Worker Selection and Skilled Immigration Policy*

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Abstract

The U.S. H-1B program helps firms hire high-skilled foreign workers, but increasingly faces a binding annual cap that is allocated through lottery-based rationing. When candidates differ in productivity and firms face imperfect information at hiring, workforce productivity and domestic outcomes become endogenous to policy design. We document higher average wages among foreign-born workers in H-1B intensive occupations, consistent with positive selection among applicants. We rationalize this pattern with a quantitative general equilibrium search and matching model with heterogeneous worker productivity, noisy screening, H-1B filing costs, and an endogenously binding cap. The calibrated model explains half of the wage gap we observe in the data. We use the model to evaluate recent reforms that replace uniform lottery selection with wage-weighted selection. Under the existing cap, wage-weighted reallocation increases average foreign-hire productivity by about 4.7%, raises skilled-sector output by about 0.09%, has limited negative impacts on domestic skilled wages, while slightly increasing domestic skilled employment and unskilled wages. Matching the same foreign productivity gain through higher filing costs or a tighter cap instead reduces vacancy creation and generates negative effects on domestic skilled employment and wages. The gains from reallocation are attenuated when the foreign applicant pool shrinks and when firms can strategically bunch wages at tier cutoffs.

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1. Introduction

The H-1B visa program is the main employer-sponsored channel for bringing high-skilled foreign workers into the U.S. labor market, especially in specialized fields like science and engineering. Demand for these visas has far exceeded the annual quota in most years, leading to allocation through a random lottery.[1] This institutional setting has been at the center of recent policy debates because random allocation can encourage excessive filing and can award visas to less productive workers who are paid less. More broadly, when high-skilled applicants differ in productivity and firms face imperfect screening at the hiring stage, visa policy affects not only how many foreign workers are hired, but also *which* workers are selected, shaping aggregate worker productivity, vacancy creation, and domestic spillovers.

Recent reforms and proposals have shifted attention from the size of the cap alone toward the allocation rule and the cost of applying. A key change is the move toward wage-based (wage-weighted) selection, which increases the selection odds for petitions tied to higher wages in an attempt to steer scarce visas toward higher-value matches.[2] At the same time, proposals to raise filing costs (through higher fees) are often motivated to discourage "excess" or low-quality applications that a pure lottery can invite.[3] These policy changes occur alongside a broader shift in the foreign talent pipeline: global demand for U.S. degrees has fallen sharply in recent times, which can shrink the pool of foreign high-skilled applicants.[4] Together, these developments raise a basic quantitative question: when applicants are heterogeneous and screening is imperfect, how do alternative H-1B allocation rules and application costs change the productivity of realized foreign hires and the outcomes of domestic workers?

This paper develops a quantitative general equilibrium framework to answer this question and, to our knowledge, provides the first evaluation of wage-weighted H-1B selection in a general equilibrium search model with noisy screening and an endogenously binding cap.

[1] See section 2 for a description of the current H-1B policy.

[2] https://www.uscis.gov/newsroom/news-releases/dhs-changes-process-for-awarding-h-1b-work-visas-to-better-protect-american-workers

[3] https://www.uscis.gov/newsroom/alerts/h-1b-faq

[4] https://thepienews.com/global-demand-for-us-masters-degrees-plunges-by-60/

We motivate the focus on worker heterogeneity using data from the American Community Survey (ACS). We show that within high-skilled occupations that rely on H-1B visas, the distribution of earnings for foreign-born workers is more right-skewed than the distribution for domestic workers, conditional on observable characteristics like location, age, and industry. H-1B likely workers earn 2.8% more than domestic workers on average in our sample and this gap has widened over the last decade. We take this as suggestive evidence that foreign-born workers are positively selected in roles that are subject to binding constraints on visas.

Motivated by this empirical evidence on worker heterogeneity within H-1B intensive occupations, we introduce four features to a canonical random search model that are essential for the H-1B setting: (i) productivity heterogeneity among high-skilled workers that firms observe through a noisy signal; (ii) steeper hiring costs for foreign workers relative to domestic workers; (iii) an endogenously binding cap on the number of foreign visas granted (modeled as a success probability for foreign hiring attempts); and (iv) complementarities in consumption between high-skilled and low-skilled output. The first ingredient generates an endogenous hiring threshold and makes selection policy-relevant. The second ingredient captures the tangible costs that firms pay to to participate in the H-1B process, such as application fees and legal fees. The third ingredient captures the realistic uncertainty around whether a foreign worker's visa application will be accepted. The final ingredient allows us to capture spillover effects between different sectors of the labor force.

The model highlights a simple selection mechanism. Because hiring a foreign worker involves both additional costs and uncertainty around application success, firms set a higher productivity threshold for entering the lottery for a foreign worker than they do for hiring a domestic worker. As a result, foreign hires are endogenously positively selected: the average foreign hire is more productive than the average domestic hire. The strength of positive selection depends on how informative the signal is. When the signal is more precise, firms can screen more effectively and selection is stronger; when the signal is noisy, screening is less effective and the difference between foreign and domestic hires narrows. Importantly, with a binding cap, the number of foreign workers is pinned down by the cap, but their average quality remains endogenous to the allocation rule and to screening frictions.

We discipline the quantitative model using moments related to U.S. labor markets and H-1B outcomes (including the composition of applicants across wage tiers). The model matches key untargeted moments related to foreign skilled employment and wages in the U.S. In particular, we are able to explain half of the gap in earnings that we document in the ACS data. The paper's central counterfactual evaluates the move from uniform lottery selection to wage-weighted selection under the existing cap. We find that reallocating visas increases the average productivity of foreign hires by about 4.7 percent. The general equilibrium effects are modest but economically meaningful: skilled-sector output rises (by about 0.09 percent), while domestic skilled employment and wages are essentially unchanged (employment rises by 0.005 percent and wages fall by 0.018 percent). The key mechanism is that wage-weighted selection raises the expected payoff to searching for and filing for high-quality foreign matches. This strengthens firms' incentives to post vacancies and expand search, with positive employment spillovers to domestic workers. Since wage-weighted selection is implemented through discrete wage tiers, we also study a counterfactual in which firms strategically bunch wages at tier cutoffs. Allowing for bunching attenuates the foreign productivity gain from reallocation from 4.65% to 2.42%.

Further, we benchmark wage-weighted reallocation against alternative policies that deliver the same increase in average foreign-hire productivity: raising visa-related costs or lowering the visa cap. These policies effectively discourage filing for foreign workers and reduce the expected value of posting vacancies, which generates negative domestic spillovers. Raising visa costs slightly lowers market tightness and domestic employment, while lowering the cap discourages vacancy posting more sharply by increasing the incidence of "wasted" foreign matches that cannot be absorbed into employment. Among the policies we consider that increase the productivity of foreign hires, reallocation is uniquely attractive because it improves selection while strengthening firms' vacancy-creation incentives, leading to positive employment spillovers and minimal wage spillovers. On the other hand, an increase in the visa cost to $100,000 as proposed, would lead to a decrease in both skilled domestic labor and foreign labor employed, which would more than offset the productivity gains and cause output to fall by 0.37%.

We also study how the gains from reallocation depend on the size of the foreign applicant pool and the informativeness of screening. When foreign labor supply falls, the productivity gains from reallocation shrink because there are fewer high-quality foreign applicants to re-rank under the fixed cap. When there is no noise in applicant screening, there is still excess filing because firms do not internalize the externality of submitting a low-quality application, but the applications are better targeted so the effects of reallocation are smaller.

Our contribution relative to this literature is twofold. First, we embed productivity heterogeneity for both domestic and foreign skilled workers into a general equilibrium model with an endogenously binding H-1B cap, policy-induced hiring costs, and noisy signals of worker productivity. This setting makes the productivity gap between the average foreign hire and the average domestic hire endogenous to policy design. Second, we quantify the gains from shifting from randomized visa allocation to wage-weighted selection in a setting where policy affects firms' vacancy posting and generates spillovers to domestic workers. To the best of our knowledge, this is the first quantitative general equilibrium model to evaluate realistic alternative H-1B policy designs in the presence of worker heterogeneity and search and information frictions.

A growing literature studies how immigration interacts with labor market frictions and with the design of visa-allocation rules. Chassamboulli & Palivos (2014) embed immigration into a Mortensen-Pissarides environment to quantify how immigrant inflows affect unemployment, vacancies, and wages. Closer to our emphasis on policy-induced frictions, Sharma & Sparber (2024) show that a random H-1B lottery induces firms to "over-search," dissipating quota rents. The negative externality created by the random allocation of visas is present in our model as well. In contrast, we quantify how changing the allocation rule (wage-weighted selection) affects the composition of foreign hires and equilibrium vacancy creation in a general equilibrium model with heterogeneous match quality and noisy screening.

Related to our model, Mehra & Shen (2022) develop a two-sector dynamic general equilibrium model with firm heterogeneity and a binding cap on skilled immigration. Firms face fixed costs when hiring foreign workers, which together with the cap generate substantial distortions. They quantify the distortion generated by the H-1B cap relative to the first-best, but their model does not include explicit search frictions or worker heterogeneity. Our study also adds to the extensive list of papers studying the general equilibrium impacts of U.S. skilled immigration, for instance, Bound *et al.* (2015); Waugh (2017); Bound *et al.* (2018); Brinatti & Morales (2023); Mandelman *et al.* (2025).

We also contribute to the set of papers employing multi-worker search models with worker heterogeneity, including Elsby *et al.* (2015), Baydur (2017), and Hegarty (2024). Like Hegarty (2024), we have random search with differences across groups of workers and a noisy screening decision. Our paper adds a new layer to this type of model by considering a binding cap on employment for one group.

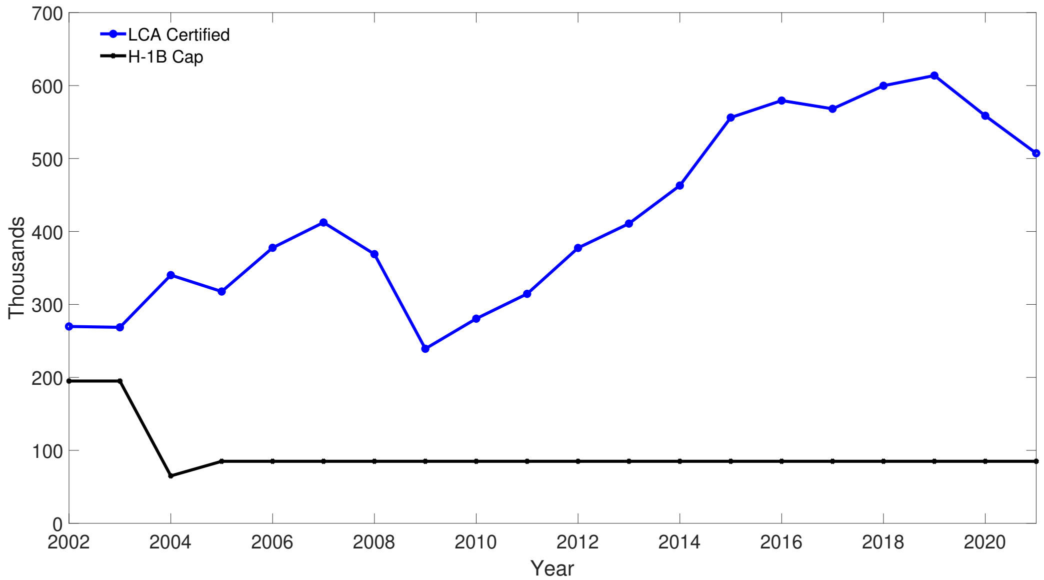
2. Institutional Background

The H-1B visa program has been the main method of entry into the U.S. workforce for foreign college-educated professionals since 1990. The H-1B visa is temporary as it is issued for only three years (and can be renewed for another three), but it is a dual intent visa since it can lead to permanent residency if the employer is willing to sponsor the worker for a green card.

The H-1B program has been subject to an annual quota on new visa issuances. The initial visa cap was 65,000, which was subsequently increased to 115,000 in 1999 and 2000 after the cap was met in 1997. The cap was further increased to 195,000 from 2001 to 2003. In 2001, cap exemptions were introduced for employees at higher education, nonprofit, and government research organizations. In 2004, the cap was reduced back to 65,000, but 20,000 additional visas were allocated for workers who had obtained a master's degree or higher from a U.S. institution. The cap applies only to new H-1B visa issuances for for-profit firms.

To obtain an H-1B visa, there are several steps to be followed, and firms play a crucial role in this process. The first step requires the firm that wants to hire a foreign worker to file an LCA with the Department of Labor, which are processed relatively quickly. In the application, the firm specifies the nature of the worker's occupation and attests that it will

Figure 1: Demand for Foreign Workers (Labor Condition Applications) vs. H-1B Cap



pay them the greater of the actual compensation paid to other employees in the same job or the prevailing compensation for that occupation. The rationale given for this attestation is to help protect domestic worker wages. LCA forms can request one or more foreign workers for a particular occupation, and thus they signal firm vacancies or demand in specific occupations for foreign workers. An LCA is submitted for every H-1B request, whether new or a renewal, and each LCA can contain multiple H-1B workers. Figure 1 highlights the increasing gap between certified LCAs and the H-1B cap in recent years.

Once the Department of Labor approves/certifies the LCA, traditionally (before 2020) it was sent to the USCIS along with the I-129 form and the visa fees. The I-129 form is the formal H-1B petition which specifies the particular worker that a firm wants to hire and their qualifications. Firms had from April 1 until the beginning of the next fiscal year to file petitions for H-1B visa applications. If the number of H-1B visa petitions that fell within the nonexempt category exceeded the cap, the USCIS randomly selected visas for processing via a lottery system until the cap was met.

In recent years, the Department of Homeland Security has slightly amended its regulations regarding the process by which the USCIS selects H-1B petitions for the filing of the

H-1B cap-subject petitions. In 2020, the USCIS implemented a preregistration process that begins on March 1 for potential employees who want to file an H-1B petition. If the USCIS receives enough registrations by March 18 (based on historic projections), they will randomly select registrations. An H-1B cap-subject petition may only be filed by a petitioner whose registration was selected.

In both scenarios (before and after 2020), potential employees can only apply for an H-1B visa if they have a job offer from an employer with LCA approval. By law, the employer cannot file more than one I-129 for the same prospective employee. Most of the filing and legal fees are also borne by the employer. In very recent years there have also been increasing cases of fraud and multiple registrations submitted for the same employee. However, such cases are subject to legal actions.

New wage-weighted system Starting with the FY 2027 season (registration in March 2026), USCIS will replace the random H-1B lottery with a weighted, wage-based system designed to prioritize higher-skilled workers and protect U.S. wages. Registrations will be weighted based on the Department of Labor's Occupational Employment and Wage Statistics (OEWS) levels. Instead of one entry per applicant, registrations will receive entries based on the wage tier, with Level IV having the highest probability of selection: Level IV (highest): 4 entries in the pool; Level III: 3 entries in the pool; Level II: 2 entries in the pool; Level I (entry-level): 1 entry in the pool. The weighting is based on the prevailing wage level (I-IV) for the specific occupation code and geographic area, not just the raw salary amount.[5] The new system still applies to the 65,000 regular cap and the 20,000 master's cap, but with the weighted, rather than purely random, selection.

[5]Here is an example according to https://flag.dol.gov/wage-data/wage-search. A software developer (O*NET code: 15-1252.000) based in Santa Clara county, California, would have the following annual wage tiers for the H-1B lottery: Level I-$149,365; Level II $187,741; Level III $226,138.00; Level IV: $264,514. But these tiers differ even for the same occupation codes across different geographies, and for different occupations within the same geographic area.

3. Motivating evidence: Heterogeneity in the data

The institutional barriers described above suggests that firms would need a strong economic incentive to hire foreign workers over domestic. Indeed, we will formalize this intuition in the model. First, we present suggestive evidence that foreign workers tend to be paid higher wages, conditional on observable characteristics, consistent with a model in which these workers have higher productivity, ex-post.

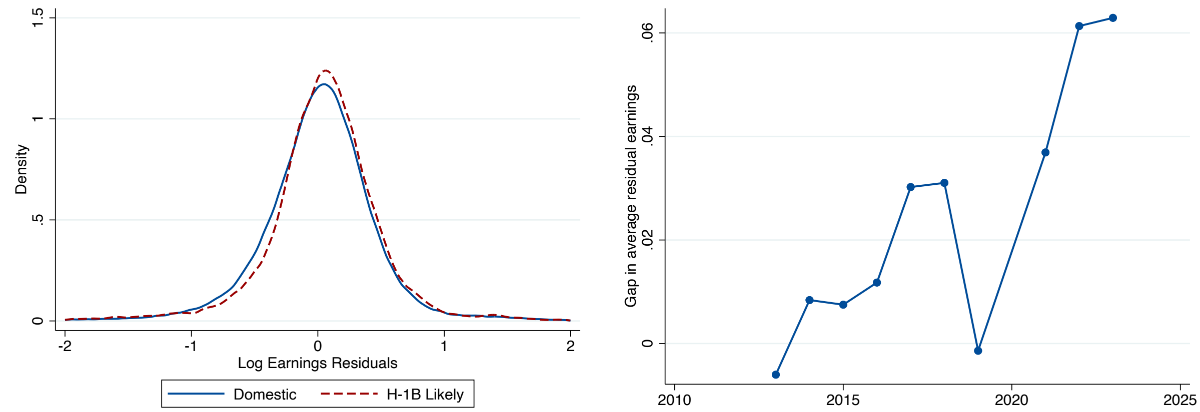
We use data from the American Communities Survey (ACS). We restrict our sample to employed workers aged 25 to 60, with at least a bachelor's degree. We include only individuals working in occupations most likely to employ H-1B workers: computer-related and architecture, engineering, and surveying.[6] We define domestic workers as those who were born in the US or born abroad to parents with US citizenship. We define H-1B candidate workers as non-citizens who arrived in the US at or after age 18. In our main specification, we further restrict our H-1B sample to immigrants from India and China, as these countries account for more than 85% all H-1B visas. Appendix A provides more details on sample construction and summary statistics.

We residualize earnings by regressing log earnings on a vector of demographic characteristics (age quadratic, marital status, and number of children all interacted with gender); hours indicators (usual hours worked and binned number of weeks worked in the prior year); education, occupation, and industry; and year by state fixed effects. We trim the top and bottom 1% of earnings by year to exclude extreme outliers.

Figure 2 Panel (a) shows the density of the residuals among domestic workers relative to H-1B likely workers, within the set of H-1B likely occupations. The distribution of foreign workers is similar in shape, but more right-skewed. The mean difference in residual earnings over the full sample is 0.028 log points. Panel (b) plots the yearly difference between mean residual earnings for H-1B dominant residents relative to domestic workers. The gap has been positive in every year except 2013 and 2019 and has generally become more positive

[6] These two occupation categories made up about 74% of approved H-1B beneficiaries in FY 2024 (https://www.uscis.gov/sites/default/files/document/reports/ola_signed_h1b_characteristics_congressional_report_FY24.pdf).

Figure 2: Heterogeneity in the data



(a) Density of earnings residuals **(b)** Relative mean earnings residuals

Panel (a) shows the distribution of log earnings residuals for domestic and H-1B likely workers in the ACS. Panel (b) shows the mean residual earnings gap between H-1B likely and domestic workers broken down by year.

over the sample period. Appendix A reports the difference in means between domestic and H-1B candidate workers across alternative definitions. The positive selection is stronger for the sample most likely to be affected by H-1B policy.

The figures provide suggestive evidence that potential H-1B workers have slightly higher residual earnings than domestic skilled workers, consistent with positive selection. In our model, positive selection of foreign workers will arise endogenously as a result of the costly visa application process—firms must expect greater productivity from foreign workers to offset the higher cost of entering the H-1B process. Indeed, the increase in positive selection over the time period shown in Panel (b) would be consistent with the visa process becoming more costly over this period due to an increasing divergence between proxied demand for visas and the cap, as shown in Figure 1.

4. Model

The economy is populated by three types of households: domestic skilled, foreign skilled, and unskilled. Production takes place in two sectors. Sector 1 (the high-skilled sector) consists of monopolistically competitive firms that produce differentiated varieties using heterogeneous skilled labor. Sector 2 (the unskilled sector) consists of a representative firm that produces a homogeneous good using unskilled labor.

Households consume a Cobb–Douglas bundle of sector-1 and sector-2 output, so the model features complementarities between skilled and unskilled workers through the consumption basket. The key friction in the high-skilled sector is search: firms post vacancies to hire domestic and foreign skilled workers, and workers are heterogeneous in productivity. Firms observe a noisy signal of productivity at the hiring stage. This imperfect screening induces endogenous selection and creates a role for immigration policy design.

Foreign hiring is subject to additional frictions that mimic the H-1B environment. First, hiring foreign workers is more costly ($c_f > c_d$). Second, intended foreign hires become realized hires only with probability x_t, which is endogenously determined by the ratio of the visa cap to the number of applications submitted. These features create wedges between domestic and foreign hiring thresholds and allow immigration policy to affect both the quantity and composition of foreign hires.

4.1. High-skilled sector

Worker heterogeneity High-skilled workers are heterogeneous in permanent productivity,

$$a_i \in \{a_L, a_H\}, \qquad a_H > a_L.$$

We focus on two types as a parsimonious way of introducing heterogeneity while keeping the model very tractable.[7] Let π_j denote the share of high types among skilled workers with nationality $j \in \{d, f\}$. While the share of high types among all workers is exogenous, the composition of the unemployment pool is endogenous: because high types are more likely to be hired (they are more likely to pass the signal threshold), the share of high types among unemployed, $\pi^u_{j,t}$, will generally be lower than π_j.

Firms in sector 1 are monopolistically competitive and produce differentiated varieties

[7] Imperfect screening, which is described in detail below will create a continuous distribution at the hiring stage without needing to keep track of a continuous distribution of types.

ω. Since firms are symmetric within the sector (abstracting from idiosyncratic firm productivity), we omit the ω index when describing the firm's hiring problem.

Each firm produces with constant returns to scale using domestic and foreign skilled labor:

$$y_t = Z_t\big(\bar{a}_{d,t}n_{d,t} + \bar{a}_{f,t}n_{f,t}\big), \tag{1}$$

where Z_t is aggregate productivity, $n_{j,t}$ is the firm's employment of nationality j, and $\bar{a}_{j,t}$ is the endogenous average productivity of employed workers of nationality j. It is convenient to express average productivity in terms of the (endogenous) high-type employment share $\pi^e_{j,t}$:

$$\bar{a}_{j,t} \equiv \pi^e_{j,t}a_H + (1 - \pi^e_{j,t})a_L. \tag{2}$$

Search and immigration frictions The high-skilled sector is characterized by matching frictions that vary across nationalities. The timing of the period is as follows: (1) firms pay vacancy costs and post vacancies to attract a randomly drawn mass of matches from the aggregate pool of skilled unemployed workers; (2) firms observe the nationality of each match and a noisy signal of worker productivity; (3) firms make hiring decisions for each worker based on the signals and pay hiring costs—for intended foreign hires, actual hires depend on the realization of an H-1B visa; (4) true productivity is observed, wages are paid, and production occurs; (5) an exogenous share δ_j of matches separate and become unemployed.

Firms post vacancies $v_{s,t}$ at per-vacancy cost κ (in units of the consumption basket). Matches are formed by a matching function

$$M_{s,t} = M(U_{s,t}, V_{s,t}),$$

where aggregate vacancies are $V_{s,t}$ and aggregate skilled unemployment is $U_{s,t} = U_{d,t} + U_{f,t}$. Market tightness is defined as the ratio of aggregate vacancies to aggregate unemployment, $\theta_{s,t} \equiv V_{s,t}/U_{s,t}$, and the vacancy-side meeting probability is

$$q(\theta_{s,t}) \equiv \frac{M(U_{s,t}, V_{s,t})}{V_{s,t}}.$$

Because search is random, $q(\theta_{s,t})$ represents the probability that a vacancy meets a random draw from the unemployed pool. The probability that a vacancy meets a worker of nationality j is proportional to that group's share in the unemployment pool. Let $\pi^u_{j,t}$ denote the share of high types among unemployed of nationality j. Then, per posted vacancy, the probability of meeting a high-type worker of nationality j is $q(\theta_{s,t})\pi^u_{j,t}\frac{U_{j,t}}{U_{s,t}}$, and the probability of meeting a low-type worker of nationality j is $q(\theta_{s,t})(1-\pi^u_{j,t})\frac{U_{j,t}}{U_{s,t}}$.

If the firm decides to hire a match, it pays hiring cost c_j. We model H-1B-type frictions as an asymmetry in both costs and feasibility. First, steeper foreign hiring costs $c_f > c_d$, capture filing fees, legal costs, and organizational costs. Second, there is cap-induced uncertainty —an intended foreign hire becomes a realized hire with probability x_t, taken as exogenous by individual firms.

Following Mehra & Shen (2022), we define

$$x_t = \min\left\{\frac{\bar{N}_e}{N_{e,t}}, 1\right\}, \tag{3}$$

where $\bar{N}_e$ is the cap and $N_{e,t}$ is the total number of visa applications submitted in period t. If applications exceed the cap, then $x_t < 1$.

Signals, posterior beliefs, and hiring thresholds When a firm meets a worker, it observes a noisy signal of productivity

$$s = a + \varepsilon, \qquad \varepsilon \sim N(0, \sigma_j^2), \tag{4}$$

where a is true productivity and σ_j governs screening precision. A lower σ_j implies a more informative signal, so firms can more sharply separate high and low types.

Given an observed signal s, firms form a posterior probability that the worker is high type. Let $\tilde{\pi}$ denote the relevant prior share of high types in the pool being considered (in equilibrium, $\tilde{\pi} = \pi^u_{j,t}$). Under normal noise, Bayes' rule yields

$$p(s \mid \tilde{\pi}, \sigma) = \Pr(a = a_H \mid s) = \frac{\tilde{\pi}\, \varphi\left(\frac{s-a_H}{\sigma}\right)}{\tilde{\pi}\, \varphi\left(\frac{s-a_H}{\sigma}\right) + (1-\tilde{\pi})\, \varphi\left(\frac{s-a_L}{\sigma}\right)}, \tag{5}$$

where $\varphi(\cdot)$ is the standard normal density. The posterior is increasing in s: a higher signal raises the probability that productivity is a_H. The mapping is flatter when σ is large (noisy screening), which reduces the extent of selection for any given threshold.

Firms follow nationality-specific cutoff rules: for each nationality j, there exists a threshold $s^*_{j,t}$ such that the firm hires (or files a visa petition) if and only if $s \geq s^*_{j,t}$. Differences in c_j, x_t, and match duration (through δ_j) generate wedges between $s^*_{d,t}$ and $s^*_{f,t}$. The key objects implied by cutoffs are (i) the share of matches hired, and (ii) the composition of hires. We characterize the wedge below and derive these objects fully in Appendix B.

Firm problem and laws of motion In each period, the firm chooses vacancy posting $v_{s,t}$ and hiring cutoffs $\{s^*_{d,t}, s^*_{f,t}\}$, taking as given wages and aggregate conditions. Hiring decisions imply the following laws of motion for employment:

$$\begin{aligned} n_{d,t} = (1-\delta_d)n_{d,t-1} + &\underbrace{v_{s,t}q(\theta_{s,t})\frac{U_{d,t}}{U_{s,t}}\pi^u_{d,t}}_{\text{high-type domestic matches}} \underbrace{\left(1-\Phi\left(\frac{s^*_{d,t}-a_H}{\sigma_d}\right)\right)}_{\text{share hired}} \\ &+ \underbrace{v_{s,t}q(\theta_{s,t})\frac{U_{d,t}}{U_{s,t}}(1-\pi^u_{d,t})}_{\text{low-type domestic matches}} \underbrace{\left(1-\Phi\left(\frac{s^*_{d,t}-a_L}{\sigma_d}\right)\right)}_{\text{share hired}} \end{aligned} \tag{6}$$

$$\begin{aligned} n_{f,t} = (1-\delta_f)n_{f,t-1} + &\underbrace{v_{s,t}q(\theta_{s,t})\frac{U_{f,t}}{U_{s,t}}\pi^u_{f,t}}_{\text{high-type foreign matches}} \underbrace{x_t\left(1-\Phi\left(\frac{s^*_{f,t}-a_H}{\sigma_f}\right)\right)}_{\text{share hired}} \\ &+ \underbrace{v_{s,t}q(\theta_{s,t})\frac{U_{f,t}}{U_{s,t}}(1-\pi^u_{f,t})}_{\text{low-type foreign matches}} \underbrace{x_t\left(1-\Phi\left(\frac{s^*_{f,t}-a_L}{\sigma_f}\right)\right)}_{\text{share hired}} \end{aligned} \tag{7}$$

The inflow terms are "matches × probability of meeting hiring criteria," where $\Phi(\cdot)$ is the cumulative standard normal density. For foreign workers, actual employment inflow is additionally scaled by x_t, because only a fraction of intended hires are realized when the cap binds.

We abstract from endogenous firing: productivity is permanent and (in the calibrated equilibrium) even low-type matches generate non-negative surplus once hired. This assumption is convenient and focuses attention on selection at hiring. Appendix B clarifies how the cutoff rule operates.

We can also write the law of motion for the share of high-type employed workers by nationality,

$$\pi^e_{d,t} = \pi^e_{d,t-1}\frac{(1-\delta_d)n_{d,t-1}}{n_{d,t}} + \frac{v_{s,t}q(\theta_{s,t})\frac{U_{d,t}}{U_{s,t}}\pi^u_{d,t}}{n_{d,t}}\Big(1-\Phi\Big(\frac{s^*_{d,t}-a_H}{\sigma_d}\Big)\Big), \tag{8}$$

$$\pi^e_{f,t} = \pi^e_{f,t-1}\frac{(1-\delta_f)n_{f,t-1}}{n_{f,t}} + \frac{v_{s,t}q(\theta_{s,t})\frac{U_{f,t}}{U_{s,t}}\pi^u_{f,t}}{n_{f,t}}x_t\Big(1-\Phi\Big(\frac{s^*_{f,t}-a_H}{\sigma_f}\Big)\Big). \tag{9}$$

Cost minimization Given CES demand and monopolistic competition, the firm's profit maximization problem can be written equivalently as minimizing expected discounted costs subject to producing the demanded quantity.[8]

The firm chooses $\{v_{s,\tau}, s^*_{d,\tau}, s^*_{f,\tau}\}_{\tau\geq t}$, which implicitly pin down $\{n_{d,\tau+1}, n_{f,\tau+1}\}_{\tau\geq t}$ and $\{\pi^e_{d,\tau+1}, \pi^e_{f,\tau+1}\}_{\tau\geq t}$, through the laws of motion above, to minimize

$$\begin{aligned}\mathbb{E}_t\sum_{\tau=t}^{\infty}\beta_{t,\tau}\Bigg[& n_{d,\tau}\big(\pi^e_{d,\tau}w_{d,\tau}(a_H)+(1-\pi^e_{d,\tau})w_{d,\tau}(a_L)\big)+n_{f,\tau}\big(\pi^e_{f,\tau}w_{f,\tau}(a_H)+(1-\pi^e_{f,\tau})w_{f,\tau}(a_L)\big)\\ &+\kappa v_{s,\tau}+c_d v_{s,\tau}q(\theta_{s,\tau})\frac{U_{d,\tau}}{U_{s,\tau}}\Big(1-\pi^u_{d,\tau}\Phi\Big(\frac{s^*_{d,\tau}-a_H}{\sigma_d}\Big)-(1-\pi^u_{d,\tau})\Phi\Big(\frac{s^*_{d,\tau}-a_L}{\sigma_d}\Big)\Big)\\ &+c_f v_{s,\tau}q(\theta_{s,\tau})\frac{U_{f,\tau}}{U_{s,\tau}}\Big(1-\pi^u_{f,\tau}\Phi\Big(\frac{s^*_{f,\tau}-a_H}{\sigma_f}\Big)-(1-\pi^u_{f,\tau})\Phi\Big(\frac{s^*_{f,\tau}-a_L}{\sigma_f}\Big)\Big)\Bigg].\end{aligned} \tag{10}$$

The first line is the wage bill, which depends on the composition of employment. The last two lines are hiring/application costs. For foreigners, c_f is incurred per intended hire (per application), regardless of whether the visa is ultimately successful, consistent with the institutional interpretation.

[8]Equivalently, one can write profits as revenues minus costs and use the standard result that under CES demand optimal pricing is a constant markup over marginal cost.

The discount factor $\beta_{t,\tau} = \beta^{\tau-t}(C_{s,\tau}/C_{s,t})$ is the stochastic discount factor of domestic skilled households, who own the skilled-sector firms. We assume firms take wages as given when choosing employment, as in Cacciatore (2014), so firms do not internalize general equilibrium wage feedback when choosing vacancies and thresholds.

Hiring rule and threshold characterization It is convenient to rewrite the firm's threshold signal, $s^*_{j,t}$, as a threshold posterior, $p^*_{j,t}$, where

$$p^*_{j,t} \equiv p(s^*_{j,t} \mid \pi^u_{j,t}, \sigma_j),$$

as defined in equation 5, such that the firm hires all matches with a posterior probability $p^*_{j,t}$ or higher of being the high type.

Let $S^F_{j,t}(a)$ denote the firm's expected lifetime surplus from employing a worker of nationality j and productivity a, after the hiring process is complete. These surpluses are derived explicitly in Appendix C. The firm hires (or files a visa petition) if expected surplus exceeds the relevant cost, giving the following threshold conditions

$$S^F_{d,t}(a_L) + p^*_{d,t}\Big(S^F_{d,t}(a_H) - S^F_{d,t}(a_L)\Big) \geq c_d, \tag{11}$$

$$S^F_{f,t}(a_L) + p^*_{f,t}\Big(S^F_{f,t}(a_H) - S^F_{f,t}(a_L)\Big) \geq \frac{c_f}{x_t}. \tag{12}$$

Equations 11 and 12 reveal that there are three factors that drive a wedge between marginal domestic and foreign productivity: (1) visa application costs, $c_f - c_d$; (2) binding visa application lottery, $x_t < 1$; (3) differences in the firm's surplus of a match, conditional on productivity, $S^F_{j,t}(a)$. Once productivity is revealed, foreign and domestic workers have the same productivity and are paid the same wages, but the lifetime surplus can differ if matches have different expected durations, for example if foreign workers face higher separation rates due to return migration risk. Firms may also choose a corner solution in which $p^*_{j,t} \in \{0, 1\}$. For example, if the hiring cost for domestic workers is reasonably low, as will be the case in our calibration, $S^F_{d,t}(a_L) > c_d$, which would lead firms to hire all domestic matches and equation 11 would be a strict inequality.

The firm takes these threshold choices as given when determining the number of vacancies and total employment. Intuitively, higher costs or a lower x_t require higher expected surplus to justify hiring, which increases the posterior cutoff $p^*_{j,t}$, thereby increasing the signal cutoff $s^*_{j,t}$ and leading to fewer matches hired. The degree of noise associated with the signal, σ_j, and the composition of the unemployed pool, $\pi^u_{j,t}$, do not appear explicitly in equations 11 and 12 and do not affect the posterior cutoff $p^*_{j,t}$. They do, however, affect the signal cutoff $s^*_{j,t}$, as higher noise (higher σ_j) or lower quality (lower $\pi^u_{j,t}$) means the firm must observe an even greater signal level to infer the same posterior probability that the candidate is the high type. Holding fixed noise, σ_j, a more negatively-selected pool of applicants (lower $\pi^u_{j,t}$) will lead firms to hire a smaller share of matches. Holding fixed the composition of unemployment, $\pi^u_{j,t}$, more noise can result in either more matches hired or fewer, depending on how selective the firm's hiring rule is relative to the unconditional mean. This is a standard result in models of statistical discrimination, such as Morgan & Várdy (2009). Appendix B provides further details.

Vacancy posting and match values The first-order conditions imply a free-entry (zero-profit) condition for vacancy posting and a recursive expression for the shadow value of employment. The vacancy posting condition is

$$\begin{aligned}\frac{\kappa}{q(\theta_{s,t})} &= \frac{U_{d,t}}{U_{s,t}}\Big(1-\pi^u_{d,t}\Phi\Big(\frac{s^*_{d,t}-a_H}{\sigma_d}\Big)-(1-\pi^u_{d,t})\Phi\Big(\frac{s^*_{d,t}-a_L}{\sigma_d}\Big)\Big)\big(\lambda_{d,t}-c_d\big)\\ &\quad+\frac{U_{f,t}}{U_{s,t}}\Big(1-\pi^u_{f,t}\Phi\Big(\frac{s^*_{f,t}-a_H}{\sigma_f}\Big)-(1-\pi^u_{f,t})\Phi\Big(\frac{s^*_{f,t}-a_L}{\sigma_f}\Big)\Big)\big(x_t\lambda_{f,t}-c_f\big), \qquad (13)\end{aligned}$$

which equates the marginal vacancy cost (left) to the expected net value of a match (right), integrating over whether the matched worker is domestic or foreign and whether the signal exceeds the hiring threshold.

The shadow value of one additional worker of nationality j, holding fixed average productivity, satisfies

$$
\begin{aligned}
\lambda_{j,t} = & \underbrace{\frac{\pi^u_{j,t}\Big(1-\Phi\big(\frac{s^*_{j,t}-a_H}{\sigma_j}\big)\Big)}{\pi^u_{j,t}\Big(1-\Phi\big(\frac{s^*_{j,t}-a_H}{\sigma_j}\big)\Big)+(1-\pi^u_{j,t})\Big(1-\Phi\big(\frac{s^*_{j,t}-a_L}{\sigma_j}\big)\Big)}}_{\text{share high type among hires}}\big(\Xi_t Z_t a_H - w_{j,t}(a_H)\big) \\
& + \underbrace{\frac{(1-\pi^u_{j,t})\Big(1-\Phi\big(\frac{s^*_{j,t}-a_L}{\sigma_j}\big)\Big)}{\pi^u_{j,t}\Big(1-\Phi\big(\frac{s^*_{j,t}-a_H}{\sigma_j}\big)\Big)+(1-\pi^u_{j,t})\Big(1-\Phi\big(\frac{s^*_{j,t}-a_L}{\sigma_j}\big)\Big)}}_{\text{share low type among hires}}\big(\Xi_t Z_t a_L - w_{j,t}(a_L)\big) \\
& + \beta(1-\delta_j)\lambda_{j,t+1}. \qquad (14)
\end{aligned}
$$

Here Ξ_t is the Lagrange multiplier on (1) and can be interpreted as the real marginal cost of production. Equation (14) shows that the shadow value is the weighted average of flow profits from high and low types among hired workers, plus the continuation value of the match.

Finally, profit maximization under CES demand implies optimal prices are a constant markup over marginal cost:

$$\rho_{1,t}(\omega) = \frac{\gamma}{\gamma-1}\Xi_t(\omega),$$

where $\gamma > 1$ is the elasticity of substitution across sector-1 varieties (defined in the household section below). This pricing block links product-market markups to the marginal value of output.

Wage determination We assume that the wage schedule is set by a Nash bargaining protocol with individual workers according to the following sharing rule,

$$\phi S^F_{j,t}(a) = (1-\phi)S^W_{j,t}(a), \qquad (15)$$

where ϕ is the bargaining power of the worker and $S^W_{j,t}(a)$ is the worker surplus.

For domestic workers this yields

$$w_{d,t}(a) = \phi \Xi_t Z_t a + (1-\phi) b_{d,t}(a), \tag{16}$$

where $b_{d,t}$ is the worker's outside option, defined as

$$b_{d,t}(a) \equiv b + \beta(1-\delta_d)\theta_{s,t+1} q_{s,t+1}(\theta_{s,t+1}) \Big(1 - \Phi\Big(\frac{s^*_{d,t+1} - a}{\sigma_d}\Big)\Big) S^W_{d,t+1}(a), \tag{17}$$

and derived in Appendix C. The worker's outside option depends on productivity through the value of search. The random search assumption implies that high- and low-type workers face the same likelihood of matching to a vacancy, $\theta_{s,t+1} q_{s,t+1}(\theta_{s,t+1})$, but the likelihood that the match turns into a hire depends on the firm's threshold, $s^*_{d,t+1}$. If equation 11 binds with equality, then high-type workers will have greater job-finding probabilities, strengthening the outside options for this group. If equation 11 is not binding, firms will hire all domestic matches and the domestic job-finding rate will not differ by productivity. However, higher productivity workers will still have stronger outside options because the surplus of a high-type match is greater ($S^W_{d,t}(a_H) > S^W_{d,t}(a_L)$). See Appendix C for complete details.

For foreign workers, the symmetric bargaining solution would imply lower wages if foreign outside options are weaker. We impose instead that conditional on productivity, foreign workers are paid at least as much as domestic workers:

$$w_{f,t}(a) \geq w_{d,t}(a), \tag{18}$$

and treat this condition as binding, consistent with H-1B prevailing-wage regulations.[9]

[9] The constraint that foreign workers can't be paid less than domestic workers is consistent with the H-1B hiring regulations: when filing a Labor Condition Application, firms must attest that they will pay the worker the prevailing compensation for that occupation.

4.2. Unskilled sector

The unskilled sector is populated by a representative, perfectly competitive firm. Output is produced using linear technology:

$$y_{2,t} = Z_t n_{u,t}.$$

We assume no matching frictions in the unskilled sector. The sector-2 good has price

$$\rho_{2,t} = \frac{w_{u,t}}{Z_t}.$$

4.3. Households

There are three households: skilled domestic (d), unskilled domestic (u), and skilled foreign (f).[10] Each household consists of a continuum of workers with exogenous labor supply $\bar{L}_d$, $\bar{L}_f$, and $\bar{L}_u$.

Households share identical preferences over the consumption basket:

$$\mathbb{E}_t \left\{ \sum_{\tau=t}^{\infty} \beta^{\tau-t} \ln C_{j,\tau} \right\}, \qquad j \in \{d, u, f\}. \tag{19}$$

The aggregate consumption basket is Cobb–Douglas in sectoral composites (we omit the household index j to ease notation, given symmetric preferences):

$$C_t = \left(\frac{c_{1,t}}{\alpha}\right)^{\alpha} \left(\frac{c_{2,t}}{1-\alpha}\right)^{1-\alpha},$$

where $c_{1,t}$ and $c_{2,t}$ are composites of sector-1 and sector-2 goods, and $\alpha \in (0,1)$.

The consumption-based price index is $P_t = (p_{1,t})^{\alpha}(p_{2,t})^{1-\alpha}$. Define prices in units of the consumption basket as $\rho_{1,t} \equiv p_{1,t}/P_t$ and $\rho_{2,t} \equiv p_{2,t}/P_t$; thus $1 = (\rho_{1,t})^{\alpha}(\rho_{2,t})^{1-\alpha}$.

[10]The focus of this paper is on modeling frictions in the high-skilled immigration process. We abstract from immigration policies affecting the unskilled sector; thus the unskilled sector should be interpreted as containing both domestic and foreign workers outside the H-1B population. By separating domestic skilled and unskilled households, we can perform welfare analysis across household types.

The sector-1 composite aggregates across varieties:

$$c_{1,t} = \left(\int_{\omega \in \Omega} c_{1,t}(\omega)^{\frac{\gamma-1}{\gamma}} \, d\omega \right)^{\frac{\gamma}{\gamma-1}}, \tag{20}$$

where $\gamma > 1$ is the elasticity of substitution across sector-1 varieties. The corresponding price index is

$$p_{1,t} = \left(\int_{\omega \in \Omega} p_{1,t}(\omega)^{1-\gamma} \, d\omega \right)^{\frac{1}{1-\gamma}}.$$

Demand for each variety in units of the consumption basket is

$$c_{1,t}(\omega) = \alpha \left(\frac{\rho_{1,t}(\omega)}{\rho_{1,t}} \right)^{-\gamma} \frac{1}{\rho_{1,t}} C_t,$$
$$c_{2,t} = (1-\alpha) \frac{1}{\rho_{2,t}} C_t.$$

We assume high-skilled sector firms are owned by domestic skilled workers. The household budget constraints are

$$\bar{w}_{d,t}(\bar{L}_d - U_{d,t}) + d_t = C_{d,t},$$
$$\bar{w}_{f,t}(\bar{L}_f - U_{f,t}) = C_{f,t},$$
$$w_{u,t}\bar{L}_u = C_{u,t},$$

where d_t denotes skilled-sector profits rebated to domestic skilled households and $\bar{w}_{j,t}$ is the average wage among nationality j skilled workers.

4.4. Aggregate accounting and equilibrium

Aggregate output in units of the consumption basket satisfies

$$Y_t^C = C_{u,t} + C_{d,t} + C_{f,t} + \kappa V_{s,t} + \sum_{j \in \{d,f\}} c_j U_{j,t} \theta_{s,t} q(\theta_{s,t}) \Big(1 - \pi_{j,t}^u \Phi\Big(\frac{s_{j,t}^* - a_H}{\sigma_j} \Big) - (1 - \pi_{j,t}^u) \Phi\Big(\frac{s_{j,t}^* - a_L}{\sigma_j} \Big) \Big). \tag{21}$$

The last two terms are vacancy and hiring/application costs in units of the consumption basket.

Goods market clearing implies

$$y_{1,t} = \frac{\alpha}{\rho_{1,t}} Y_t^C, \qquad y_{2,t} = \frac{1-\alpha}{\rho_{2,t}} Y_t^C,$$

so $\rho_{1,t}y_{1,t}/\alpha = \rho_{2,t}y_{2,t}/(1-\alpha)$. Total demand for new visas is determined by the share of foreign workers selected after search:

$$N_{e,t} = U_{f,t}\theta_{s,t}q(\theta_{s,t})\Big(1 - \pi^u_{f,t}\Phi\Big(\frac{s^*_{f,t} - a_H}{\sigma_f}\Big) - (1-\pi^u_{f,t})\Phi\Big(\frac{s^*_{f,t} - a_L}{\sigma_f}\Big)\Big), \tag{22}$$

and the visa success probability x_t is given by (3). When the cap binds, $x_t < 1$ and only a fraction x_t of intended foreign hires are realized.

Equilibrium Given the visa cap $\bar{N}_e$, and parameters, an equilibrium is a set of sequences

$$\{C_{j,t}, c_{1,t}(\omega), c_{2,t}, \rho_{1,t}(\omega), \rho_{1,t}, \rho_{2,t}, w_{j,t}(a), w_{u,t}, V_{s,t}, \theta_{s,t}, n_{j,t}, U_{j,t}, \pi^u_{j,t}, \pi^e_{j,t}, s^*_{j,t}, \lambda_{j,t}, x_t, N_{e,t}\}_{t\geq 0}$$

where $j \in \{d, f\}$ such that:

1. Households maximize utility subject to their budget constraints and take prices and wages as given.

2. Sector-2 firms maximize profits, implying $w_{u,t} = Z_t\rho_{2,t}$.

3. Sector-1 firms choose vacancies and hiring thresholds to satisfy the threshold rules (11)–(12), the laws of motion (6)–(7), and the FOCs (13)–(14); and set prices as a markup over marginal cost.

4. Wages satisfy Nash bargaining and the prevailing-wage constraint for foreign workers.

5. The matching technology aggregates consistently: $q(\theta_{s,t}) = M(U_{s,t}, V_{s,t})/V_{s,t}$ and $\theta_{s,t} = V_{s,t}/U_{s,t}$.

6. The visa success probability satisfies $x_t = \min\{\bar{N}_e/N_{e,t}, 1\}$ with $N_{e,t}$ given by (22).

7. Goods and resource constraints clear.

5. Quantification

5.1. Calibration

The model period is one year. We calibrate the parameters to match the U.S. economy between 2013-2023 and solve for the stationary distribution. First, there is a set of parameters that are fixed using estimates from other papers or computed based on data. Second, we internally calibrate the remaining parameters to match moments.

Fixed parameters We set $\beta = 0.96$, consistent with the RBC literature. The elasticity across varieties, γ, is set at 3.8, following Ghironi & Melitz (2007). Aggregate productivity, Z, is set to 1. We normalize the productivity of the low-type skilled worker, a_L, to 1. We choose the level of the flow value of unemployment, b, such that the ratio of b to average productivity for domestic workers is 0.73, consistent with the calibrated value of leisure from Mortensen & Nagypál (2007).

We use a constant elasticity of substitution matching function, $M(U,V) = (U^{-\zeta} + V^{-\zeta})^{-1/\zeta}$, with $\zeta = 1.699$ taken from Baydur (2017).[11]

The domestic high-skilled separation rate, δ_d, is set to 1.7%, such that given a target for the domestic high-skilled job-finding rate, the equilibrium unemployment rate for this group is 2%.[12] In the March supplement of the CPS from 2013-2019, the average duration of unemployment over the previous year was 28 weeks for workers with a college degree. We convert this to an annual job-finding probability of $0.85 = 1 - (1 - 1/28)^{52}$. The foreign

[11] Baydur (2017) uses a target for vacancy filling rates, job-finding rates, and the daily probability of hiring a match conditional on matching to separate the average share of matches hired from the matching rate. We choose not to follow this approach because we want to allow for the possibility that the selection margin is not binding for domestic workers (meaning firms hire all domestic matches).

[12] The average unemployment rate among college-educated workers in the ACS was 2.6% from 2013-2023 and the average among college-educated workers in H-1B occupations was 1.8%.

Table 1: Parameters

(a) Fixed Parameters

Parameter	Value	Meaning	Target
β	0.960	Discount rate	Real interest rate
γ	3.800	Elasticity of subst. across varieties	Ghironi & Melitz (2007)
Z	1.000	Aggregate productivity	Normalization
a_L	1.000	Low-type productivity	Normalization
b	1.046	Value of leisure	0.73 ratio to average productivity
ζ	1.699	Matching elasticity	Baydur (2017)
δ_d	0.017	Domestic separation rate	Domestic skilled unemployment
δ_f	0.116	Foreign separation rate	North (2011)
$\bar{L}_d$	1.000	Mass of domestic skilled workers	Normalization
$\bar{L}_u$	1.880	Mass of unskilled workers	Relative employment
$\bar{L}_f$	0.030	Mass of foreign skilled workers	H-1B registrations
$\bar{N}_e$	0.002	Visa cap	Visas per domestic skilled empl

(b) Fitted Parameters

Parameter	Value	Meaning	Target
α	0.430	Skilled share of consumption	Skill premium
c_d	0.016	Domestic hiring cost	Hiring cost/ avg wage
c_f	0.130	Foreign hiring cost	Hiring cost/ avg wage
κ	1.170	Vacancy cost	Domestic job-finding rate
π	0.201	Share high type	H-1B data
σ	1.632	SD signal distribution	H-1B data
a_H	3.155	High-type productivity	H-1B data
ϕ	0.095	Worker bargaining power	H-1B data

separation rate is set such that foreign workers face an additional 10% separation probability for return migration, as documented by North (2011), such that $\delta_f = 1 - (1 - \delta_d)(1 - 0.10)$.

The mass of domestic workers is normalized to 1. The mass of unskilled workers, $\bar{L}_u$ is set to 1.88 to reflect the number of employed workers with less than a college education relative to domestic skilled workers in the ACS sample. We choose a value for the visa cap, $\bar{N}_e = 0.0022$, to reflect the ratio of the 85,000 cap relative to total domestic skilled employment in the ACS. The mass of foreign skilled workers is the sum of foreign applicants ("unemployed") and employed workers. In the model, employment is pinned down by the binding visa cap and separation probability. To calibrate the mass of foreign applicants, we use the number of unique H-1B cap registration beneficiaries (a measure of how many individuals were in the cap-season pool each year) reported by the U.S. Department of Homeland Security (DHS) for 2020-2024.[13] We scale these by the number of skilled domestic employment in the ACS over the same period (the same scaling we use for the visa cap) to get $\bar{L}_f = 0.030$. Combining total foreign labor supply with equilibrium employment determined by the visa cap, this implies that there is approximately one foreign applicant for every two domestic unemployed workers, based on the equilibrium domestic unemployment rate.

Fitted parameters The remaining eight parameters affect all moments, but we provide some intuition on identification. The weight of the skilled good in the consumption basket, α, is used to target the skill premium of 1.95. which we calculate as the ratio of average earnings for college-educated and non-college-educated workers in the ACS, among workers reporting full-time employment. As the weight of the high-skilled good increases, demand for the low-skilled good decreases and relative low-skilled wages fall.

We target moments for the hiring costs relative to average wages. The domestic hiring cost, c_d, is estimated to equal 4.5% of quarterly wages (1.1% annual), following Hagedorn & Manovskii (2008). The visa application cost, $c_f - c_d$, is estimated to be 8.1% of annual domestic wages based on an \$8,000 application cost scaled by the average earnings for college-educated workers in the ACS. The vacancy posting cost is important for the "free-entry" condition, given by equation 13. This is not actually a free entry condition because we assume a fixed mass of firms with endogenous size, but as vacancy costs increase, each firm in the mass chooses to post fewer vacancies, leading to lower overall market tightness, the same way it would under a free entry assumption. We target a job-finding rate of 85% for domestic workers, consistent with the average duration of unemployment in our data of 28 weeks for workers with a college degree.

We assume that domestic and foreign workers have the same noise in their signal, σ. We think this is reasonable for two reasons. First, many (though not all) foreign applicants are already in the U.S. and have temporary work permits and/or have attended U.S. colleges,

[13] On average, there were 465,522 registrations over this period, with the lowest in the 2020 season (274,237) and the highest in the 2023 season (780,884).

Table 2: Targeted moments

Moment	Data	Model
High/low skilled average earnings	1.950	1.957
Domestic skilled job-finding rate	0.849	0.849
Cost, relative to domestic skilled wage		
Foreign visa cost	0.081	0.081
Hiring cost	0.011	0.011
Visa filling probability	0.296	0.296
Wage tiers (application share in parenthesis)		
I (28%)	1.000	1.000
II (55%)	1.213	1.169
III (12%)	1.546	1.561
IV (5%)	1.912	1.901

making their resumes very similar to U.S. applicants.[14] Second, based on our targets for hiring costs described above and the target for relative wages, the foreign hiring cost is about 8.2 times greater than the domestic hiring cost. We also target a 30% success rate for the visa lottery. This means that the effective hiring cost of one realized foreign hire is 27 times greater than one domestic hire. Conditional on productivity, the flow surplus associated with a foreign hire is the same as a domestic hire in each period (because wages are the same conditional on productivity), but foreign workers face a higher separation rate due to return migration risk, making the expected lifetime surplus lower. Combining these factors, if equation 12 is binding for foreign workers, then a reasonable calibration would lead 11 to be non-binding, given that the surpluses are larger and the hiring cost is orders of magnitude smaller. Taking these factors together, the signal noise is irrelevant for domestic hires and we would not be able to identify a different noise level.

We calibrate the remaining four parameters, worker bargaining power, ϕ, share of high-

[14]Out of all initial-employment H-1B approvals (including consular processing for people abroad), about one-third were students (F-1/ F-2 status) to H-1B change-of-status cases in fiscal year 2023 (https://www.govinfo.gov/content/pkg/CMR-HS8-00193273/pdf/CMR-HS8-00193273.pdf). The proportion of F-1/F-2 students is more than 70% if we consider new-employment H-1B approvals where the worker was already in the U.S. and the petition requested a change of status.

type workers, π, productivity of high-type workers, a_H, and noise of signal distribution, σ, to target features of the H-1B lottery pool described by Department of Homeland Security (2025). We target a visa success rate of 30%, based on the average reported by DHS for FY 2020-24. Under the policy change, each applicant will get 1-4 entries based on the wage tier. Table 2 reports the average share of applicants falling into each category from FY 2020-24 and the average salary for workers in each bin, relative to tier I. In the model, we calculate the tiers based on the signal of worker productivity, s, such that the shares of applicants match the shares from the data. For example, the share of workers in tier I in the model is

$$0.28 = \frac{\pi_f^u \left(\Phi\left(\frac{s_f^{II}-a_H}{\sigma_f}\right) - \Phi\left(\frac{s_f^{*}-a_H}{\sigma_f}\right)\right) + (1-\pi_f^u)\left(\Phi\left(\frac{s_f^{II}-a_L}{\sigma_f}\right) - \Phi\left(\frac{s_f^{*}-a_L}{\sigma_f}\right)\right)}{1-\pi_f^u \Phi\left(\frac{s_f^{*}-a_H}{\sigma_f}\right) - (1-\pi_f^u)\Phi\left(\frac{s_f^{*}-a_L}{\sigma_f}\right)},$$

where s_f^* is the signal threshold for hiring foreign workers and s_f^{II} is the threshold for being included in tier II such that the share above is 28%, as in the data. The numerator in the expression above reflects the mass of workers with signals between s_f^* and s_f^{II} and the denominator is the total mass hired, or those with signals above s_f^*. We define wages based on the worker's signal,

$$w_f(s) = w_f(a_L) + p(s|\pi_f^u, \sigma_f)(w_f(a_H) - w_f(a_L)),$$

and we integrate over the signals to determine the average wage for each bin.

The lottery probability is an indirect measure of the lower bound for tier I in the model: as firms reduce their hiring standards, they submit more applications, leading to a decreased probability of lottery success. Intuitively, increasing the high-type share of the population leads to a compression of the wage distribution towards the middle: the lottery probability goes up, meaning the bottom tier becomes more positively selected, while the middle two tier wages rise and the top tier wage falls.[15] Meanwhile, increasing noise leads to a compression towards the bottom: all three tiers fall towards 1 as the share of low-type workers in each bin increases and the bottom tier becomes less positively selected. Increasing the productivity of

[15] This depends on starting from a relatively low high-type share (20% in the calibration).

the high-type worker leads to higher selectivity and more wage dispersion. Increasing worker bargaining power also increases selectivity and wage dispersion because workers extract more of the surplus, which depends on productivity.

Table 3: Untargeted moments

Moment	Data	Model
Foreign employment, relative to domestic skilled	0.013	0.019
Log difference in wages, foreign-domestic	0.028	0.014
Domestic SD log wage	0.488	0.346
Domestic 90-10 percentile log wage	0.980	0.862

Wage moments are based on residual log earnings from the ACS from 2013-2023 (excluding 2020). The 90-10 percentile log wage in the model is calculated as the log difference between high-type and low-type wages.

Table 2 summarizes the data used in the calibration. Table 3 shows that the model fits well along four untargeted moments. In the ACS, we observe that the ratio of employed H-1B-likely workers to domestic skilled workers is 0.013, whereas in the model, the ratio of skilled foreign to domestic employment is 0.019. The remaining three moments relate to the distribution of residual log earnings in the ACS, shown in Figure 2. The model captures half of the empirical wage gap, based on our preferred specification. Appendix Table A.2 shows that the difference in residual log earnings ranges from 0.007 to 0.037, depending on the group of workers considered and the treatment of outliers. Our model-implied gap of 0.014 is squarely in that range. The model somewhat underestimates the dispersion of domestic wages, but we are reassured that our model is able to produce reasonable values of wage dispersion from a completely different source than the foreign distribution of earnings used in the calibration.

6. Counterfactual analysis

In this section, we consider the effects of skilled immigration policy changes that are motivated by recent policy changes that encourage firms to be more selective about which foreign workers they hire. First, we estimate the general and partial equilibrium effects of the proposed switch to a wage-weighted lottery. We also consider the effects of this wage-weighted lottery under a plausible scenario where firms have an incentive to boost wages for visa applicants above the level implied by expected productivity in order to boost the visa lottery success rate of applicants just below the tiers (bunching). Next, we consider the impact of alternate policy changes, specifically increases in the filing cost and decreases in the visa cap, that would generate the same counterfactual increase in average foreign worker productivity.

6.1. Reallocation of visas

We provide the first analysis of proposed changes to the H-1B visa lottery. The new rules will create a weighted selection process tied to the offered wages. There are four wages levels. Each individual registration in the lottery gets more "entries" if it is associated with a higher wage level. The highest tier gets four entries, while the lowest tier gets one. We apply this to our setting by making the lottery probability a function of the worker's posterior probability of being the high type based on their signal, which directly maps to the expected wage they would be paid.

Since the bargained wage is increasing in expected productivity, and expected productivity is increasing in the posterior probability of being high type, ranking applications by wage tiers is equivalent in the model to ranking by posterior thresholds. We solve for the posterior thresholds for each bin based on the distribution reported in Table 2 and described in the calibration. For example, in our baseline model, the marginal hire in the bottom tier has a 3.1% probability of being high type whereas the marginal hire in the top tier has a 64% probability of being high type.

Following the rules outlined by DHS, we define the probability of a successful visa based on

$$x(s) = \begin{cases} x^* & \text{if } p(s|\pi_f^u, \sigma_f) < p^{II} \\ 2x^* & \text{if } p(s|\pi_f^u, \sigma_f) \in [p^{II}, p^{III}) \\ 3x^* & \text{if } p(s|\pi_f^u, \sigma_f) \in [p^{III}, p^{IV}) \\ 4x^* & \text{if } p(s|\pi_f^u, \sigma_f) \geq p^{IV}, \end{cases} \tag{23}$$

where x^* is determined endogenously.[16] If the cap is binding, we solve for x^* such that

$$\bar{N}_e = U_f \theta_s q(\theta_s) \int_{s_f^*} x(s) dF(s|\pi_f^u, \sigma_f) \tag{24}$$

where demand for visas is determined by the mass of foreign applicants, U_f, which is fixed if the cap is binding, meaning foreign employment is at capacity, market tightness, θ_s, which determines the number of matches the firm gets, and the threshold for hiring matches, s_f^*. Even if the firm does not change its recruiting or hiring decisions, the number of applications also depends implicitly on the share of high-type workers in the unemployed pool, π_f^u, which changes endogenously due to reallocation.

Table 4 shows how the composition of applications changes with the policy implementation. Fewer applications are submitted from the bottom tier and the top tiers with more submitted from the middle. The applications in the lowest tier fall because firms prioritize higher-quality applications and search harder to find these workers. The applications at the top end of the distribution fall because these workers become increasingly rare as the better applicants are more likely to be absorbed into employment and the underlying distribution of the applicant pool changes.

Table 5 shows the percentage changes in key outcomes relative to the baseline with the implementation of this policy. The first column of Table 5 reports the general equilibrium effects, where firms adjust their hiring strategies. The posterior probability of the marginal hire being the high type rises from 3.1% to 5.4%. Given that high-posterior matches are now more valuable (more likely to get visas), firms have more incentive to search for more matches to increase the number of high-posterior applicants and vacancies rise by 0.8% as a result. Foreign productivity increases by 4.65% relative to baseline. Domestic workers benefit from the increased vacancy posting, which leads to more domestic matches, but the effect is quantitatively small with an increase in domestic employment of less than 0.005%. Total skilled sector output also increases by approximately 0.095%, reflecting both of these

[16] We use these multiplicative levels rather than probabilities bounded by 1 to be consistent with the exact language from the policy rules outlined by Department of Homeland Security (2025). In the case that $x^* > 0.25$, we set the probabilities in each tier to 1 as needed.

margins, but mostly the increase in foreign productivity. Domestic skilled wages fall due to substitution effects, but unskilled sector wages increase modestly due to complementarities between sectors. Overall domestic consumption rises marginally, though it falls marginally for skilled domestic households.

Table 4: Counterfactual policies: reallocation variants and application composition

	Baseline	Reallocate	Partial	Bunching	
				true	filed
I	0.28	0.20	0.35	0.25	0.05
II	0.55	0.67	0.54	0.62	0.81
III	0.12	0.10	0.09	0.10	0.10
IV	0.05	0.03	0.03	0.03	0.03

The table reports the percentage of applications in each wage tier in the baseline model and three reallocation counterfactuals. (1) Reallocate visas uses the tiered lottery system described above, (2) Partial implements the partial equilibrium reallocation counterfactual keeping vacancies and hiring thresholds constant, and (3) Bunching implements the case where firms bunch wages. For the bunching counterfactual the "true" column reports the share of applicants who would fall in each tier if wages were productivity based and the "filed" column reports the share based on wages reported (i.e. with bunching).

Table 5: Counterfactual policies: reallocation variants

Moment	Reallocate	Partial	Bunching
Foreign productivity	4.6510	3.4085	2.4244
Domestic skilled employment	0.0045	0.0000	0.0360
Skilled sector output	0.0947	0.0662	0.2916
Wages			
Domestic skilled	-0.0179	-0.0269	0.0484
Unskilled	0.0407	0.0284	0.1253
Consumption			
Domestic skilled	-0.0113	0.0029	-0.0092
Domestic total	0.0089	0.0129	0.0434

The table reports the percent changes in steady state moments relative to the baseline under three reallocation counterfactuals. (1) Reallocate visas uses the tiered lottery system described above, (2) Partial implements the partial equilibrium reallocation counterfactual keeping vacancies and hiring thresholds constant, and (3) Bunching implements the case where firms bunch wages.

The column labeled 'Partial' in Table 5 considers a partial equilibrium case in which firms keep vacancies and hiring thresholds constant, illustrating the direct effects of the policy. Foreign productivity increases by 3.41%, leading to an increase in skilled sector output of approximately 0.07%. Domestic skilled wages fall, due to substitution effects, while unskilled wages rise due to complementarities between sectors. Table 4 shows that the distribution of applications becomes more negatively selected, even though the realization of which applications are accepted leads productivity to increase. Applicants at the high end of the distribution become more rare because they are more likely to be hired, just as in the general equilibrium case. However, firms hire more applicants from the bottom tier because they do not update their threshold to account for the updated selection of the applicant pool. This partial effect is not a sustainable equilibrium because the marginal foreign hire now faces a much lower likelihood of a successful visa application, so the firm would expect a loss from continuing to hire workers above this threshold.

Bunching Given the fixed thresholds used for determining the lottery weights, firms may have an incentive to boost wages for visa applicants above the level implied by expected productivity. For example, an application paying a wage consistent with a posterior probability of 64% would face an 89% lottery success rate, whereas an application paying a wage consistent with 63% would face a lottery success rate of only 67%. Firms may prefer to pay a higher wage to boost their lottery success rate for workers close to the margin, though they likely will not want to do this for a worker with a posterior probability of 1%.

We model this behavioral response by modifying our hiring rule to be tier-specific. A firm will submit the true wage for all workers with a posterior probability that places them in the top tier because there is no gain to boosting those wages. For workers below the cutoff, $p < p^{IV}$, firms will bunch wages at the cutoff if

$$\frac{c_f}{x(p^{IV})} + \sum_{\tau=t}^{\infty} \beta_{t,\tau} (1-\delta_j)^{\tau-t} \left(w(p^{IV}) - w(p) \right) \leq \frac{c_f}{x(p)}, \tag{25}$$

where the left-hand side represents the cost associated with deviating: the visa filing fee is relatively less costly because the lottery success rate increases but the firm must pay the additional cost of the difference between the bunching wage and the productivity-implied wage.[17] The right-hand side represents the visa cost scaled by the lottery success rate if the

[17] We assume complete commitment, where firms must pay the elevated wage for the duration of the match. If firms could lower the wage later, that would likely increase the amount of bunching.

firm pays the productivity-implied wage. We can solve for the marginal posterior, p^{IV*}, such that the firm is indifferent between deviating or not for this hire. We can symmetrically define deviation for tiers II and III.

The final column of Table 5 reports the results of reallocation policy with bunching. Average foreign productivity increases by substantially less: 2.42% relative to 4.65%. This is intuitive because bunching will decrease the quality of applications accepted. The last two columns of Table 4 report the share of applications that fall into each wage tier in bunching equilibrium if they were reported truthfully and based on the wage reported on the petition. Firms commit to pay productivity-implied wages for 80% of visa petitions, with nearly all bunching happening at the low end of the distribution: 25% of all applications should be in the lowest tier—20% are bunched at the threshold for tier II and 5% are submitted truthfully. Applicants at the high end of the distribution are increasingly rare, as they are more positively selected into employment so even though firms do bunch at the higher thresholds as well, there are fewer applicants who are near the margin at those levels.

With bunching, there are greater positive spillover effects for domestic workers: domestic employment increases by 0.036 percent and skilled wages go up by 0.048 percent. To understand the increase in employment, consider the free-entry condition—the benefit of posting a vacancy depends on the composition of matches hired. By reallocating more matches towards high-productivity workers, this expected surplus increases. Allowing bunching creates an additional increase by raising the likelihood that a worker who is ϵ below the cutoff gets prioritized, further increasing the firm's incentive to post vacancies. Wages go up because these complementarities generated through search outweigh the negative substitution effects when the increase in foreign productivity is smaller. This also amplifies the wage effects for low-skilled workers. Although the high-skilled domestic wage bill increases, consumption still falls for this group because firm profits decrease.

Taken in sum, our results suggest that the new reallocation policy can increase average worker productivity, skilled output, and unskilled wages, with quantitatively small negative effects on domestic skilled wages. The general equilibrium vacancy response accounts for roughly one-quarter of the total foreign productivity gain and generates small domestic employment spillovers. Firms' incentives to boost foreign wages to improve the lottery odds would weaken the productivity gains but strengthen the positive spillovers to domestic workers.

6.2. Alternate policies

Increase visa cost The administration has also proposed significant increases to the visa filing costs, which would also lead firms to be more selective about foreign hires. We benchmark this policy to the reallocation scenario by increasing the cost of filing a visa application, defined in the model as the difference in hiring costs between foreign and domestic workers, $c_f - c_d$, by a factor of 3.93.[18] We choose the magnitude of the increase such that foreign productivity increases by 4.65%, the same as the reallocation scenario.

Table 6: Alternate counterfactual policies

Moment	Reallocate	Raise cost	Lower cap
Foreign productivity	4.6510	4.6510	4.6510
Domestic skilled employment	0.0045	-0.0030	-0.0896
Skilled sector output	0.0947	0.0873	-0.5729
Wages			
Domestic skilled	-0.0179	-0.0495	-0.1761
Unskilled	0.0407	0.0375	-0.2468
Consumption			
Domestic skilled	-0.0113	-0.0216	-0.0042
Domestic total	0.0090	0.0015	-0.0987

The table reports the percentage changes in steady state moments relative to the baseline under three counterfactual policy changes: (1) Reallocate visas uses the tiered lottery system described above, (2) Raise cost increases the visa cost by a factor of 3.9, such that the increase in foreign productivity is the same as column (1), and (3) Lower cap decreases the cap by 28%, such that the increase in foreign productivity is the same as column (1).

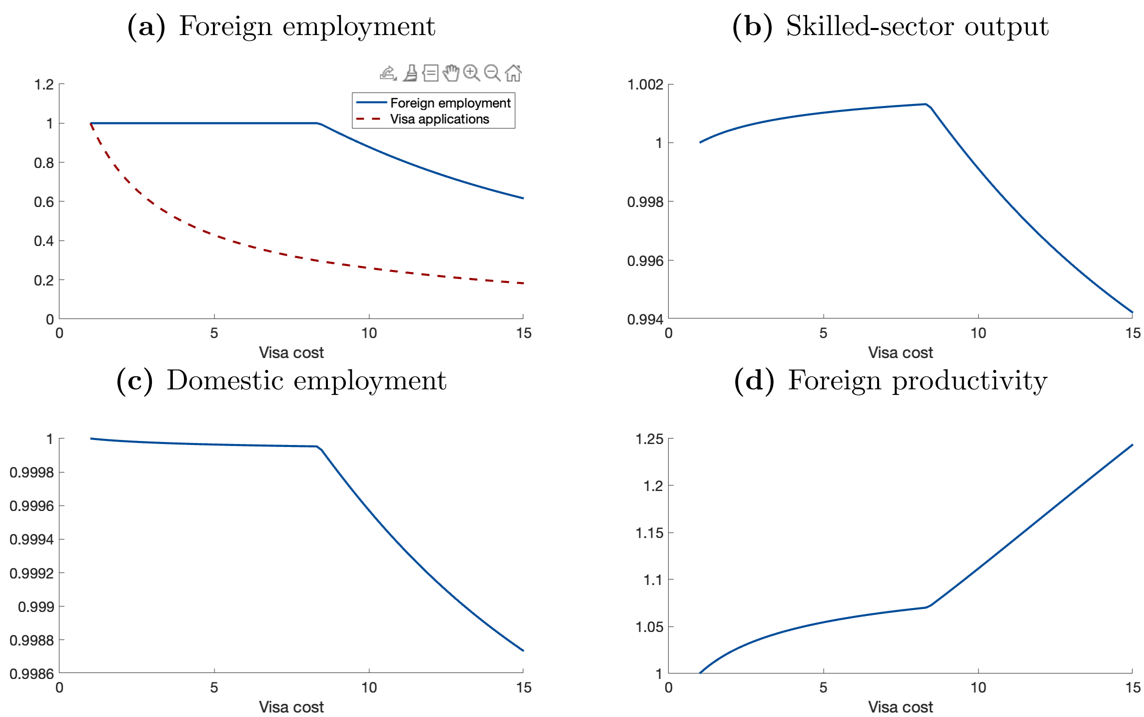
Raising filing costs delivers the same foreign selection improvement, but it reduces vacancy creation and therefore produces negative domestic spillovers. With reallocation, firms become more selective about the marginal hire and they have the incentive to search more for high-productivity matches, which benefited domestic workers. With the increased cost,

[18]In dollars, this would correspond to a cost of \$31,472, whereas our baseline is calibrated to a cost of \$8,000.

firms become more selective about the marginal hire but they don't have the same incentive to search for high-productivity matches so they reduce vacancy posting by 0.5%. This has a quantitatively small negative effect on domestic skilled employment. Domestic skilled wages fall more because there is more substitution away from domestic skilled workers towards higher productivity foreign workers through this matching channel: in addition to the substitution effects that are present in the reallocation scenario, there is the additional substitution that arises from lower domestic employment. Domestic skilled consumption falls more. Total consumption is still weakly higher than the baseline, but the gains to the unskilled sector are weaker and the the losses to the skilled sector are stronger relative to reallocation.

As the visa filing cost increases, firms submit fewer visa applications and the cap becomes less binding. In the scenario shown in the Table 6, firms decrease the number of visa applications filed by 50%. Figure 3 shows more broadly, what happens to foreign employment and skilled-sector output as the visa cost scales up. The figure highlights a key nonlinearity — the effects of filing costs depend on whether the visa cap is binding. For moderate cost increases, the cap remains binding and realized foreign employment is essentially pinned down; firms adjust primarily on the intensive margin by raising hiring standards and submitting fewer, better-targeted applications. In this region, foreign productivity increases and skilled-sector output inches up, peaking at roughly 0.13% above baseline at the point where visa demand just equals visa supply (the kink is around an 8.3 times increase relative to our calibrated cost). Past this kink, the cap becomes non-binding ($x = 1$), and further cost increases reduce the quantity of foreign hiring: foreign employment falls sharply and eventually approaches zero. This decline has negative spillovers for domestic workers through two channels. First, firms post fewer vacancies as the expected value of foreign hiring falls, and second, the unemployment pool becomes increasingly crowded with foreign applicants who match but are not hired, which reduces successful domestic matches. Consequently, skilled-sector output falls sharply after the kink even though foreign productivity rises. Increasing the cost by a factor of 12.5 (about $100,000 relative to our $8,000 baseline) raises foreign productivity by 17.8% but lowers domestic skilled employment by 0.09% and foreign employment by 27%, implying a 0.37% decline in skilled-sector output.

Figure 3: Implications of increased visa costs



The figure shows the ratio of steady state moments in the counterfactual with increased visa costs relative to the baseline. Visa cost is measured relative to baseline.

Decrease visa cap There have been no proposals to decrease the cap on visas, but the cap has been effectively decreasing in real terms for years, since it has been fixed at 85,000 visas, whereas the domestic labor force has grown over this period. A more binding cap makes the likelihood of a successful visa application decrease, which leads firms to be more selective about which foreign workers they hire. The third column of Table 6 shows the effects of a 28% decrease in the visa cap, such that the resulting increase in foreign productivity is the same as the reallocation counterfactual. In this scenario, domestic skilled employment decreases by approximately 0.09%, because there is a larger mass of unmatched foreign applicants that creates congestion in the labor market for domestic workers, similar to the scenario above in which the increased cost leads the cap to be non-binding. Interestingly, firms actually increase the number of vacancies posted by 2.3%, but this increase is small relative to the increase in the size of the unemployment pool caused by unmatched foreign workers, leading market tightness to fall. Skilled sector output declines by 0.57%, as the increase in foreign productivity is not enough to offset the decreases in both foreign and domestic skilled labor. Wages fall for all workers.

6.3. The role of signal noise

The reallocation policy seeks to improve the average productivity of foreign workers through giving better odds to more productive workers. An equilibrium effect of the policy is that it also increases the average quality of the pool of submitted applications. Another way to improve the average quality of the pool of applications would be to remove noise about worker productivity. If firms could perfectly observe foreign worker productivity, they would hire all the high-type applicants and hire low-type applicants if the surplus associated with hiring them is non-negative.

We implement this thought experiment by setting $\sigma_f = 0$. The number and composition of visa applications submitted affects the marginal cost of production, which in turn affects the surplus associated with hiring a low-type match. We find an equilibrium in which firms submit visa applications for all high-type foreign applicants and 37% of low-type foreign applicants. The surplus associated with submitting a visa application for a low-type match is 0, so firms are indifferent between submitting them or not. All other matches generate a positive surplus.

The effects of removing noise are remarkably similar to the reallocation policy, as shown in Table 7. Foreign productivity, domestic skilled employment, and skilled-sector output all increase slightly more than in the reallocation scenario. In both cases, the visas submitted become better-targeted and firms submit fewer excess visas: under reallocation the average lottery success rate rises from 30% to 44% and without noise it rises to 54%.

The third column of Table 7 shows the effects of implementing the reallocation policy in the model without noise, relative to the baseline model and relative to the model with $\sigma_f = 0$. Importantly, this shows that there does not need to be noisy information about foreign worker productivity in order for reallocation to improve the selection of foreign employment. Even with perfect information, firms still have an incentive to submit visas for inefficiently

Table 7: Signal noise

Moment	Reallocate	No noise	Remove noise and reallocate	
			vs. baseline	vs. no noise
Foreign productivity	4.65	5.50	9.23	3.53
Domestic skilled employment	0.00	0.01	0.01	0.00
Skilled sector output	0.09	0.11	0.19	0.07
Wages				
Domestic skilled	-0.02	-0.02	-0.04	-0.02
Unskilled	0.04	0.05	0.08	0.03
Consumption				
Domestic skilled	-0.01	-0.01	-0.02	-0.01
Domestic total	0.01	0.01	0.02	0.01

The table reports the percentage changes in steady state values relative to the baseline under three counterfactual scenarios: Reallocate uses the tiered lottery system described above. Remove noise sets signal noise to 0 about foreign worker productivity. Remove noise and reallocate combines the first two cases for a) the percent change relative to baseline scenario, and b) relative to no-noise scenario.

many low-type workers because they do not internalize the spillover effects of submitting more low-type applications on the probability of getting their own high-type applications. However, this problem is more severe when there is imperfect information. Thus, the effects of the reallocation policy on worker productivity and skilled-sector output are higher in the environment with noisy information.[19] The positive effects on domestic skilled employment are also slightly larger, although these are quantitatively unimportant in both cases.

Accounting for noisy screening is quantitatively important. In the baseline model wage-weighted reallocation raises foreign productivity by 4.65%, whereas with perfect information ($\sigma_f = 0$) the incremental gain from reallocation falls to 3.53%, so a model that ignores noise may understate the productivity gains from selection-based reforms.

6.4. Impact of foreign labor supply changes

With the proposed changes in visa policy, there is some speculation that labor supply to the U.S. by foreign skilled workers could decrease. There has been a notable plunge in the 2025

[19] This relationship is not monotonic over all levels of noise, σ_f. Intuitively, reallocation policy has the biggest impact when there is some noise but the noise is low enough such that the signal still conveys meaningful information. In the extreme, if the signal were pure noise, firms would not use the signal at all and reallocation would have the mechanical effect of improving the visa applications selected without improving the targeting of applications submitted.

global demand for U.S. degrees, which could translate to lower U.S. firm access to foreign skilled workers.[20] In this section, we analyze how the impacts of the reallocation policy are affected if the foreign labor supply pool shrinks.

Figure 4 shows foreign productivity, domestic skilled employment, skill-sector output, and domestic skilled wages over a range of foreign labor supply values from 35% lower than baseline to 10% higher. Given a constant cap on visas, decreased foreign labor supply has two effects: first, it reduces congestion in the labor market, as firms match with fewer workers that face the visa process; and second, assuming that the composition of foreign labor supply is constant, it leads to fewer high-ability workers in the pool in absolute terms. Panel (a) of Figure 4 shows that foreign productivity in the standard random lottery environment is increasing in foreign labor supply, as the number of high-productivity applicants relative to the cap has increased. When foreign labor supply falls substantially, about 20% compared to baseline, it is no longer worth it for firms to screen applicants and the productivity of the average foreign worker converges to the productivity of the average domestic worker. The increase in skilled-sector output continues below this point due to the congestion effects. Domestic skilled employment rises when there are fewer foreign workers due to the alleviation of congestion: fewer foreign applicants in the pool means that firms will match with more domestic workers per vacancy. Another kink arises around a 28% reduction in foreign labor supply: the lottery cap becomes non-binding because the number of matches between foreign applicants and firms is less than the cap. Below this point, skilled-sector output falls, as seen in panel (c) because annual foreign hiring falls below the cap.

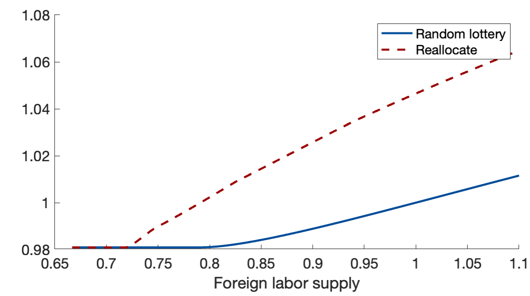
Importantly, if the objective of the change in visa policy is to prioritize high-productivity high wage employment, then it is important to consider how changes in foreign labor supply would change the counterfactual policy effects. A decrease in foreign labor supply would decrease the number of high-type skilled workers in the pool, and therefore would lessen the effects of a reallocation policy. This is because firms have a less incentive to seek out the high-productivity foreign applicants when there are fewer of them, leading to negative spillover effects for domestic workers. In the extreme, substantial decreases in foreign labor

[20] https://thepienews.com/global-demand-for-us-masters-degrees-plunges-by-60/

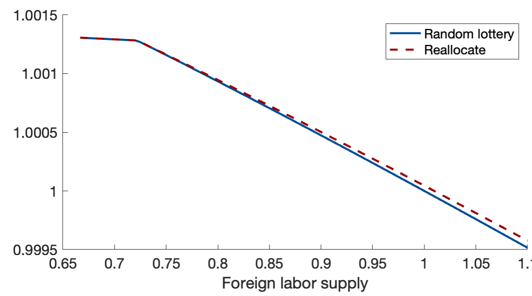
supply would erode any gains to the reallocation policy because firms become so constrained that they are hiring all matches and the number of matches is below the cap, so the visa allocation process does not matter.

Figure 4: Changes in foreign labor supply

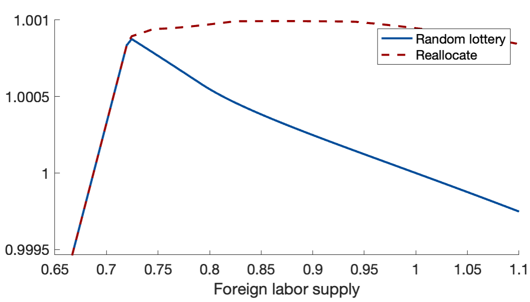
(a) Foreign productivity



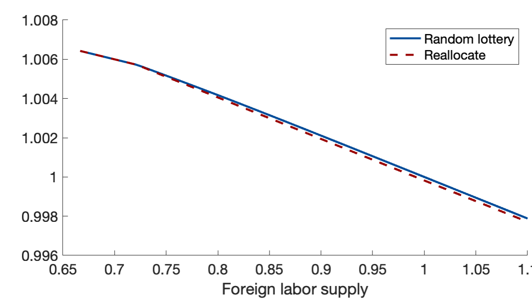
(b) Domestic skilled employment



(c) Skilled-sector output



(d) Domestic skilled wages



Foreign labor supply is measured relative to baseline. The solid blue line shows the model outcomes relative to baseline when labor supply changes without changing the lottery system. The red dashed line shows the model outcomes relative to baseline with both changes in labor supply and wage-weighted reallocation policy.

7. Conclusion

The paper shows that immigration frictions influence the types of workers that get hired, ultimately affecting aggregate productivity, domestic wages, and employment. Our counterfactual results suggest that there are overall domestic welfare gains to implementing policies that reduce the inefficient over-submission of visa petitions. Importantly, a recent policy that reallocates visas to higher-wage workers under the existing cap can improve average foreign worker productivity and lead to marginal employment gains for domestic skilled workers, with quantitatively small effects on skilled wages. However, some of these gains to foreign worker productivity are offset if firms can strategically bunch reported wages at tier cutoffs. The results also highlight that the reallocation policy is most effective when the applicant pool is large enough. The paper reinforces the importance of considering the general equilibrium impacts of skilled immigration policy changes in settings that allow for skilled worker heterogeneity and noisy screening of workers.

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Appendix

A. Data

We use data from the American Communities Survey (ACS) from 2013-2023, excluding 2020.

Worker group definitions We make the following classifications:

- **Skilled workers**: those with a bachelor's degree or higher;
- **H-1B occupations**: computer-related and architecture, engineering, and surveying, which we identify using 2010 Census occupation codes, `occ2010` $\in (1000, 1560)$;
- **Domestic workers**: born in the U.S. or born abroad to parents with U.S. citizenship; we omit naturalized citizens from both the definition of domestic workers and H-1B-candidate workers;
- **H-1B-candidate workers**: Non-citizen skilled workers who arrived in the U.S. at or after age 18 and work in H-1B occupations
- **H-1B-likely workers**: H-1B-candidate workers whose country of birth is India or China

Summary statistics Our sample includes all domestic skilled workers in H-1B occupations and H-1B-candidate workers. The table below provides summary statistics. H-1B candidate workers are on average more likely to have a master's degree. They report higher annual earnings, though this does not adjust for differences in education or other characteristics.

Earnings residuals We define log earnings as the log of pre-tax wage and salary income at the individual level (`INCWAGE`). For each year, we trim the top and bottom 1% of the earnings distribution. We regress log earnings on a vector of individual characteristics and fixed effects:

Table A.1: Summary statistics

	Age	Men	Master's	Hours	Real earnings	Observations
Domestic	40	0.77	0.28	43	117,327	325,615
H-1B candidate	36	0.77	0.61	41	130,550	60,084
H-1B likely	35	0.75	0.66	41	129,842	40,493
Excl. MEX & CAN	36	0.76	0.62	41	130,347	57,146

The table reports means and number of observations. Means are weighted using individual survey weights. Master's reports the share with a master's degree or higher. Hours is average weekly hours worked in the previous year. Real earnings are reported in 2023 dollars.

- Education
- Gender and gender interacted with age, age-squared, marital status, number of children
- Usual hours worked last year
- Binned weeks worked last year
- Granular occupation fixed effects
- Two-digit industry fixed effects
- State by year fixed effects

We use individual survey weights. The R-squared of the regression is 0.42 and the within R-squared is 0.33. Table A.2 reports the average difference in means for H-1B Candidate workers relative to domestic workers. Column (1) includes all countries of origin and column (2) restricts to H-1B dominant countries. Columns (3) and (4) report the means after trimming the top and bottom 1% of residual earnings. Across all specifications, H-1B candidate workers have statistically significant higher residual earnings than native-born workers, with stronger effects for the sample from India and China.

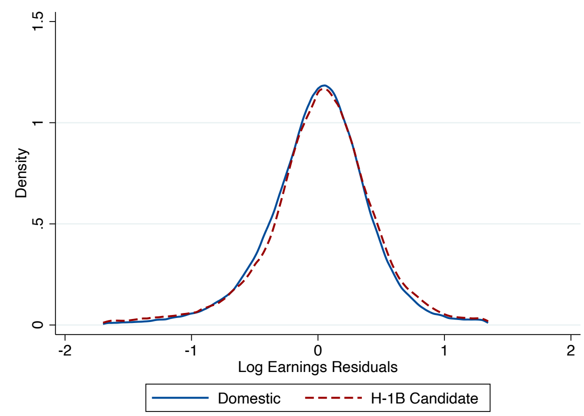
Figure A.1 shows the density of log earnings residuals and the mean difference over time for the full sample of H-1B candidate individuals. The selection effects are weaker. To the extent that our preferred sample is capturing the workers most likely to be affected by H-1B visa policy, this weakening of results is consistent with our story. Figures A.2 and A.3 show

Table A.2: Mean difference in residual earnings

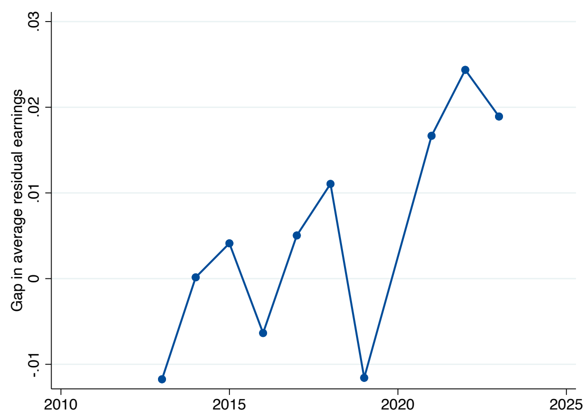
	(1)	(2)	(3)	(4)
H-1B Candidate	0.00657*	0.0276***	0.0158***	0.0365***
	(0.00293)	(0.00325)	(0.00241)	(0.00263)
H-1B-likely		X		X
Trimmed			X	X
N	385,692	366,102	377,979	359,099

The table reports the mean difference in residual earnings between H-1B candidate workers and domestic workers. Columns (2) and (4) restrict to H-1B-likely workers from India or China. Columns (3) and (4) trim the top and bottom 1% of residual earnings.

Figure A.1: Heterogeneity in the data: All countries



(a) Density of earnings residuals

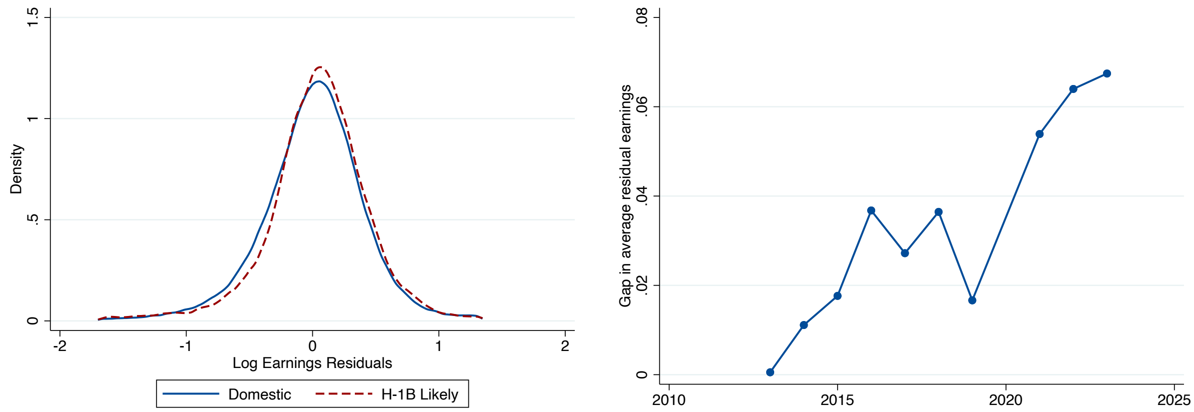


(b) Relative mean earnings residuals

Panel (a) shows the distribution of log earnings residuals for domestic and H-1B candidate workers in the ACS. Panel (b) shows the mean residual earnings gap between H-1B candidate and domestic workers broken down by year.

that the selection effects for both groups are stronger when we exclude the top and bottom 1% of residual earnings.

Figure A.2: Heterogeneity in the data: H-1B likely countries, trimmed sample

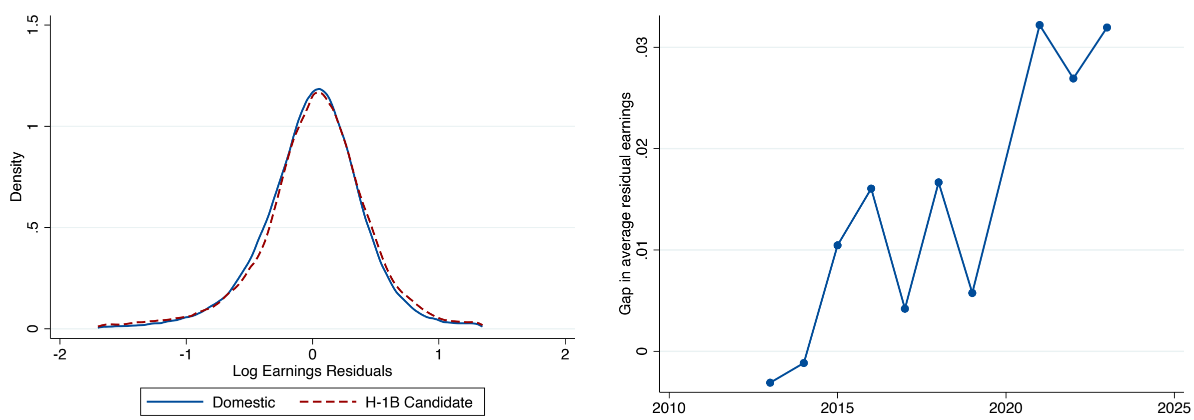


(a) Density of earnings residuals

(b) Relative mean earnings residuals

Panel (a) shows the distribution of log earnings residuals for domestic and H-1B candidate workers in the ACS. Panel (b) shows the mean residual earnings gap between H-1B candidate and domestic workers broken down by year.

Figure A.3: Heterogeneity in the data: All countries, trimmed sample



(a) Density of earnings residuals

(b) Relative mean earnings residuals

Panel (a) shows the distribution of log earnings residuals for domestic and H-1B candidate workers in the ACS. Panel (b) shows the mean residual earnings gap between H-1B candidate and domestic workers broken down by year.

B. Signals, Screening and Hiring Thresholds

This appendix derives the key objects implied by noisy screening: (i) the share of matches hired conditional on type, (ii) the posterior probability a worker is high type given a signal, (iii) the expected surplus conditional on a signal, and (iv) the composition of hires and the threshold characterization.

B.1. Share hired conditional on type

Each time a worker meets a firm, they draw a signal $s = a + \varepsilon$, where $\varepsilon \sim N(0, \sigma^2)$. Consider a firm using threshold s^*. For a worker with true productivity a, the probability of being hired is

$$\begin{aligned} \Pr(s \geq s^* \mid a) &= \Pr(a + \varepsilon \geq s^*) \\ &= \Pr(\varepsilon \geq s^* - a) \\ &= 1 - \Phi\left(\frac{s^* - a}{\sigma}\right), \end{aligned} \tag{A.1}$$

where $\Phi(\cdot)$ is the standard normal CDF. Setting $a = a_H$ and $a = a_L$ yields the expressions used in the main text.

B.2. Posterior probability of being high type

Let $\tilde{\pi}$ denote the prior probability that a matched worker is high type (in equilibrium, $\tilde{\pi} = \pi^u_{j,t}$). The conditional density of the signal satisfies

$$f(s \mid a = a_k) = \frac{1}{\sigma}\varphi\left(\frac{s - a_k}{\sigma}\right), \qquad k \in \{H, L\},$$

where $\varphi(\cdot)$ is the standard normal density. Bayes' rule implies

$$\begin{aligned} p(s \mid \tilde{\pi}, \sigma) &= \Pr(a = a_H \mid s) \\ &= \frac{\tilde{\pi}\, f(s \mid a = a_H)}{\tilde{\pi}\, f(s \mid a = a_H) + (1 - \tilde{\pi})\, f(s \mid a = a_L)} \\ &= \frac{\tilde{\pi}\, \varphi\left(\frac{s - a_H}{\sigma}\right)}{\tilde{\pi}\, \varphi\left(\frac{s - a_H}{\sigma}\right) + (1 - \tilde{\pi})\, \varphi\left(\frac{s - a_L}{\sigma}\right)}, \end{aligned} \tag{A.2}$$

since the $1/\sigma$ factors cancel.

B.3. Expected surplus conditional on a signal

Let $S_j^F(a)$ denote the firm's lifetime surplus from employing a worker of nationality j and true productivity a. Let $\tilde{p}$ be the posterior probability that this worker is high type conditional on their signal. Because $a \in \{a_L, a_H\}$, the expected surplus conditional on $\tilde{p}$ is

$$\begin{aligned} \mathbb{E}[S_j^F(a) \mid \tilde{p}] &= \tilde{p} S_j^F(a_H) + (1 - \tilde{p}) S_j^F(a_L) \\ &= S_j^F(a_L) + \tilde{p}\big(S_j^F(a_H) - S_j^F(a_L)\big). \end{aligned} \tag{A.3}$$

This is equivalent to defining the expected surplus conditional on a signal s, but it has the advantage that we do not need to condition on the information needed to convert the signal into a posterior probability, namely the prior probability that a match is high type and the signal noise,

$$\begin{aligned} \mathbb{E}[S_j^F(a) \mid s] &= \mathbb{E}[S_j^F(a) \mid s, \tilde{\pi}, \sigma] \\ &= S_j^F(a_L) + p(s \mid \tilde{\pi}, \sigma)\big(S_j^F(a_H) - S_j^F(a_L)\big). \end{aligned} \tag{A.4}$$

B.4. Hiring thresholds and marginal posteriors

A firm hires if expected surplus based on posterior $\tilde{p}$ exceeds the relevant cost. For domestic workers, the decision rule is

$$\mathbb{E}[S_d^F(a) \mid \tilde{p}] \geq c_d.$$

For foreign workers, the expected benefit is scaled by x because an intended hire becomes realized with probability x, while the application cost is incurred regardless:

$$x\,\mathbb{E}[S_f^F(a)\mid\tilde{p}]\geq c_f \quad\iff\quad \mathbb{E}[S_f^F(a)\mid\tilde{p}]\geq\frac{c_f}{x}.$$

Let s^* be the firm's cutoff such that they hire all matches with $s\geq s^*$. Given $\tilde{\pi}$ and σ,

$$s\geq s^* \iff p(s\mid\tilde{\pi},\sigma)\geq p^*,$$

where $p^*\equiv p(s^*\mid\tilde{\pi},\sigma)$. This allows us to write the firm's cutoff rules as

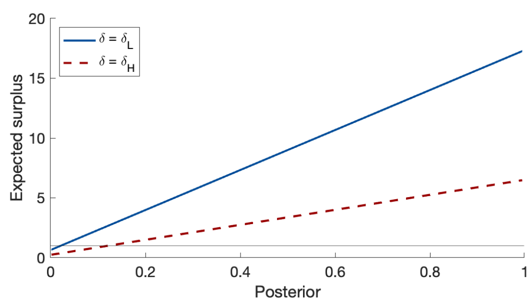
$$S_d^F(a_L)+p_d^*\big(S_d^F(a_H)-S_d^F(a_L)\big)\geq c_d, \tag{A.5}$$

$$S_f^F(a_L)+p_f^*\big(S_f^F(a_H)-S_f^F(a_L)\big)\geq\frac{c_f}{x}, \tag{A.6}$$

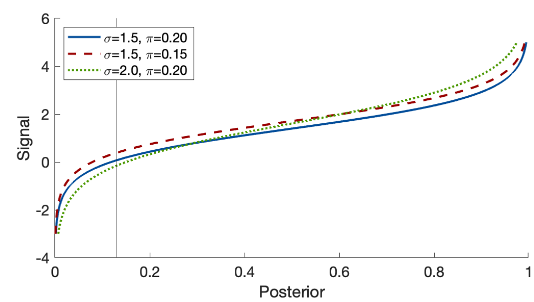
which are the cutoff conditions reported in the main text.

Figure A.4: Expected surplus and posterior

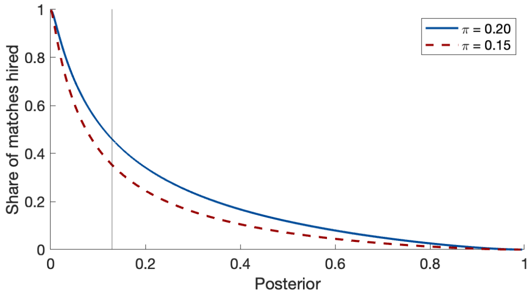
(a) Expected surplus



(b) Posterior formation



(c) Share hired, $\tilde{\pi}$



(d) Share hired, σ

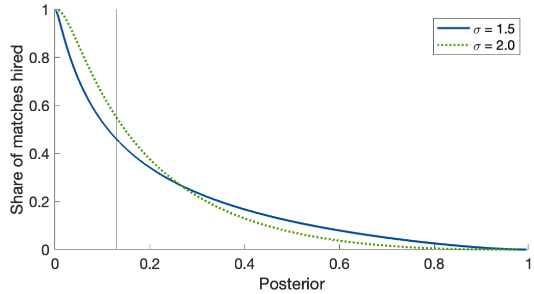


Figure A.4 Panel (a) illustrates the marginal posterior decision rule. The horizontal axis shows the posterior probability that the worker is high type. The blue and red lines show the expected surplus conditional on this posterior, which is an affine function given by equation A.3, for low (δ_L) and high (δ_H) separation rates. For simplicity, suppose the cost of hiring a worker is 1, as plotted by the gray horizontal line. For the low-separation surplus, this would imply $p^* \approx 0.02$; for the high-separation surplus, $p^* \approx 0.13$. If foreign workers have a higher separation probability ($\delta_f > \delta_d$) due to return migration risk, firms will set $p^*_f > p^*_d$. If the gray line were to rise to 2, reflecting either the visa application cost ($c_f - c_d$) or the uncertain lottery success (x), then the gray line would intersect the solid blue line at $p^* \approx 0.08$ and the dashed red line at $p^* \approx 0.28$. This example shows that a higher foreign separation rate can amplify the effects of visa frictions, though it is not necessary to induce a wedge in selectivity.

Figure A.4 Panel (b) shows how a posterior threshold maps to a signal threshold for different values of $\tilde{\pi}$ and σ. First, consider the solid blue line. As the posterior threshold increases, the signal threshold increases. The shape of the curve indicates that small changes in the signal threshold lead to bigger changes in posterior formation when firms are away from the corners, for example at 0.13, the intersection point of the high separation curve with the cost example in panel (a). The blue curve in Panel (c) shows how this maps into the share of matches hired. When firms set a higher posterior threshold, they hire fewer matches because fewer matches are observed with signals above the thresholds shown in panel (b).

Next, consider the effect of reducing the quality of the pool by decreasing the prior probability that a match is high type from 20% to 15%. This is shown by the red dashed lines in panels (b) and (c). When the applicant pool is more negatively selected, this unambiguously leads to a higher signal threshold needed to achieve the same posterior threshold, as shown in panel (b). Intuitively, for each signal level, when the high type is more scarce it becomes more likely that a low-type applicant had a good signal draw rather than a high-type applicant with a poor signal draw. Panel (c) maps the differences in signal thresholds to the differences in the share of matches that are hired. When the high type applicants become rarer, fewer matches are hired for each posterior possibility.

Lastly, the green dashed line in panels (b) and (d) shows the effect of increasing the signal noise from 1.5 to 2.0. This change leads the signal threshold to *decrease* for low posterior probabilities and *increase* for high posterior probabilities. Mapping into the share of matches hired in panel (d), this leads firms to hire more matches for low posterior thresholds and fewer matches for high thresholds. This is a standard result in models of statistical discrimination, such as Morgan & Várdy (2009), that increasing noise leads firms to be more selective when they are already being sufficiently selective (i.e. setting a high posterior threshold), but less selective when they are being relatively lax.

B.5. Composition of hires and average productivity

Let $\tilde{\pi}$ be the high-type share among unemployed. Conditional on using threshold s^*, the unconditional probability of hiring (among matches) is

$$\begin{aligned} \text{share} &= \tilde{\pi}\,\Pr(s \geq s^* \mid a_H) + (1-\tilde{\pi})\Pr(s \geq s^* \mid a_L) \\ &= \tilde{\pi}\left(1 - \Phi\left(\frac{s^* - a_H}{\sigma}\right)\right) + (1-\tilde{\pi})\left(1 - \Phi\left(\frac{s^* - a_L}{\sigma}\right)\right). \end{aligned} \tag{A.7}$$

The share of high types among hires is given by Bayes' rule at the hiring stage:

$$\begin{aligned} \Pr(a_H \mid s \geq s^*) &= \frac{\tilde{\pi}\,\Pr(s \geq s^* \mid a_H)}{\tilde{\pi}\,\Pr(s \geq s^* \mid a_H) + (1-\tilde{\pi})\Pr(s \geq s^* \mid a_L)} \\ &= \frac{\tilde{\pi}\left(1 - \Phi\left(\frac{s^*-a_H}{\sigma}\right)\right)}{\tilde{\pi}\left(1 - \Phi\left(\frac{s^*-a_H}{\sigma}\right)\right) + (1-\tilde{\pi})\left(1 - \Phi\left(\frac{s^*-a_L}{\sigma}\right)\right)}. \end{aligned} \tag{A.8}$$

Average productivity of hires is therefore

$$\tilde{a}^h = a_L + \Pr(a_H \mid s \geq s^*)\,(a_H - a_L),$$

and this object is what ultimately drives average productivity differences across nationalities when $s^*_f \neq s^*_d$.

C. Surpluses and bargaining rules

Firm's surplus At the time of bargaining, hiring costs are sunk and productivity is observable. We define the firm's surplus from a match with a domestic worker recursively as

$$S^F_{d,t}(a) = \Xi_t Z_t a - w_{d,t}(a) + \beta_{t,t+1}(1 - \delta_d) S^F_{d,t+1}(a), \tag{A.9}$$

where Ξ_t is the Lagrange multiplier on (1) and can be interpreted as the real marginal cost of production.

Worker's surplus We define the worker's surplus as the value of employment relative to unemployment at the end of the period,

$$S^W_{d,t}(a) = V_{d,t}(a) - U^{end}_{d,t}(a). \tag{A.10}$$

The value of employment is the wage plus the expected value of employment or unemployment next year,

$$V_{d,t}(a) = w_{d,t}(a) + \beta_{t,t+1}(1 - \delta_d) V_{d,t+1}(a) + \beta \delta_d U^{beg}_{d,t+1}(a). \tag{A.11}$$

The difference between unemployment at the beginning of a period, $U^{beg}_{d,t}$, and unemployment at the end of the period, $U^{end}_{d,t}$, is that unemployed workers at the beginning of a period have the opportunity to match with a firm within the period. The value function for the beginning of the period is

$$U^{beg}_{d,t}(a) = U^{end}_{d,t}(a) + \theta_{s,t} q(\theta_{s,t}) \left(1 - \Phi\Big(\frac{a - s^*_{d,t}}{\sigma_d}\Big)\right) V_{d,t}(a) \big(V_{d,t}(a) - U^{end}_{d,t}(a)\big), \tag{A.12}$$

and the value function for the end of the period is

$$U^{end}_{d,t}(a) = b + \beta_{t,t+1} U^{beg}_{d,t+1} \tag{A.13}$$

The worker's surplus is thus

$$\begin{aligned} S^W_{d,t}(a) =& w_{d,t}(a) - b + \beta_{t,t+1}(1-\delta_d) S^W_{d,t+1}(a) \\ & - \beta(1-\delta_j)\theta_{s,t+1} q(\theta_{s,t+1}) \left(1 - \Phi\Big(\frac{a - s^*_{d,t+1}}{\sigma_d}\Big)\right) S^W_{d,t+1}(a). \end{aligned} \tag{A.14}$$

Defining $b_{d,t}(a)$ as the total flow value of the worker's outside option gives the result reported in equation (17),

$$b_{d,t}(a) = b + \beta(1-\delta_d)\theta_{s,t+1} q_{s,t+1}(\theta_{s,t+1}) \Big(1 - \Phi\Big(\frac{s^*_{d,t+1} - a}{\sigma_d}\Big)\Big) S^W_{d,t+1}(a).$$

. Using this notation, we can simplify the worker's surplus to be

$$S^W_{d,t}(a) = w_{d,t}(a) - b_{d,t}(a) + \beta_{t,t+1}(1-\delta_d) S^W_{d,t+1}(a) \tag{A.15}$$

Sharing rule The total surplus is

$$S_{d,t}(a) = \Xi_t Z_t a - b_{d,t}(a) + \beta_{t,t+1}(1-\delta_d) S_{d,t+1}(a) \tag{A.16}$$

The bargaining rule is such that the worker share is determined by bargaining power ϕ,

$$S^W_{d,t}(a) = \phi S_{d,t}(a) \tag{A.17}$$

Expanding both sides of this equation, we get

$$w_{d,t}(a) - b_{d,t}(a) + \beta_{t,t+1}(1-\delta_d) S^W_{d,t+1}(a) = \phi\Big(\Xi_t Z_t a - b_{d,t}(a)\Big) + \phi \beta_{t,t+1}(1-\delta_d) S_{d,t+1}(a),$$

which can be rearranged to get the wage,

$$w_{d,t}(a) = \phi \Xi_t Z_t a + (1 - \phi) b_{d,t}(a). \tag{A.18}$$

This is the wage reported in the main text.