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ABSTRACT

Foreign Physicians: Discriminatory Patient Preferences and Doctor Availability*

Roughly a quarter of physicians in the United States are either international medical graduates (IMGs) or foreign-born physicians (FBPs). We propose a theoretical model where patient preferences that disfavor IMGs and FBPs may result in those physicians offering better access to their services compared with non-IMGs/FBPs in equilibrium. We use data from two field experiments to test the predictions from the model: one concerning patient preferences and the other concerning physician availability. In the patient preferences field experiment, we find that patients strongly prefer doctors educated in the United States to IMGs by about 2-to-1. In the physician availability field experiment, we find that US-born physicians generally have lower levels of availability including offering fewer appointments and longer wait times. These results indicate a substantial underutilization of FBPs relative to US-born physicians and suggest that a sizable share of the US healthcare provider base is unfairly disadvantaged based on nativity.

JEL Classification: I11, C93, J7

Keywords: patient preferences, physician availability, foreign doctors, International Medical Graduates (IMGs), Foreign-Born Physicians (FBPs)

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1. BACKGROUND

In the United States, twenty-five percent of working physicians are international medical graduates (IMGs) [1] and twenty-eight percent are foreign-born physicians (FBPs) [2]. These groups have significant overlap with one study finding that about eighty-two percent of IMGs are also FBPs [3]. Like workers in other industries, physicians may encounter bias resulting from personal characteristics like where they are from (e.g., nativity) and where they were trained which may emanate from employers, co-workers, or patients [4]. The National Association of Medicine (NAM) developed a conceptual model of physician well-being in which "discrimination and bias" and "patient expectations and behaviors" are listed as external factors that influence the well-being of physicians and, ultimately, patients [5]. In addition to facing perceived hiring discrimination [6-11], IMGs and FBPs frequently report experiencing discrimination from patients who consider nativity in addition to race, ethnicity, gender, quality, cost, and fit when selecting a provider [12].

Discrimination from patients may come in the form of refusal of care (e.g., requesting a different physician) and mistrust [13,14]. IMGs and FPBs report having their clinical decisions questioned more often than other physicians [15]. Physicians from the Global North (e.g., United Kingdom and Canada) report less discrimination than those from countries in Africa and South Asia [13,14] with much of the discrimination from patients centered on concerns about language abilities and/or accent [14-17]. Two studies in England found that IMG job candidates with Asian names were shortlisted for consideration 36% of the time compared with 52% of the time for White English candidates [18,19].

Existing research regarding disparities and discrimination in physician appointments focuses on how physician preferences over heterogeneous patients affect availability of care for different patient groups. To the best of our knowledge, this paper is the first to develop a model to assess how patient preferences over heterogeneous physicians result in different market outcomes for physicians (e.g., varying levels of appointment availability) who differ in identifiable personal characteristics (e.g., being foreign in terms of education or place of birth). We employ this model to assess the impact of discrimination against IMGs and FBPs on their practice of medicine. Systematic differences in patient preferences across physician groups have the potential to create sub-markets within the market for physician services which may manifest in different equilibria for different groups of physicians. Physicians who are less preferred because of their status as an IMG or FBP may face lower demand leading to shorter wait times for appointments or a greater willingness to accept new patients, including those with less profitable insurance types or no insurance at all.

Prior empirical studies of discrimination against physicians have been based on qualitative data or cross-sectional surveys of physicians rather than on experimental methods. Experimental methods have the advantage of generating causal estimates of discrimination. In this study, we use experimental methods to quantify patient preferences related to IMGs and FBPs and consider the impact of patient preferences on physician availability and willingness to accept new patients. We employ data collected from two separate field experiments: one evaluating patient preferences for foreign physicians (using IMG signals) and the other evaluating physician availability (using data on FBP status). Through this research, we begin to quantify potential inequities that may be impacting a substantial and growing subset of the physician workforce in the United States.

2. CONCEPTUAL FRAMEWORK

Most empirical economic work on physician acceptance of different types of patients relies on the framework of Sloan, Mitchell, and Cromwell (1978) [20]. Their framework focuses on differences in marginal revenue from different patient types (e.g., those covered by Medicaid vs. private insurance) that results in different acceptance rates by physicians. To the best of our knowledge, no economic models exist that examine how patient preferences affect physician availability. To address this gap, we develop a simple single-period model of patients seeking new-patient appointments from physicians who differ across a single, observable, personal dimension (e.g., a demographic characteristic, IMG status, etc.). In primary care, a request for a new-patient appointment or a physical exam typically implies that the patient is asking the physician to oversee care for an extended period. Consequently, the selection of a new physician or the acceptance of a new patient is an important decision for both parties. While the model described here abstracts away from considerations related to physicians' existing patient panels for simplicity, it can be readily modified to accommodate established patients if they were matched with physicians in previous iterations of the search process described below.

Suppose that there are two types of patients, denoted X and Y, who are seeking new-patient appointments with primary care physicians and let $N^X \geq 0$ and $N^Y \geq 0$ denote the numbers of the two types of patients. Two physician types, denoted A and B, are potentially available to patients. The two physician types differ in one observable dimension of personal characteristics (e.g., gender, nativity), but are otherwise a priori identical. Let $N^A > 0$ and $N^B > 0$ denote the numbers of practicing physicians of the two types. To abstract away from implications of potentially discriminatory behavior by physicians, we assume that physicians are unable to observe whether a patient is of type X or type Y.

2.1. New patients' valuation of appointments from different physician types

Consider a representative patient k who values an appointment net of its financial cost at $v_k \in [v_{min}, v_{max}]$ where $v_{min} > 0$. The probability distribution function $f(v)$ and the associated cumulative distribution function $F(v)$ describe the distribution of patients from which patient k is drawn. If patient k is of type X, then they gain an additional benefit $\lambda^A \geq 0$ from obtaining care from a physician of type A (so that their valuation of such an appointment is $v_k + \lambda^A$). Similarly, if patient k is of type Y, then they gain an additional benefit $\lambda^B \geq 0$ from obtaining care from a physician of type B (so that their valuation of such an appointment is $v_k + \lambda^B$). Since patients value their health highly and primary care physicians are often gatekeepers for many healthcare services, even the value v_{min} could be very high.

2.2. Physician costs and the shadow price of appointments

Suppose that representative physician i accepts and treats a total $Q_i \in [0, Q_{max}]$ patients and incurs costs $C^T(Q_i)$ in their treatment. We assume that the marginal cost of treating an additional patient is positive and increases with the number of patients (i.e., $dC^T(Q_i)/dQ_i > 0$ and $d^2C^T(Q_i)/d^2Q_i > 0$). Consequently, when the number of patients differs across physicians for any reason (including patient preferences among physicians), the marginal cost of accepting additional patients will differ across physicians.

Reimbursements to physicians are generally determined by federal and state agencies in the case of Medicare and Medicaid patients or are negotiated between insurers and physician groups in the case of privately insured patients. Consequently, individual physicians usually cannot unilaterally alter the monetary prices of services. However, other characteristics of appointments may become less desirable as the number of the physician's patients increases. We assume that physicians respond to a larger number of patients in their practice, and the resulting higher marginal costs, by altering their new patient appointment offers in a manner that makes the appointments less attractive. For example, a physician might become more selective (i.e., decrease the probability of an appointment offer), increase the wait to an appointment, or decrease the duration of appointments.

Let $P_i^{NM} \geq 0 \ \forall \ i$ where $dP_i^{NM}(Q_i) \big/ dQ_i > 0$ denote this non-monetary (NM) shadow price of obtaining care where higher P_i^{NM} indicates greater difficulty securing appointments or less desirable appointments. From the physician's perspective, P_i^{NM} can be regarded as a rationing mechanism to keep marginal costs equal to the benefit they derive from the marginal patient. The benefit derived from accepting and treating a patient includes both revenue and any non-monetary benefits derived from fulfilling personal or organizational objectives regarding the provision of care. While we model P^{NM} as a scalar for simplicity, physicians may ration availability along multiple dimensions of appointment availability. For example, some physicians may accept many new patients and have long waits for appointments while others may limit the number of patients they accept but provide early appointments to accepted patients.

2.3. Search costs and patient beliefs

Finding an appointment requires a potentially costly search by patients. Let S_k^j denote the number of type j physicians from whom patient k seeks appointment availability information. Let $S_k \equiv S_k^A + S_k^B$ so that $S_k \in [0, S_{max}]$ be the total number of physicians from whom the patient seeks information incurring costs equal to $C(S_k) \geq 0$. The marginal cost of seeking appointment information from an additional physician is $dC(S_k)/dS_k \equiv MC(S_k) \geq 0 \;\forall\; S_k \geq 0$.

Many types of patient beliefs, and mechanisms for updating such beliefs, are plausible for those searching for a new physician. We model a simple framework where beliefs regarding P^{NMj}, type *j* physicians' prevailing shadow price(s) in the market, affect patient k's decision regarding whether and how much to search for a new physician. Let P_L^{NMj} denote the lowest shadow price available in the market from type *j* physicians (which is not directly observable to patients). Let $P^{NMj}(S_k^j)$ denote the shadow price that patient k is offered by the S_k^jth physician. For patient k who has obtained appointment availability information from S_k^j physicians, let $EP^{NMj}(S_k^j)$ denote the expectation of the lowest shadow price that is available from type *j* physicians. We assume that the patient locks in the lowest shadow price encountered up to each point in the search process (denoted $P_{min}^{NMj}(S_k^j)$) by making the appointment with the type *j* physician who offers it. If the patient subsequently encounters a more favorable offer, we assume that the prior appointment can be cancelled costlessly.

Definition: Patient k's beliefs regrading prevailing shadow prices available from type *j* physicians at the beginning of the search are defined to be *most optimistic rational* (MOR) if $EP^{NMj}(0) = P_L^{NMj}$.

We assume that patient k's beliefs are not more optimistic than MOR (i.e., $EP^{NMj}(0) \geq P_L^{NMj}$). When $S_k^j > 0$, the patient's expectation of the lowest available shadow price is sequentially updated to the mean of all observed shadow prices and $EP^{NMj}(0)$.

Patient k's expected decrease in $P_{min}^{NMj}(S_k^j)$ from obtaining information from an additional type j physician depends on the patient's initial expectation as well as the prices encountered during the search process. Let $\delta_k^j \equiv \delta_k^j(EP^{NMj}(0), P^{NMj}(1), P^{NMj}(2), \dots, P^{NMj}(S_k))$ denote this expected decrease. Patient k ends the search when marginal search costs exceed δ_k^j for both types of physicians. That is, if

$$MC(S_k) > \delta_k^j \ \forall \ j \in \{A, B\} \tag{1}$$

We assume that, at the end of their search process, a patient selects the physician who offers the appointment that yields the greatest net benefit.

If patient k ends the search process after obtaining information from S_k physicians and is of type X, they will select the type A physician who offers the appointment with the lowest shadow price if the net value they derive with $P_{min}^{NMA}(S_k)$ is non-negative and no less than the net value they derive with $P_{min}^{NMB}(S_k)$. That is, if

$$0 \leq v_k + \lambda^{\mathrm{A}} - P_{min}^{NMA}(S_k) \geq v_k - P_{min}^{NMB}(S_k) \tag{2}$$

Similarly, if patient k is of type X, they will successfully select the type B physician who offers the appointment with the lowest shadow price if the net value they derive with $P_{min}^{NMB}(S_k)$ is non-negative and greater than the net value they derive with $P_{min}^{NMA}(S_k)$. That is, if

$$0 \leq v_k - P_{min}^{NMB}(S_k) > v_k + \lambda^A - P_{min}^{NMA}(S_k) \tag{3}$$

If patient k ends the search process after obtaining information from S_k physicians and is of type Y, conditions *mutatis mutandis* identical to (2) and (3) will determine whether they will successfully select a physician of type A or B. Patient k stops searching without successfully locating a physician if the value of the appointment net of the shadow price is negative for all physicians encountered in the search process.

2.4. Model outcomes

The framework described above can be used to examine the effects of several factors such as the prevalence of different types of physicians and patients, the strength of patient preferences over physician types, and the distribution of patients in terms of the value placed on appointments. Here we limit ourselves to showing that, even when the search process is costless (i.e., $C(S_k) = 0 \; \forall \; S_k \geq 0$), this model can yield (1) a Nash equilibrium outcome where the shadow price chosen by type A physicians is identical to that chosen by type B physicians, and (2) a Nash equilibrium where the different types of physicians select different shadow prices. Proofs are omitted from the text but are available from the authors on request.

2.4.1. Equilibrium with equal shadow prices across physician types

Let P^{NMA} be the shadow price set by type A physicians when all such physicians select the same price. Similarly, let P^{NMB} be the shadow price set by type B physicians when all such physicians select the same price.

Proposition 1: If $C(S_k) = 0 \; \forall \; S_k \geq 0, 0 < \frac{N^X}{N^A} = \frac{N^Y}{N^B} < Q_{max}$, and $\lambda^A = \lambda^B > 0$, then there exists a Nash equilibrium where $P^{NMA} = P^{NMB}$.

Proposition 1 describes a situation where different types of patients prefer different types of physicians (e.g., female patients prefer female physicians and male patients prefer male physicians), but the strength of the preferences is symmetric. The search is assumed to be costless, the number of type X patients per type A physician equals the number of type Y patients per type B physician, and the health care system has adequate physician capacity. Under these assumptions, all type X patients who obtain care will do so with type A physicians and all type Y patients who obtain care will do so with type B physicians. The number of patients per physician will be equal across all physicians all of whom will have the same marginal cost and select the same shadow price. This outcome is a Nash equilibrium because none of the physicians will benefit from a unilateral change in their selected shadow price, and none of the patients will benefit from a unilateral change in their selected physician.

2.4.2. Equilibrium with unequal shadow prices across physician types

Proposition 2: If $C(S_k) = 0 \; \forall \; S_k \geq 0,\; N^X > 0,\; N^Y = 0, \frac{N^X}{N^A + N^B} < Q_{max} < \frac{N^X}{N^A}$, and $\lambda^A > 0$, then there exists a Nash equilibrium where $P^{NMA} > P^{NMB}$.

Proposition 2 describes a situation where all patients prefer one physician type over another (e.g., if IMGs or FBPs are less preferred by all patients). We assume that the search is costless, and that the health care system has adequate capacity to treat all patients if physicians of both types are utilized to care for patients but not if only physicians of the preferred type are utilized. Under these circumstances, each physician of the preferred type will treat more patients and have higher marginal costs than each physician of the less preferred type. Physicians of the preferred type will set a higher shadow price than those of the less preferred type such that, in equilibrium, patients are indifferent between the two physician types.

2.5. Implications for empirical research

The framework outlined here shows how differences in patient preferences over an observable demographic characteristic can lead to differences in the shadow price of appointments offered by physicians who differ on that characteristic but are otherwise identical. Our framework also illustrates that there are circumstances, such as when patients have countervailing preferences for different physician types, when patient preferences for physician types may persist without leading to differences in shadow prices of appointment offers. While propositions 1 and 2 describe specific and narrow situations where different types of equilibria arise, our framework permits analyses of a much wider range of circumstances.

In the following sections, we employ data from a choice experiment to measure patient preferences for IMG physicians compared to US-educated physicians. We then analyze data from a separate audit study to assess whether the shadow price of appointments with FBPs differs from the (equilibrium) shadow price of appointments with US-born physicians in a manner consistent with the patient preferences that are revealed by the choice experiment.

3. METHODOLOGY

3.1. Patient preferences field experiment

In 2021, we deployed a patient-focused survey using Lucid, a platform that supports large-scale online surveys (see *Appendix* for the full set of survey questions). Prospective subjects were asked their age and place of residence to determine whether they were eligible for the survey given inclusion criteria of being at least 22 years old and living in the United States. We first collected details on respondents including gender (55% of respondents were female), race (71% were White, 11% were Black, 4% were East Asian, and 2% were South Asian), and ethnicity (12% were Hispanic) (see *Table 1*), and state of residence (see *Figure 1* distribution of responses by state). We then asked a series of questions about respondent preferences when seeking primary care.

The core prompt and question for this survey read as follows: "You are experiencing a lot of pain in your lower stomach. The pain is dull and comes and goes. It has been about two weeks since the pain began. Please review the following doctor profiles and indicate which doctor you would proceed with." On the same screen below this prompt were two physician profiles similar in fashion to those commonly found on insurance websites meant to guide patients to in-network providers, where the respondent could select their preferred provider (see *Figure 2*).

To signal international status, physician profiles included educational backgrounds conveying whether the physician received their medical doctor degree in the United States or in another country. University pairings were selected using 2020 Quacquarelli Symonds (QS) World University Rankings for medical schools with both schools being in similar ranking bands [21]. In each pair, race and ethnicity (signaled by first and last names) and binary gender (signaled by silhouettes commonly found on insurance websites) were held constant across both profiles. Each respondent was asked to state their preference across one of six comparisons: within-gender Hispanic (Hispanic Pairs N=186), South Asian (South Asian Pairs=204), and East Asian pairs (East Asian Pairs=199) for a total of 589 observations (see *Table 2*).

In the case of Hispanic pairings, the male names were Jose Garcia-Gonzalez and Roberto Rodriguez-Lopez and the female names were Maria Garcia-Gonzalez and Rosa Martinez-

Hernandez. The medical school signals were University of Central Florida and Universidad de Guadalajara, both ranked in the 451-500 band (which was reported as a range by QS). The South Asian male names were Venkata Srinivasan and Manoj Shetty and the female names were Smita Bhat and Deepa Kaur with the medical school signals being University of Connecticut (with a ranked range of 451-500) and the University of Delhi (with a slightly higher ranked range of 351-400). Finally, for the East Asian groups, the male names were Jun Wang and Yong Chen and the female names were Yun Li and Qing Huang. The medical schools were the University of Michigan Ann Arbor (ranked 26) and Tsinghua University (with a lower ranked range of 101-150) [21].

The IMG physician was on the left panel 50% of the time and on the right panel the other 50% of the time. First and last names were assigned to the IMG physicians 50% of the time as well so that IMG physicians had on average the same names as the US-educated physicians. This was to avoid any unintentional socioeconomic signaling associated with the names that would otherwise be misattributed to the IMG signal. We similarly included years of experience with a one-year difference in experience between the pairs, with the longer experience signal being assigned to the IMG physician 50% of the time. This component of the research was approved by the Institutional Review Board of one of the participating institutions.

3.2. Physician availability field experiment

In the physician availability field experiment, trained research assistants called a national random sample of primary care physicians offices and asked for the earliest available appointment for a physical exam for their aunt or uncle, the simulated patient. The annual call lists were random samples from the latest available version of the American Medical

Association's (AMA) Physician Masterfile from 2013-2016. The prospective patients were randomly assigned demographic features including race, ethnicity, binary gender, and insurance, and were randomly assigned to physicians. We used patient names to signal race and ethnicity and gender as Black, White, and Hispanic men and women [22-24]. The four insurance types were Medicaid, "traditional" Medicare, self-pay (uninsured), and private insurance. The field experiment was deployed in a fall and spring wave starting with a fall 2013 wave and ending with a fall 2016 wave. Research assistants recorded call outcomes including whether an appointment was offered with the requested physician or an alternate provider ("any appointment"), whether the patient's insurance was accepted, the date of any offered appointment, and its expected duration. If no appointment was offered, research assistants recorded reasons for the refusal.

The entire available sample from this data included 11,030 observations. However, only 7,517 (68%) of this sample has a physician nativity value. Completeness varied by year, with 0% completeness in 2013, 51% completeness in 2014, 82% completeness in 2015, and 81% completeness in 2016. Overall, 78.1% of the physician sample with a nativity variable was born in the United States (see *Table 5*). The overall study design has been described previously [25-27]. This component of the research was approved by the Institutional Review Board of one of the participating institutions.

3.3. Patient preferences regression

The regression for the patient preferences analysis was specified as follows:

$$Y_{ij} = \alpha + \beta \text{ US-Educated}_i + \delta \text{ Race/Ethnicity}_i + \theta \text{ Respondent Characteristics}_j + \varepsilon_{ij} \qquad [A]$$

where Y_{ij} is the choice by respondent j among two physician i options (taking the value of 1 for being selected and 0 for not being selected). *US-Educated* is an indicator variable for being educated in the US while *Race/Ethnicity* is a vector of indicator variables for Hispanic, South Asian, and East Asian physician pairings. *Respondent Characteristics* is a vector of indicator variables for respondent race, gender, age, and state of residence. Standard errors were clustered on state.

3.1.1. Physician availability regression(s)

The regression for the physician availability analysis was specified as follows:

$$Y_{ijt} = \alpha + \beta \text{ US Born}_j + \delta \text{ Physician Characteristics}_j + \theta \text{ Call Characteristics}_i + \tau_t + \varepsilon_{ijt} \qquad [B]$$

where i is the simulated patient, j is the physician, and t is time. *US Born* is an indicator variable for a physician being born in the US, *Physician Characteristics* include gender, age, MD vs. DO, and state of practice fixed effects. We evaluated five primary outcome variable measures for appointment availability: whether any appointment was offered, whether the patient's insurance was accepted, whether the patient was told that the physician is not taking new patients, the duration in minutes of an offered appointment, and wait time in days until the appointment date. *Call Characteristics* include caller fixed effects and simulated patient race, ethnicity, gender, and insurance signals. τ captures time controls including survey wave, month of call, and day of week fixed effects. Standard errors were clustered on caller. We further specified an interaction model as follows:

$$Y_{ijt} = \alpha + \gamma \text{ US Born}_j * \text{Interaction}_i + \lambda \text{ Interaction}_j + \beta \text{ US Born}_j \quad [C]$$

$$+ \delta \text{ Physician Characteristics}_j + \theta \text{ Call Characteristics}_i + \tau_t + \varepsilon_{ijt}$$

where everything is specified as in equation B but with γ estimating the marginal association of *US Born * Interaction variable* and the outcome, separate from the association of each set of indicator variables. The two interaction models included a vector of indicator variables for each *Insurance Type* and, separately, *Physician Age ≥ 50*.

4. RESULTS

4.1. Patient preferences results

Respondents in the patient-preferences survey strongly preferred doctors educated in the United States (estimate = 0.393, 95% CI: 0.311 to 0.474; $p<0.01$) (see *Table 3*). Given the choice context in which our outcome variable takes the value of zero or one, this translates to an approximately 130% higher level of preference (1.295 = 0.393 / [(1 – 0.393) / 2]), which is greater than a 2-to-1 preference. These results are robust to linear and non-linear functional forms including probit and logit models measured as average marginal effects and marginal effects at the means (see *Appendix Table A1*) as well as to linear models with varying combinations of controls (see *Appendix Table A2*).

We then analyzed the within-race/ethnicity pair results separately and find very similar estimates for each group: the estimated preference for US-educated Hispanic physicians compared with non-US-educated Hispanic physicians was 0.393 (95% CI: 0.201 to 0.584; $p<0.01$); the estimated preference for US-educated South Asian physicians compared with non-US-educated South Asian physicians was 0.345 (95% CI: 0.179 to 0.511; $p<0.01$); and the estimated preference for US-educated East Asian physicians compared with non-US-educated East Asian physicians was 0.390 (95% CI: 0.205 to 0.574; p<0.01) (see *Table 4*).

4.2. Physician availability results

Physicians born outside of the US generally had higher levels of availability. US-born physicians were 12 percentage points less likely to offer any appointment (95% CI: -0.14 to -0.09; p<0.01), 11 percentage points less likely to accept insurance (95% CI: -0.14 to -0.07; p<0.01), and 13 percentage points more likely to say that they were not accepting new patients (95% CI: 0.10 to 0.15; p<0.01). The wait to appointment for US-born physicians was 10.28 days longer (95% CI: 7.96 to 12.60; p<0.01) (see *Table 6*). The difference in appointment duration between US-born physicians and FBPs was not statistically significant. These results are very similar for the 2014 cohort with 51% completeness in the nativity variable and the 2015-16 cohorts with about 81-82% completeness in that variable (see *Table A3 and A4*, respectively).

There do appear to be heterogeneous impacts along simulated patient insurance type (see *Table 7*), with the effect of a Medicaid patient variable interacted with a US-born physician being positive for appointment offers (estimate = 0.15, 95% CI: 0.10 to 0.19; p<0.01). This interaction was also associated with higher levels of insurance acceptance (estimate=0.15, 95% CI: 0.11 to 0.19; p<0.01) and lower likelihoods of stating that they are not taking new patients (estimate=-0.07; 95% CI: -0.13 to 0.00; p=0.04). Similarly, the effect of a self-pay interaction with US-born physician was positive for likelihood of appointment offers (estimate=0.06, 95% CI: 0.00 to 0.13; p=0.051) as well as insurance acceptance (estimate=0.07, 95% CI: 0.02 to 0.11; p=0.01). These results indicate that the lower willingness of US-born physicians to accept insurance and offer appointments compared to FBPs did not apply to Medicaid patients. US-born physicians' lower willingness to accept new patients was also partially mitigated for those with Medicaid. Similarly, US-born physicians' lower willingness to offer appointments and accept insurance was partially mitigated for self-pay patients. In contrast, the higher waits to appointment with US-born physicians were not affected by patients' insurance.

There were limited relative differences when interacting by physician age>50 years (see *Table 8*). Notably, older US-born physicians were 6 percentage points more likely to say that they were not accepting new patients than their younger counterparts (95% CI: 0.02 to 0.10; p=0.01).

5. DISCUSSION AND CONCLUSIONS

The literature on disparities and discrimination in availability of health care has focused on how physician preferences and incentives affect access for patients who differ along demographic, socio-economic, and insurance dimensions. We develop a theoretical framework where differential patient preferences across physician types differentiated on an identifiable characteristic may result in less favored physicians setting lower shadow prices than the preferred type. Empirically, we find that different equilibria of the type identified by our theoretical model do, in fact, exist for US-born physicians and FBPs. This study is the first—to our knowledge—to assess the impact of discrimination against IMGs and FBPs on their practice of medicine using field experimental data.

From our patient preferences experiment, we find consistently stronger preferences for US-educated physicians on the order of about 2-to-1. These results were robust to linear and non-linear specifications, to the inclusion of various combinations of covariates, and across Hispanic, East Asian, and South Asian within-gender pairs. Notably, the results were stable despite slight differences in university ranking levels (i.e., University of Central Florida and Universidad de Guadalajara for Hispanics [both ranked in the 451-500 range], University of Connecticut and the University of Delhi [ranked ranges of 451-500 and 351-400, respectively], and the University of Michigan Ann Arbor and Tsinghua University (ranked 26 and 101-150, respectively). These results, indicative of relatively lower levels of demand for IMGs, correspond with greater levels of access to FBPs measured in our separate physician availability field experiment. For instance, US-born physicians offered fewer and later appointments, accepted patient insurance less often, and conveyed that they were not taking new patients more often. Our analysis of appointment availability by physician age finds that the higher availability of FBPs is not merely an early career phenomenon that disappears as FBPs become established in their profession and their communities. Our finding that US-born physicians' willingness to accept new patients relative to FBPs decreases with age suggests that some aspects of the differences between the two types of physicians may in fact increase with experience.

This study has several limitations. In the patient preferences study, we compared simulated US-educated physicians to IMGs of the same ethnic origin. In reality, US-educated physicians are more likely to be White (of European ancestry) while IMGs are more likely to be racial or ethnic minorities. If patients also have a preference for White physicians, then the results in this paper are likely to underestimate the true disadvantage faced by IMGs. For the physician availability study, we did not have the physician nativity variable for the full sample. This could induce selection bias if the availability of the variable is systematically associated with our outcomes. However, less than 20% of the sample for years 2015-16 was impacted by this and our main results hold when conducted across multiple samples with a wide range of completeness. Our use of IMGs in the patient preferences study is not the same as the use of

FBPs in the physician availability study (though, there is significant overlap as noted above) [3], and the years of our study do not overlap with the former being conducted in 2021 and the latter being conducted between 2013-2016. The results regarding better appointment availability for FBPs reflect market outcomes, and we are unable to directly ascribe these to either demand or supply side factors. However, it is difficult to imagine plausible physician-preference-based reasons for results that indicate a substantial underutilization of FBPs relative to US-born physicians. In the absence of substantial patient preferences for US-born physicians, it is likely that better appointment availability for FBPs would quickly dissipate as patients sought the more desirable FBP appointments.

One of our unexpected findings concerned heterogeneous patterns of access by patients' insurance type. We found that the US-born physicians' reduced rate of insurance acceptance and appointment offers are largely mitigated for Medicaid patients and partially mitigated for self-pay patients. We are unsure as to the mechanisms by which these results emerge. IMGs do disproportionately provide care in low-income areas [28]. It is possible that a subset of US-born physicians, perhaps those associated with hospitals that happen to be located in low-income urban areas in which Medicaid patients comprise a sizable share of the patient population, carve out appointments for potentially disadvantaged patients. However, the longer wait times for US-born physicians are unaffected by patients' insurance. We are unable to test the potential mechanisms underlying these phenomena in this study.

The empirical findings of our field experiments are consistent with our theoretical model: we find that patients do strongly prefer US-educated physicians and that FBPs offer greater availability to new patients. These results suggest that patient preferences can strongly influence the labor market outcomes of the physicians whose attributes they consider. In the case of nativity status, a sizable share of the physician population in the US is unfairly disadvantaged.

TABLES AND FIGURES

Table 1: Patient Preferences Study: Respondent Self-Reported Characteristics

Attribute	Mean (SD)
Age	45.23 (15.22)
Female	0.55 (0.50)
White	0.71 (0.45)
Black	0.11 (0.31)
East Asian	0.04 (0.19)
South Asian	0.02 (0.14)
American Indian/Alaska Native (AIAN)	0.02 (0.12)
Middle Eastern / North African	0.01 (0.08)
Native Hawaiian/Pacific Islander (NHPI)	0.01 (0.08)
Other	0.10 (0.30)
Hispanic	0.12 (0.32)

Notes: N=589.

Table 2: Patient Preferences Study: Simulated Physician Characteristics

Variable	**Mean (SD)**
South Asian Physician	0.346 (0.476)
East Asian Physician	0.338 (0.473)
Hispanic Physician	0.316 (0.465)

Notes: N=589. Hispanic Pairs N=186, South Asian Pairs=204, East Asian Pairs=199.

Table 3: Preference for Physicians, by Location of Education

	Choice
US-educated	0.393***
	[0.311, 0.474]
	p<0.01
Non-US-educated Mean	0.304
N	589

Notes: Observations are individual respondents. Each respondent faced two choices. 95% in brackets. * p<0.10 ** p<0.05 *** p<0.01. Controls for respondent ethnicity, race, insurance status, gender, and state. Standard errors are clustered on state. Means are calculated recognizing that the sum of choices across US and non-US-educated choices is equal to 1.0. Thus, half of 1.0 minus the point estimate is the implied mean for the non-US-educated mean.

Table 4: Preference for Physicians, by Education Race/Ethnicity Pairing

	Hispanic Pairs	South Asian Pairs	East Asian Pairs
US-educated	0.393***	0.345***	0.390***
	[0.201, 0.584]	[0.179, 0.511]	[0.205, 0.574]
	p<0.01	p<0.01	p<0.01
Non-US-educated Mean	0.304	0.328	0.305
N	186	204	199

Notes: Observations are individual respondents. Each respondent faced two choices. 95% in brackets. * p<0.10 ** p<0.05 *** p<0.01. Controls for respondent ethnicity, race, insurance status, gender, and state. Standard errors are clustered on state. Means are calculated recognizing that the sum of choices across US and non-US-educated choices is equal to 1.0. Thus, half of 1.0 minus the point estimate is the implied mean for the non-US-educated mean.

Table 5: Physician Availability Summary Statistics

Variable	Mean (SD)	N
US Physician	0.791 (0.407)	7,427
Medicaid * US Physician	0.196 (0.397)	7,427
Medicare * US Physician	0.196 (0.397)	7,427
Self-Pay * US Physician	0.200 (0.400)	7,427
Private * US Physician	0.200 (0.400)	7,427
Any Appointment	0.549 (0.498)	7,427
Insurance Accepted	0.595 (0.491)	7,427
No New Patients	0.278 (0.448)	7,427
Appt. Duration (minutes)	40.1 (17.7)	3,290
Wait to Appointment (days)	31.4 (40.7)	4,074

Notes: The full physician sample is N=11,030; country of birth was available for 67%, but varies by year: 0% in 2013, 80% in 2014, 79% in 2015, and 79% in 2016.

Table 6: Physician Availability and Nativity

	Any Appt. Offer	**Insurance Accepted**	**No New Patients**	**Appt. Duration**	**Wait to Appt.**
US Physician	-0.12*** (-0.14 to -0.09) p<0.01	-0.11*** (-0.14 to -0.07) p<0.01	0.13*** (0.10 to 0.15) p<0.01	0.19 (-0.77 to 1.15) p=0.69	10.28*** (7.96 to 12.6) p<0.01
Hispanic Patient	-0.04*** (-0.06 to -0.01) p<0.01	-0.04*** (-0.06 to -0.01) p<0.01	0.02 (-0.01 to 0.05) p=0.13	0.37 (-0.61 to 1.34) p=0.43	-0.63 (-5.20 to 3.94) p=0.77
Black Patient	-0.01 (-0.03 to 0.02) p=0.54	-0.01 (-0.04 to 0.02) p=0.38	0.02 (-0.01 to 0.05) p=0.20	-0.15 (-1.24 to 0.94) p=0.78	-1.01 (-6.09 to 4.08) p=0.68
Female Patient	0.02 (-0.02 to 0.06) p=0.35	0.02 (-0.02 to 0.06) p=0.34	-0.01 (-0.03 to 0.01) p=0.27	-0.17 (-1.11 to 0.76) p=0.70	-2.35** (-4.23 to -0.46) p=0.02
Non-US Physician Mean (SD)	0.629 (0.483)	0.664 (0.473)	0.171 (0.377)	40.1 (18.6)	24.8 (37.6)
N	7,427	7,427	7,427	3,290	4,074

Notes: * p<0.10 ** p<0.05 *** p<0.01. Regression specifications controlled for physician characteristics including gender, age, MD vs. DO, and state of practice fixed effects, as well as call characteristics including caller fixed effects and simulated patient race, ethnicity, gender, and insurance signals. Controls for timing included survey wave, month of call, and day of week fixed effects while standard errors were clustered on caller.

Table 7: Nativity by Payer Interaction Associations

	Any Appt. Offer	**Insurance Accepted**	**No New Patients**	**Appt. Duration**	**Wait to Appt.**
Medicaid * US Physician	0.15*** (0.10 to 0.19) p<0.01	0.15*** (0.11 to 0.19) p<0.01	-0.07** (-0.13 to -0.00) p=0.04	0.04 (-3.47 to 3.54) p=0.98	0.53 (-7.90 to 8.95) p=0.90
Medicare * US Physician	0.07 (-0.02 to 0.15) p=0.11	0.06 (-0.01 to 0.13) p=0.11	-0.03 (-0.08 to 0.03) p=0.37	0.06 (-4.62 to 4.74) p=0.98	-1.63 (-10.65 to 7.39) p=0.71
Self-Pay * US Physician	0.06* (-0.00 to 0.13) p=0.051	0.07*** (0.02 to 0.11) p=0.01	-0.01 (-0.06 to 0.04) p=0.58	2.12 (-2.76 to 6.99) p=0.37	2.94 (-4.72 to 10.60) p=0.43
US Physician	-0.19*** (-0.24 to -0.13) p<0.01	-0.17*** (-0.22 to -0.13) p<0.01	0.15*** (0.12 to 0.19) p<0.01	-0.42 (-3.26 to 2.42) p=0.76	9.83*** (5.31 to 14.34) p<0.01
Medicaid	-0.38*** (-0.44 to -0.33) p<0.01	-0.40*** (-0.46 to -0.35) p<0.01	0.05* (-0.00 to 0.09) p=0.06	-1.03 (-3.61 to 1.54) p=0.41	1.21 (-7.29 to 9.70) p=0.77
Medicare	-0.06 (-0.15 to 0.04) p=0.22	-0.05 (-0.14 to 0.03) p=0.20	0.03 (-0.01 to 0.08) p=0.12	2.06 (-0.87 to 4.98) p=0.16	3.78 (-3.27 to 10.82) p=0.27
Self-Pay	-0.06* (-0.13 to <0.01) p=0.06	-0.07** (-0.13 to -0.01) p=0.02	0.02 (-0.03 to 0.07) p=0.50	-1.33 (-4.22 to 1.56) p=0.34	-3.34 (-9.00 to 2.31) p=0.23
Non-US Physician Private Insurance Mean (SD)	0.766 (0.424)	0.807 (0.396)	0.148 (0.356)	40.0 (18.9)	24.5 (29.9)
N	7,427	7,427	7,427	3,290	4,074

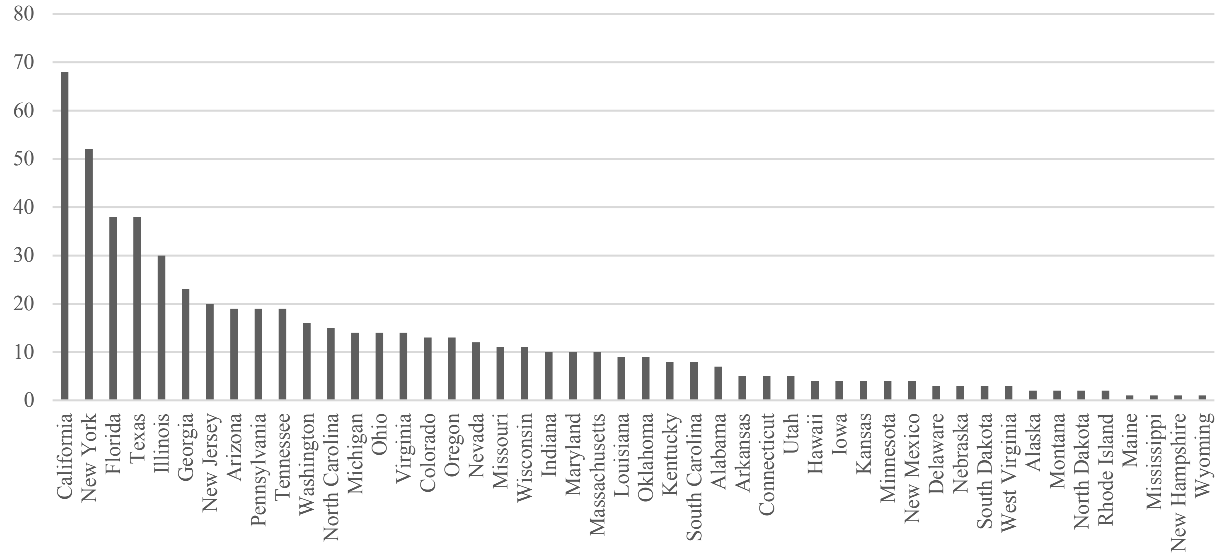
Notes: * p<0.10 ** p<0.05 *** p<0.01. Non-US physician, private insurance, and their interaction are the omitted variables.

Table 8: Nativity by Physician Age Interaction Associations

	Any Appt. Offer	**Insurance Accepted**	**No New Patients**	**Appt. Duration**	**Wait to Appt.**
Age 50+ * US Physician	-0.04 (-0.09 to 0.02) p=0.16	-0.04 (-0.09 to 0.01) p=0.11	0.06*** (0.02 to 0.10) p=0.01	0.77 (-1.94 to 3.49) p=0.55	2.91 (-3.62 to 9.44) p=0.36
US Physician	-0.09*** (-0.14 to -0.04) p<0.01	-0.08*** (-0.12 to -0.03) p<0.01	0.08*** (0.04 to 0.12) p<0.01	-0.31 (-2.72 to 2.11) p=0.79	8.09*** (3.26 to 12.92) p<0.01
Age 50+	-0.02 (-0.06 to 0.01) p=0.19	-0.02 (-0.06 to 0.02) p=0.21	-0.01 (-0.06 to 0.03) p=0.59	2.77 (-0.96 to 6.50) p=0.14	-3.92 (-9.25 to 1.40) p=0.14
Mean for Age<50 Non-US Physician (SD)	0.644 (0.479)	0.684 (0.465)	0.188 (0.391)	39.2 (15.7)	28.8 (46.2)
N	7,427	7,427	7,427	3,290	4,074

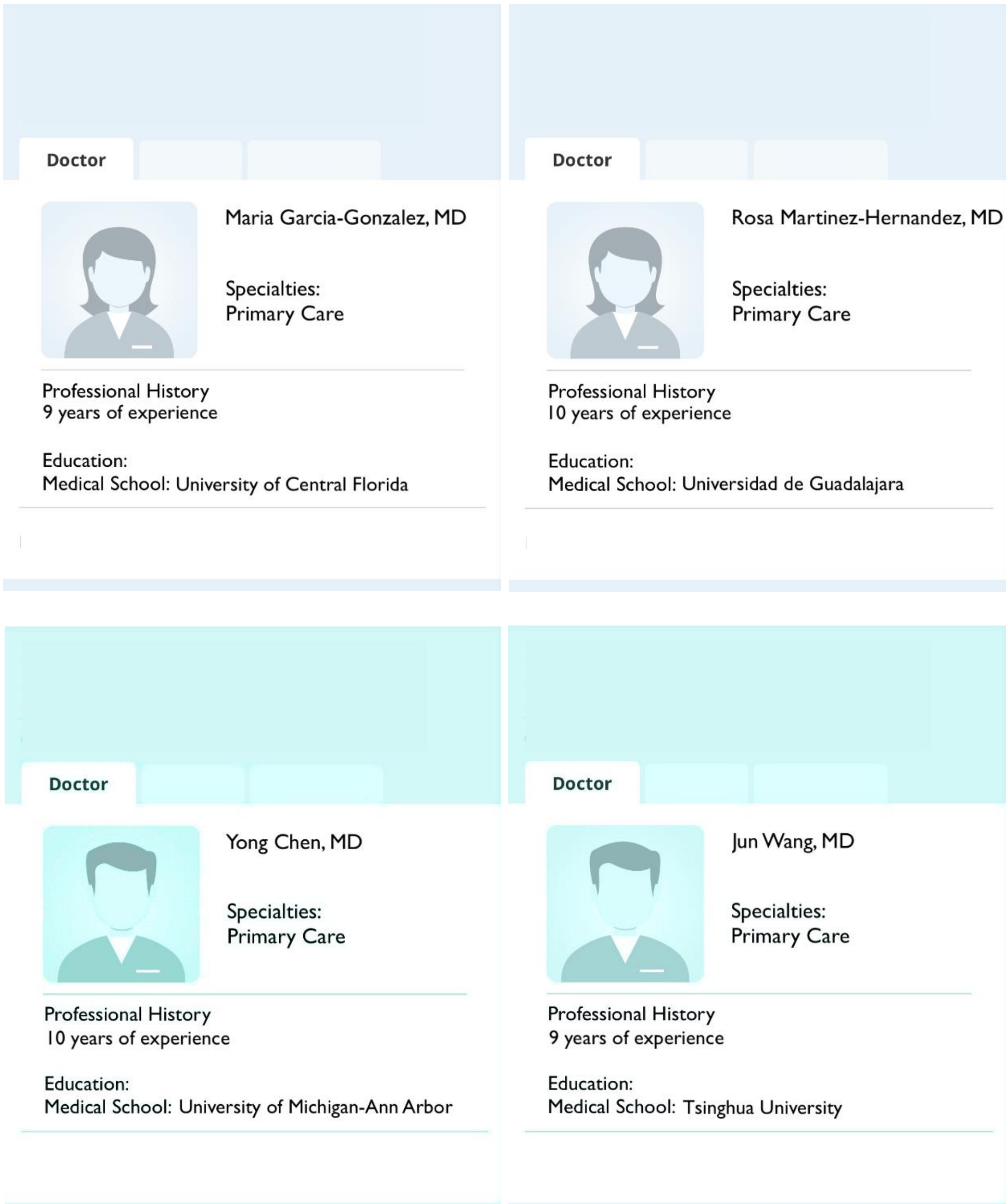
Notes: * p<0.10 ** p<0.05 *** p<0.01. Non-US physician, age<50, and their interaction are the omitted variables.

Figure 1: Patient Preferences Study Lucid Respondent Self-Reported Location



Notes: N=589.

Figure 2: Sample Presentation of Physician Pairs



Notes: The respondents were presented with pairs like the figures above and provided the following prompt: "Scenario: You are experiencing a lot of pain in your lower stomach. The pain is dull and comes and goes. It has been about two weeks since the pain began. Please review the following doctor profiles and indicate which doctor you would proceed with."

APPENDIX

Survey Questions

1. We are researchers interested in the patient experience when seeking medical care. Your participation will take 5-10 minutes. Your honest feedback will help us to better understand the patient experience. All responses will remain anonymous. Thank you for your consideration. Please indicate below if you would like to proceed with the survey.
2. Before we begin, we would like to make sure that you qualify for our study. Please indicate your age using only numbers:
3. Please indicate the state in which you live: (List of 50 states plus District of Columbia, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Northern Mariana Islands, and Outside the United States)
4. Do you consider yourself to be: (Female; Male; Non-binary/Gender fluid/Third gender; Other)
5. With what races do you identify? Check all that apply. (American Indian, Native American, or Alaska Native; East Asian; South Asian; Middle Eastern/North African; Native Hawaiian or Pacific Islander; Black or African American; White or Caucasian; Other; Prefer not to answer)
6. Are you of Hispanic, Latino, or Spanish origin? (Yes; No; Prefer not to answer)
7. This survey is anonymous, and your response will be used to better understand the patient experience within the United States.
8. Are you a citizen of the United States?
9. Which of the following insurance do you have? (Private; Medicare; Medicaid; Self-pay; HIS; Tricare; VA; Do not currently have medical insurance; Other)
10. In the past year, how many times did you schedule a primary care appointment? Please indicate using only numbers.
11. What are the features of a doctor that are most important to you?
12. How many days do you expect to wait until you see your doctor?
13. How many doctors will you call to get an appointment within your expected number of wait days?
14. If you are unable to get an appointment within an acceptable number of days, will you go to the emergency room? (Yes; No; Not sure; Other)
15. What is the maximum number of days that you are willing to wait for an appointment until you decide to go to the emergency room?
16. What is the maximum number of days that you are willing to wait until you decide to no longer seek any form of care?

17. Scenario: You are experiencing a lot of pain in your lower stomach. The pain is dull and comes and goes. It has been about two weeks since the pain began. Please review the following doctor profiles and indicate which doctor you would proceed with.
18. In the previous question you were required to choose a doctor to advance in the survey. If you were not required to pick one doctor, would you: (Doctor A; Doctor B)
19. Given that you chose Doctor A, how many days longer are you willing to wait for Doctor A over Doctor B?
20. Given that you chose Doctor B, how many days longer are you willing to wait for Doctor B over Doctor A?
21. What did you notice about Doctor A? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    a. Race: What did you notice about Doctor A? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    b. Ethnicity: What did you notice about Doctor A? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    c. Sex: What did you notice about Doctor A? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    d. Age: What did you notice about Doctor A? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    e. Years of Experience: What did you notice about Doctor A? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    f. Country of Education: What did you notice about Doctor B? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    g. Race: What did you notice about Doctor B? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    h. Ethnicity: What did you notice about Doctor B? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    i. Sex: What did you notice about Doctor B? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    j. Age: What did you notice about Doctor B? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    k. Years of Experience: What did you notice about Doctor B? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.
    l. Country of Education: What did you notice about Doctor B? Please fill in each box. If you don't recall any of these features, "NA" is acceptable.

Table A1: Preference for Physicians, by Location of Education, by Functional Form

		Probit		Logit	
	Linear	Marginal Effects at Means	Average Marginal Effects	Marginal Effects at Means	Average Marginal Effects
US-educated	0.393***	0.441***	0.367***	0.449***	0.362***
	[0.311, 0.474]	[0.344, 0.539]	[0.306, 0.427]	[0.350, 0.548]	[0.305, 0.419]
	p<0.01	p<0.01	p<0.01	p<0.01	p<0.01
N	589	589	589	589	589

Notes: Observations are individual respondents. Each respondent faced two choices. 95% in brackets. * p<0.10 ** p<0.05 *** p<0.01. Controls for respondent ethnicity, race, insurance status, gender, and state. Standard errors are clustered on state.

Table A2: Preference for Physicians, by Location of Education, by Controls

	(1)	(2)	(3)	(4)
US-educated	0.376***	0.376***	0.387***	0.393***
	[0.303, 0.449]	[0.303, 0.449]	[0.312, 0.462]	[0.311, 0.474]
	p<0.01	p<0.01	p<0.01	p<0.01
No Controls	✓			
Race/Ethnicity Pair Controls		✓	✓	✓
Patient Characteristic Controls			✓	✓
State Fixed Effects				✓
N	589	589	589	589

Notes: Observations are individual respondents. Each respondent faced two choices. 95% in brackets. * p<0.10 ** p<0.05 *** p<0.01. Controls for respondent ethnicity, race, insurance status, gender, and state. Standard errors are clustered on state.

Table A3: Physician Availability and Nativity (2014)

	Any Appt. Offer	**Insurance Accepted**	**No New Patients**	**Appt. Duration**	**Wait to Appt.**
US Physician	-0.09*** (-0.11 to -0.07) p<0.01	-0.08*** (-0.13 to -0.04) p<0.01	0.14*** (0.08 to 0.20) p<0.01	0.02 (-3.72 to 3.75) p=0.99	8.77*** (4.78 to 12.76) p<0.01
Hispanic Patient	-0.03 (-0.09 to 0.03) p=0.29	-0.05 (-0.11 to 0.02) p=0.13	0.05 (-0.03 to 0.12) p=0.18	0.11 (-2.72 to 2.94) p=0.93	-0.95 (-7.05 to 5.15) p=0.72
Black Patient	-0.01 (-0.08 to 0.07) p=0.87	-0.02 (-0.10 to 0.06) p=0.58	0.04 (-0.07 to 0.14) p=0.43	-0.96 (-3.77 to 1.85) p=0.44	-2.60 (-8.49 to 3.28) p=0.32
Female Patient	-0.02 (-0.11 to 0.08) p=0.69	0.01 (-0.08 to 0.10) P=0.80	<0.01 (-0.04 to 0.04) p=0.83	-0.48 (-2.37 to 1.41) p=0.56	1.43 (-4.43 to 7.30) p=0.57
Non-US Physician Mean (SD)	0.629 (0.484)	0.677 (0.469)	0.134 (0.341)	40.4 (14.8)	20.3 (21.8)
N	1,172	1,172	1,172	474	667

Notes: * p<0.10 ** p<0.05 *** p<0.01. Regression specifications controlled for physician characteristics including gender, age, MD vs. DO, and state of practice fixed effects, as well as call characteristics including caller fixed effects and simulated patient race, ethnicity, gender, and insurance signals. Controls for timing included survey wave, month of call, and day of week fixed effects while standard errors were clustered on caller.

Table A4: Physician Availability and Nativity (2015-16 Only)

	Any Appt. Offer	**Insurance Accepted**	**No New Patients**	**Appt. Duration**	**Wait to Appt.**
US Physician	-0.12*** (-0.15 to -0.09) p<0.01	-0.11*** (-0.15 to -0.07) p<0.01	0.12*** (0.10 to 0.15) p<0.01	0.42 (-0.66 to 1.49) p=0.42	10.45*** (7.60 to 13.29) p<0.01
Hispanic Patient	-0.04*** (-0.07 to -0.01) p<0.01	-0.04*** (-0.06 to -0.01) p<0.01	0.02 (-0.01 to 0.05) p=0.21	0.53 (-0.62 to 1.68) p=0.34	-0.50 (-6.06 to 5.06) p=0.85
Black Patient	-0.01 (-0.03 to 0.02) p=0.52	-0.01 (-0.05 to 0.02) p=0.44	0.01 (-0.01 to 0.04) p=0.20	-0.01 (-1.13 to 1.12) p=0.99	-0.74 (-6.87 to 5.38) p=0.80
Female Patient	0.02 (-0.02 to 0.07) p=0.28	0.02 (-0.02 to 0.07) p=0.34	-0.01 (-0.04 to 0.01) p=0.26	-0.13 (-1.12 to 0.86) p=0.78	-2.85*** (-4.85 to -0.86) p=0.01
Non-US physician Mean (SD)	0.629 (0.483)	0.661 (0.473)	0.178 (0.382)	40.0 (19.1)	25.5 (39.7)
N	6,255	6,255	6,255	2,816	3,407

Notes: * p<0.10 ** p<0.05 *** p<0.01. Regression specifications controlled for physician characteristics including gender, age, MD vs. DO, and state of practice fixed effects, as well as call characteristics including caller fixed effects and simulated patient race, ethnicity, gender, and insurance signals. Controls for timing included survey wave, month of call, and day of week fixed effects while standard errors were clustered on caller.

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