reported in Table 2. 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 10 times the size of the OLS estimates suggests that if bias were present in the OLS estimates, it would be in the direction of dampening the estimated effect.

#### 4 Occupational licensing and skilled migration: theory and public policy implications

Occupational licensing regulations are implicit, occupation-specific barriers to high-skill migration. In this article, we analyze the origins and consequences of variation in US



**Fig. 3** 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 IMG inflows if residency requirement were equalized between native and foreign-educated physicians (Table 2, Column 3 estimates). Top panel includes all states. Bottom panel includes only states needing fewer than 500 physicians to remove federal physician-shortage designation

states' licensure requirements for foreign-educated physicians for the 1973–2010 period. We show that in states where physicians can more readily influence the stringency of licensure regulations, IMGs face far tougher requirements. Further, states with more onerous rules receive fewer migrant physicians. By recasting extant political economy theories of immigration to emphasize skill specificity we reconcile contradictory findings on public support for skilled immigration. In addition, our research shows that implicit protectionism—the existence of behind-the-borders barriers to skilled migration—is not

**Table 3** Ordinary least squares and two-stage least squares models of physician migration

	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 100 K)	−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)
<i>N</i>	1,887	1,836	

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 clustered by state 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 ( $p > F = 0.0000$ )

\*\*\*  $p < .01$ ; \*\*  $p < .05$ ; \*  $p < .10$

only a more fruitful approach to the political economy of immigration policy but is also an important topic for future research.

Our findings also have stark public policy implications. More than one-quarter of US practicing physicians received their medical education outside of the United States. This dependence on foreign-trained physicians is poised to grow with the implementation of universal healthcare and an aging population (Dill and Salsberg 2008). IMGs are more likely to become general practitioners and work in localities suffering from physician shortages (Mick, Lee and Wodchis 2000).

By our calculations, over a third of all states could reduce their physician shortages by at least 10 percent over five years by eliminating the additional licensing requirements imposed on foreign-educated physicians. Using the estimates from Table 2, column 3, we calculate the expected inflows of foreign-educated physicians summed over the 2005–2009 period if states' IMG residency requirements were equivalent to those applied to US-educated physicians.<sup>34</sup>

Figure 3 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 the *y* axis.<sup>35</sup> The top panel includes estimates for all states, whereas the bottom panel excludes those states with the most pressing needs to enhance readability. The diagonal line is a reference

<sup>34</sup> The expected increase in foreign physicians into a state correlates highly with the degree of physician shortage it faces ( $\rho = 0.77$ ).

<sup>35</sup> These estimates must be interpreted with 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.

point: states to the right of the line would receive enough additional IMGs to resolve their shortage.<sup>36</sup> By our estimates, this policy change could have saved the average state \$5.49 million in healthcare costs in 2010. Nationwide savings from such a policy shift would have totaled, conservatively speaking, \$280 million as a result of reduced inpatient, outpatient and emergency department visits alone.<sup>37</sup> Removing protectionist barriers to skilled immigration is a straightforward, practical policy change that can result in measureable improvements in social welfare.

More generally, our study highlights the new challenges that advanced economies face from global economic integration. As we demonstrate with the case of physician licensing, unelected state regulators determine the mobility of skills across borders. Long-standing fixtures of the regulatory landscape take on new meaning in a globalized economy. As the locus of international economic integration shifts to human capital-intensive activities, national and even sub-national regulations increasingly will be the site of distributive struggles over economic openness.

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<sup>36</sup> States to the left of the line may 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 area is left for future research.

<sup>37</sup> Our estimates of reduced emergency department visits compare favorably to other highly-touted healthcare reforms, such as the introduction of High Deductible Health Plans (HDHPs) with Health Savings Accounts. Based on estimates of the impact of HDHPs (Wharam et al 2007), equalizing licensure requirements for native and foreign-educated physicians would reduce emergency department visits as much as enrolling an additional 2.5 million American in HDHPs, or an 18.5 percent increase in current HDHP enrollment. See the supplemental appendix for a detailed explanation of these cost estimates. [https://dl.dropboxusercontent.com/u/3771432/doctors\\_licensing\\_SuppApp.pdf](https://dl.dropboxusercontent.com/u/3771432/doctors_licensing_SuppApp.pdf).

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