An empirical evaluation of H-1B visa policies

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Abstract

The H-1B visa allows U.S. firms to hire foreign workers, subject to restrictions that make these workers more expensive to hire. This study uses a laboratory experiment to examine how two key restrictions of the H-1B visa policy affect economic outcomes. Specifically, we examine how visa fees and minimum wage requirements affect worker effort, market output, and the distribution of welfare between citizens and immigrants. We implement a 2×2 labor market simulation, with treatments that include a visa fee, a minimum wage, both, or neither. We find, perhaps counterintuitively, that a visa fee results in higher productivity, longer tenures, and greater combined surplus of the firm and the worker. This result is driven by a behavioral response: because the fee is waived when a contract is renewed, firms hold on to their foreign workers, and foreign workers work harder to keep their jobs. The minimum wage, by contrast, raises the wages of foreign workers without lengthening their tenures. As expected, both restrictions increases employment of domestic workers. Foreign workers are unemployed more often, but the ones who do get employed earn more. Finally, we discuss how policymakers can leverage these behavioral responses to design more efficient immigration policies.

JEL Codes: C91; C92; F22; J61; K37
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1 Introduction

The H-1B visa program is the primary channel through which U.S. employers hire high-skilled foreign workers. More than half a million foreign workers are employed in the United States on H-1B visas.[1] In recent years, U.S. immigration policy has increasingly focused on reducing the demand for foreign labor by making it more costly for firms to hire foreign workers. Supporters of these policies argue that they protect the jobs (Bound et al., 2018; Doran et al., 2022) and wages (Borjas, 2009) of domestic workers. Critics contend that they discourage innovation (Kerr and Lincoln, 2010), push work offshore (Glennon, 2024), and reduce overall productivity (Peri et al., 2015). Yet the economic consequences of these demand-side restrictions remain poorly understood. In particular, we know little about how they change the behavior of firms, the outcomes of foreign and domestic workers, and the efficiency of the market as a whole.

This paper examines the economic consequences of two restrictions in the H-1B visa program: a one-time visa fee and a minimum wage for foreign workers. In practice, employers incur significant costs to obtain employment authorization for foreign workers. In addition to direct processing fees, these include long waiting periods, legal fees for immigration attorneys, and uncertainty about whether a petition will be approved.[2] Moreover, foreign workers must be paid at least the *prevailing wage*, which is determined and regularly updated by the U.S. Department of Labor.[3]

We study these restrictions through a laboratory experiment that simulates the interaction of firms and workers in a labor market. We use a 2×2 experimental design in which a visa fee and a minimum wage for foreign workers are either present or absent across treatments. A laboratory experiment allows us to switch each restriction on or off while holding everything else fixed. This ceteris paribus comparison is nearly impossible to obtain using field data, because policies seldom change in isolation. The empirical literature on the H-1B program mostly studies the effects of the annual cap on the number of visas (Kerr and Lincoln, 2010; Peri et al., 2015; Mayda et al., 2018) and of using a lottery for additional applications (Doran et al., 2022; Dimmock et al., 2022). While these studies identify the effect of admitting foreign workers, they do not examine the effect of making them more expensive to hire. To our knowledge, our study is the first to examine this question.

Our experimental design extends the labor market experiment of Brown et al. (2004) to include foreign workers. Each session comprises six firms, four domestic workers, and four foreign workers, who interact in a 14-player labor market for 15 periods. A firm can hire at most one worker, so there are always two more workers than jobs. Each period has three phases: a hiring phase, a working phase, and a renewal phase. In the hiring phase, firms post jobs on a live job board by specifying a wage and their willingness to sponsor a visa. Workers accept jobs posted on the job board. The only difference between the two types of workers

[1] U.S. Citizenship and Immigration Services estimated this population at about 583,000 as of September 2019 (`https://www.uscis.gov/sites/default/files/document/reports/USCIS%20H-1B%20Authorized%20to%20Work%20Report.pdf`). However, the program's contribution to the U.S. labor force is larger than this number suggests, because many H-1B workers transition to permanent residence each year and no longer appear in this count.

[2] Legal and government fees for an initial H-1B petition and one extension can cost an employer up to $34,900 (National Foundation for American Policy, `https://nfap.com/wp-content/uploads/2025/03/H-1B-Is-The-Most-Restrictive-Visa.NFAP-Policy-Brief.2025.pdf`). In August 2026, the Department of Homeland Security proposed an additional fee of $103,265 for each H-1B petition subject to the annual cap (Federal Register, `https://www.federalregister.gov/documents/2026/08/25/2026-17324/fee-for-certain-h-1b-petitions`).

[3] The prevailing wage varies with occupation, location, and experience. For computer-related occupations, where about two-thirds of H-1B workers are hired (Congressional Research Service, `https://www.congress.gov/crs_external_products/IF/PDF/IF12912/IF12912.2.pdf`), the prevailing wage is well above the average U.S. wage. For example, the current entry-level prevailing wage for software developers in the San Francisco area is $137,093 (OFLC wage data, `https://flag.dol.gov/wage-data/wage-search`), almost twice the average annual wage of $69,770 across all U.S. occupations (Bureau of Labor Statistics, `https://www.bls.gov/news.release/ocwage.t01.htm`).

is that foreign workers can only accept jobs that offer visa sponsorship. In the working phase, each hired worker chooses how much effort to supply, which is costly to the worker but beneficial for the firm. In the renewal phase, the firm and the worker each decide whether to renew their contract. If both agree, they are automatically rematched at the same wage and skip the next period's hiring phase. The four treatments differ only in the restrictions placed on foreign workers. In the *Baseline* treatment, visa sponsorship is free, so firms have no reason to prefer domestic workers. In the *Visa Fee* treatment, firms pay a visa fee when they hire foreign workers from the job board, but the fee is waived for contract renewals. In the *Minimum Wage* treatment, foreign workers can only accept jobs that pay at least a minimum wage, which is slightly above the average wage in the *Baseline* treatment. The *Combined* treatment includes both a visa fee and a minimum wage for foreign workers.

We find, perhaps counterintuitively, that restrictions on hiring foreign workers raise total output. A visa fee acts much like a tax on hiring foreign workers, so one would normally expect it to reduce output and create a deadweight loss. Instead, the visa fee raises output by about 12 percent. These gains come entirely from foreign workers, who supply considerably higher effort and become more inclined to renew their contracts in the presence of a visa fee, a behavior driven by fear of not getting a job in the next hiring phase. Firms are also more likely to renew contracts with these hardworking foreign workers. This results in the average tenure of foreign workers being 68 percent higher with a visa fee than without one. The minimum wage also raises the effort of foreign workers, but through a different mechanism, namely reciprocity. Two patterns in our data support this explanation. First, the effect of the minimum wage on effort disappears once we control for the wage, so the higher wage accounts for all of it. Second, the effect persists in the final period, when there is no future job to protect and thus no threat of termination. By contrast, the effect of the visa fee shows the opposite pattern; it remains after we control for the wage and disappears in the final period, consistent with the notion of working hard out of fear of termination.

At the same time, visa restrictions affects which type of worker gets hired. Foreign workers are unemployed more often under both restrictions, because firms shift their hiring toward domestic workers. When the two restrictions are combined, a foreign worker is unemployed in 39 percent of periods, compared with 26 percent in the *Baseline* treatment. Foreign workers who do find a job earn more in each period they work, especially when a minimum wage is in place. However, their more frequent unemployment offsets this gain. As a result, the average income of a foreign worker, counting the periods in which he is unemployed, does not rise significantly under either restriction, and with a visa fee in place it stays almost exactly at its *Baseline* level. Domestic workers, in contrast, gain from the restrictions without changing their behavior. They get more of the jobs that foreign workers lose, and when both restrictions are in place, they also earn more in each period they work. Together, these two effects raise their average income by about a third.

These findings speak directly to the design of H-1B policy. An employer that sponsors an H-1B worker must pay him at least the prevailing wage for his occupation and location, and it must pay several fees when it files his petition.[4] These two requirements correspond to the minimum wage and the visa fee in our experiment. The correspondence also extends to when the costs are incurred. Much as in our experiment, the cost of sponsorship is highest when an employer hires a new H-1B worker. An employer that wants to hire a worker who does not already hold H-1B status must first win a place for him in the annual lottery, and some of the fees are charged when an employer hires a new worker but not when it extends the stay of the worker it already has. An H-1B worker who loses his job, in turn, has at most 60 days to find another

[4]The wage requirement is set out in section 212(n) of the Immigration and Nationality Act. In addition to the base filing fee, employers pay a training fee under the American Competitiveness and Workforce Improvement Act, a fraud prevention and detection fee, and, if they rely heavily on H-1B and L-1 workers, an additional fee under Public Law 114-113.

employer willing to sponsor him. Both features make separation costly for the employer and the worker, which our results suggest can tie H-1B workers to their employers and raise their effort. Employer fees of this kind are not unique to the United States; many countries charge employers substantial fees for each foreign worker they hire.[5] Despite the prevalence of these restrictions, our study is the first to provide controlled evidence on who bears their cost.

This paper contributes to two strands of literature. The first is the empirical literature on the H-1B program, which examines how the admission of foreign workers affects innovation (Kerr and Lincoln, 2010), productivity and wages (Peri et al., 2015), the employment of foreign-born workers (Mayda et al., 2018), and the outcomes of the firms that hire them (Doran et al., 2022; Dimmock et al., 2022). We complement this literature by studying the cost of hiring foreign workers, not the number admitted, and by tracing this cost across firms, foreign workers, and domestic workers. The second is the experimental literature on labor markets. In markets where firms cannot enforce the effort of their workers, this literature shows that workers reciprocate generous wages with higher effort (Fehr et al., 1993, 1998; Fehr and Falk, 1999), and that firms combine high wages with the threat of termination to sustain effort in long-term relations (Gächter and Falk, 2002; Brown et al., 2004, 2012). It also shows how labor market policies change behavior. A minimum wage raises workers' reservation wages by changing what they consider a fair wage (Falk et al., 2006), and it raises their average effort modestly by raising average wages (Owens and Kagel, 2010). Employment regulation, in turn, affects the duration of employment relationships and the efficiency of the market (Berninghaus et al., 2013). Our Baseline treatment reproduces the central patterns of this literature: firms share the gains from trade with their workers, renew the contracts of good performers, and terminate those of shirkers. In terms of subject matter, our paper is most akin to Falk et al. (2006) and Owens and Kagel (2010), who study a minimum wage that applies to all workers. What distinguishes this study is that the restrictions apply to only one type of worker, in a market where effort is sustained by long-term relations. This allows us to examine not only how the restrictions change behavior, but also who ends up paying for them.

[5]For example, the United Kingdom charges sponsoring employers an Immigration Skills Charge of up to £1,320 per worker for each year of sponsorship, Singapore charges employers a monthly levy of S$650 for each S Pass holder, and Saudi Arabia charges employers a monthly levy of up to SAR 800 for each foreign worker. All amounts are as of 2026. Unlike the fee in our experiment, some of these charges recur for as long as the worker is employed, so they raise the cost of keeping a foreign worker as well as the cost of hiring one.

2 Experimental Design

The ideal data for policy evaluation requires an exogenous ceteris paribus implementation of the policy along with a counterfactual. At least for visa policies, such a setting is impossible to find or create in the real world. However, a carefully designed lab experiment – where policies can be turned on or off across treatments and measurement and endogeneity problems are minimal – can serve as a useful alternative.

To study the effects of a one-time visa fee and a minimum wage on foreign workers, we develop a 2 × 2 design with treatments that include a fixed visa fee, a minimum wage, both, and neither. A comparison across these treatments gives us a clean and robust way to evaluate the effect of each visa restriction policy on various labor market outcomes, such as labor productivity, tenure length, and firm and worker welfare.

2.1 Implementation and Procedures

We conducted a total of 20 experimental sessions, five for each treatment. Each session consisted of 14 subjects, for a total recruitment of 280 subjects. All environmental features and experimental procedures were constant across sessions.

Each session started with an instruction period in which participants read instructions and answered some understanding questions.[6] When all questions were answered correctly, the instruction period ended and the paid experiment began. Subjects were randomly assigned the role of a firm, domestic worker, or foreign worker and kept that role for all 15 periods. Subjects were also assigned role-based IDs of the format *Firm* i, DWj, and FWj, where $i \in \{1, 2, 3, 4, 5, 6\}$ and $j \in \{1, 2, 3, 4\}$, and were known to others by these IDs. All experimental payoffs were represented in terms of "points" and paid in U.S. dollars at an exchange rate of 20 points to \$1. All subjects started with an endowment of 100 points and period earnings and losses were added to or subtracted from their running total. Complete feedback was provided after each period along with the current point balance. Each session took approximately one hour, and average participant earnings were \$25, inclusive of a \$7 show-up fee.

All sessions were conducted at Utah State University (USU) in April 2023 and the experiment was approved by the USU Institutional Review Board (Protocol # 13446). The experiment was programmed in oTree (Chen et al., 2016) and all interaction between subjects took place through computers. All subjects were USU students and were recruited using Sona Systems (www.sona-systems.com).

2.2 Baseline Game Description

Six firms and eight workers—four domestic and four foreign—participate in a labor market for 15 periods.[7] Each period consists of three phases: a hiring phase, a working phase, and a renewal phase.

In the hiring phase, firms post job offers to a live job board and workers accept posted jobs on a first-come-first-served basis. To post a job, firms need to specify three elements: wage (0–100 points), desired effort (1–10), and their willingness to sponsor a visa for foreign workers (see Figure 1). To accept a job, workers simply need to click an "accept" button next to the posted job. Workers observe all postings in real-time and can accept any available offer. The first worker to click the button gets the job. Each firm can hire at most one worker, and each worker can accept at most one job. Domestic workers can accept any job

[6] The complete instructions for the baseline treatment are provided in Appendix C.

[7] We keep an excess labor supply, following a standard practice in labor market and gift exchange experiments (Fehr et al., 1993; Fehr and Falk, 1999; Brown et al., 2004). To test this practice, Brown et al. (2012) implement a version with excess labor demand, and find that it does not affect the number or length of firm-worker relationships.

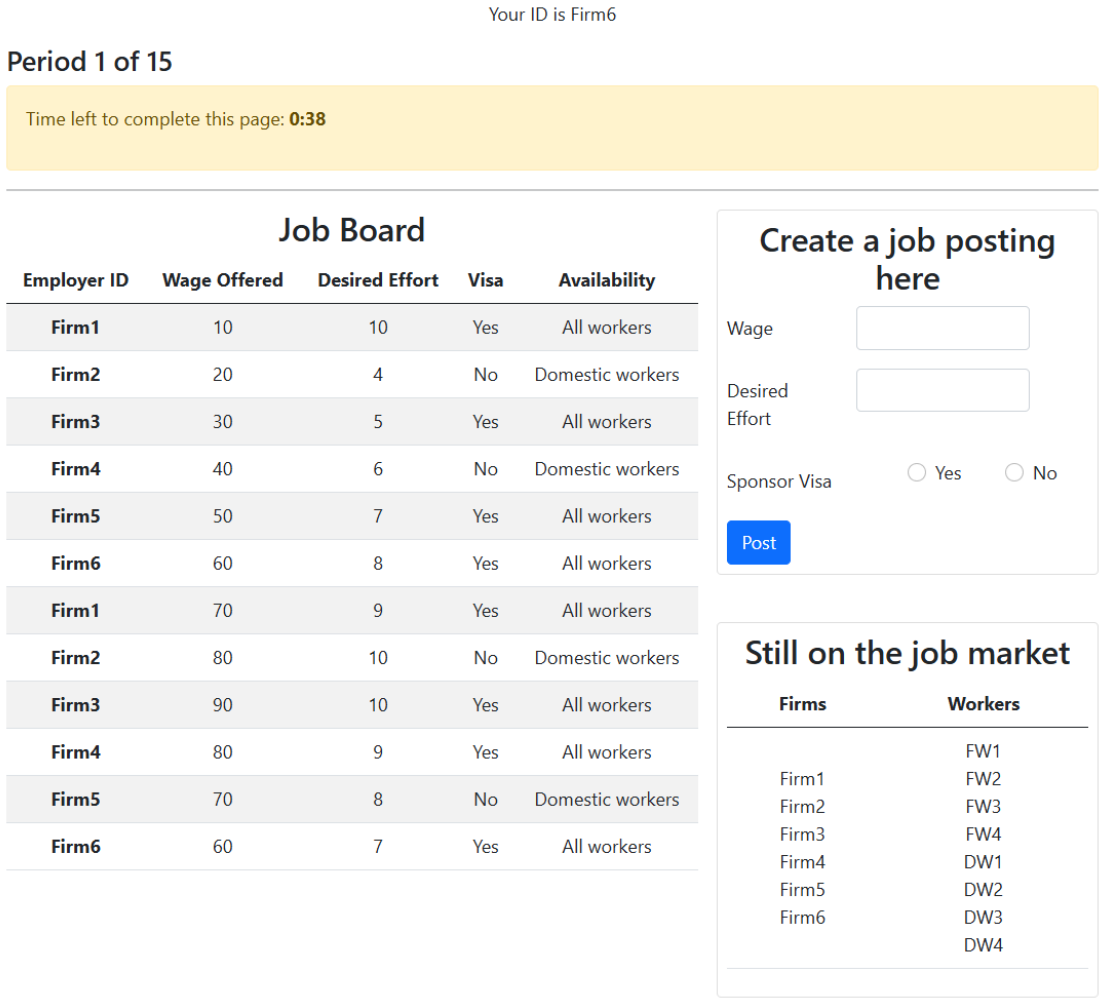


Figure 1. Screenshot of the hiring phase

This is the screen seen by firms in the hiring phase. Workers' interface does not include the box titled "Create a job posting here" but includes an "Accept" button next to each line in the job board.

whereas foreign workers can only accept jobs for which firms are willing to sponsor a visa. Given the excess supply of workers, this means that at least two workers remain unemployed in each period. The hiring phase has a time limit of 3 minutes, but can end sooner if all firms hire a worker. Workers who remain unemployed earn zero points, as do firms who fail to hire a worker.

In the working phase, workers who accepted jobs decide how much effort to put in. There are 10 effort levels to choose from, with higher effort being more costly for workers but also more profitable for firms. Workers are not obligated to choose the firm's desired effort mentioned in the job posting. The cost of effort is determined by the cost schedule shown in Table 1.

Effort	1	2	3	4	5	6	7	8	9	10
Cost (points)	0	1	2	4	6	8	10	12	15	18

Table 1. Workers' cost schedule

Firm and worker payoffs are $U_f = 10e - w$ and $U_w = w - c(e)$, respectively, where e is the effort chosen by

the worker, w is the wage offered in the job posting, and $c(e)$ is the cost of effort. Thus, each firm-worker pair creates a social surplus of $10e - c(e)$, with wages determining how the surplus is divided between firms and workers. The efficient effort level is 10, generating a maximum surplus of 82 points. After workers submit their decisions, payoffs are calculated and shown to both parties, along with their earnings from previous periods and their running points balance (see Figure 2).

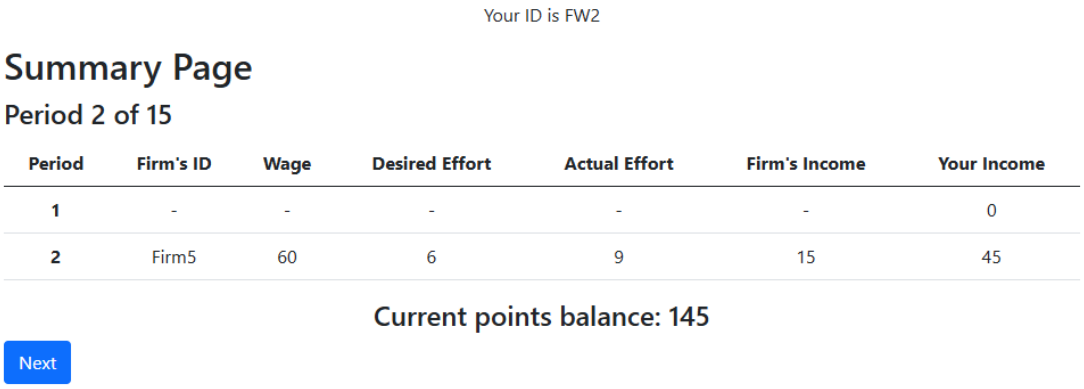


Figure 2. Screenshot of round feedback

In the renewal phase, which takes place after participants view this feedback, both parties are asked if they want to renew their current contract with the same partner for the next period (see Figure 3). If the firm and the worker both choose to renew, they are automatically re-matched in the next period, skipping the hiring phase entirely. Under the renewed contract in the following period, the wage and desired effort carry over from the current contract, but workers may choose a different effort level. This is in contrast to some labor market experiments where firms may propose a wage adjustment for the renewed contract.[8] In our experiment, if a firm-worker pair wants to renew with different terms, the only way is for the firm to post a new job in the next hiring phase and hope the same worker is the first to accept it. There is no renewal phase in the 15th period, which is known to be the final period.

2.3 Treatment Design

We implemented four treatments in a between-subject design, which we refer to as *baseline*, *visa fee*, *minimum wage*, and *combined*. In the baseline treatment, the only difference between domestic and foreign workers is that foreign workers can only accept jobs for which firms are willing to sponsor a visa. However, a visa does not cost anything and firms have no reason to exclude foreign workers.

The visa fee treatment differs from the baseline in only one way: firms are charged a fee of 15 points for sponsoring a visa. This amount, which is about 18 percent of the maximum surplus of 82 points, is intended to create a meaningful disincentive without being prohibitive. Thus, a firm's payoff function in this treatment is $U_f = 10e - w - 15$ if a foreign worker accepts their job and $U_f = 10e - w$ if a domestic worker accepts their job. Firms who successfully renew their contract with a foreign worker are not charged a visa fee for the renewed period.

[8] For example, Berninghaus et al. (2013) renew firm-worker matches based on bilateral agreement (similar to our experiment) but allow the firm to propose different terms, which the worker accepts or rejects. Brown et al. (2004) do not have a renewal phase as such, but they give firms the ability to make private offers to workers during the hiring phase, effectively allowing them to renew a contract with a previous worker.

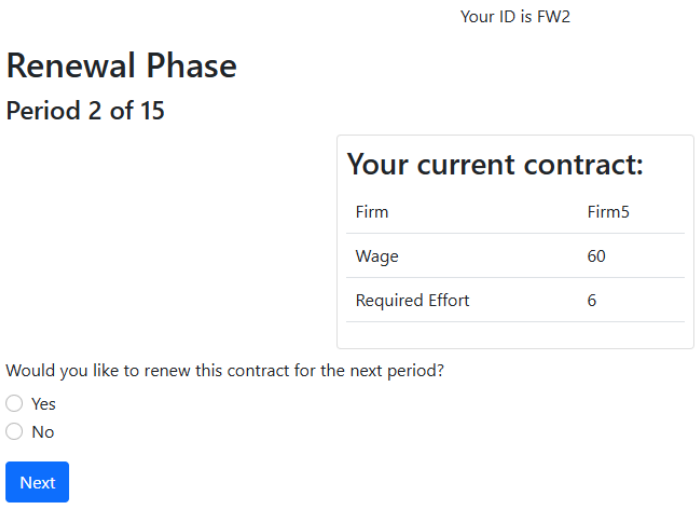


Figure 3. Screenshot of the renewal phase

In the minimum wage treatment, foreign workers can only accept jobs that pay at least 45 points. We use 45 points as a minimum wage because it was about the average wage in a pilot session we ran before the experiment. This is consistent with the H-1B visa policy, which requires employers to pay foreign workers at least the prevailing wage—which is defined as "the average wage paid to similarly employed workers" by the U.S. Department of Labor. As in the baseline treatment, visa sponsorship is costless.

The combined treatment completes the 2×2 design, including both a 15-point visa fee and a 45-point minimum wage for foreign workers. Thus, this treatment includes two additional features relative to the baseline treatment and one additional feature relative to each of the visa fee and minimum wage treatments. Table 2 summarizes these treatment differences.

Table 2. Treatment Names

	Min wage = 0	Min wage = 45
Visa fee = 0	Baseline	Min Wage
Visa fee = 15	Visa Fee	Combined

2.4 Hypotheses

We base our hypotheses on the incentives that each intervention creates for firms and workers, and on two regularities from earlier labor market experiments. First, workers respond to higher wages with higher effort, even when effort cannot be enforced (Fehr et al., 1993; Fehr and Falk, 1999). Second, when firms and workers can stay together, firms renew the contracts of workers who perform well and terminate those of workers who shirk, and workers supply more effort when they have more to lose from termination (Brown et al., 2004). We expect foreign and domestic workers to behave alike in the Baseline treatment, where visa sponsorship is free and firms have no reason to exclude foreign workers.

We begin with employment. Both interventions make a foreign worker more expensive to hire from the job board than a domestic worker. The visa fee adds 15 points to the cost of a new foreign hire, and the minimum wage rules out any contract that pays a foreign worker less than 45 points. Since the two types of

workers are otherwise identical, we expect firms to shift their hiring toward domestic workers. A firm can do so by posting jobs without visa sponsorship or, under the minimum wage, by posting a wage below 45 points. There are always six jobs for eight workers, so every job that shifts to a domestic worker leaves one more foreign worker unemployed.

Hypothesis 1. *Relative to the Baseline treatment, each intervention lowers the employment rate of foreign workers and raises the employment rate of domestic workers. Under the visa fee, fewer job postings offer visa sponsorship.*

The minimum wage should also raise the wages of foreign workers. The floor of 45 points is slightly above the average wage in the Baseline treatment, so it rules out a large share of the contracts that firms would otherwise offer. The effect of the visa fee on wages is harder to predict. Standard incidence reasoning suggests that a firm paying the fee will try to recover it by offering foreign workers a lower wage. However, workers in these markets respond to low wages with low effort, so a wage cut is costly for the firm. We therefore state no directional hypothesis for the visa fee and treat its effect on wages as an empirical question.

Hypothesis 2. *Relative to the Baseline treatment, the minimum wage raises the wages of foreign workers.*

The two interventions treat a renewed contract differently. The visa fee is due when a firm hires a foreign worker from the job board and is waived when the firm renews its current foreign worker. Keeping a foreign worker is therefore 15 points cheaper than hiring another one. The firm could avoid the fee by hiring a domestic worker instead, but there are only four domestic workers for six firms, so a firm that lets a foreign worker go will often find only foreign workers left on the market. The foreign worker has a reason of his own to renew. If sponsored postings become scarce (Hypothesis 1), a foreign worker who leaves his firm will have a harder time finding another job. The minimum wage, in contrast, applies to new and renewed contracts alike, so it leaves the firm's renewal decision unchanged. A foreign worker may be more willing to renew under the minimum wage, since his job pays more and is harder to replace, but a contract is renewed only if the firm also agrees. Neither intervention changes the renewal incentives in a domestic match.

Hypothesis 3. *Relative to the Baseline treatment, the visa fee raises the renewal rate and the tenure length of foreign matches. The minimum wage does not.*

We expect both interventions to raise the effort of foreign workers, through different channels. Under the visa fee, a foreign worker has more to lose from termination. His job is harder to replace (Hypothesis 1), and it is likely to last longer if he performs well (Hypothesis 3). Since workers supply more effort when termination is more costly to them, the visa fee should raise the effort of foreign workers even at an unchanged wage. This channel operates only while a contract can still be renewed, so it should be absent in the final period. Under the minimum wage, foreign workers are paid more (Hypothesis 2), and workers respond to higher wages with higher effort. Earlier evidence suggests that this response is modest, because workers who are paid close to a wage floor supply less effort than they would at the same wage without one (Owens and Kagel, 2010). The minimum wage also makes a foreign worker's job harder to replace, but it does not make a well-performing worker any more likely to be retained, so we expect the wage to be its main channel. This difference gives us a way to tell the two interventions apart. The effect of the minimum wage on effort should shrink once we account for the wage, whereas the effect of the visa fee should remain.

Domestic workers are not subject to either intervention, so we do not expect their effort to rise. If anything it may fall, since domestic workers face less competition for jobs when firms shift away from foreign workers, which weakens the threat of termination for them.

Hypothesis 4. *Relative to the Baseline treatment,*

(a) the visa fee raises the effort of foreign workers, and the increase remains after controlling for the wage and is absent in the final period;

(b) the minimum wage raises the effort of foreign workers, and the increase is accounted for by the higher wage;

(c) neither intervention raises the effort of domestic workers.

The Combined treatment applies both interventions at once. The fee acts on the cost of replacing a worker and the floor acts on the wage, and neither undoes the other. We therefore expect Hypotheses 1 to 4 to hold in the Combined treatment as well, with the employment of foreign workers at its lowest and their effort at least as high as under either intervention alone.

These hypotheses do not tell us who bears the cost of the interventions, a question we take up in Section 3.6. They do carry one implication for it. If the visa fee raises renewal rates (Hypothesis 3), the fee is paid only when a foreign match is formed and not while it lasts, so the amount that firms actually pay may be small. The cost would then fall mainly on foreign workers, who supply more effort to keep their jobs and find fewer jobs to begin with. We have no prediction for whether higher wages compensate them for these costs.

3 Results

Since the treatments differ only in the interventions in place and subject assignment is random, any observed differences across them can be attributed to the interventions. We evaluate these effects on various labor market outcomes, such as effort supplied, tenure length and renewal rates, unemployment by worker type, and welfare of firms and workers.

3.1 Data

Our final data consist of 1,792 firm-worker matches.[9] We call a match foreign or domestic depending on the type of worker a firm is matched with. We use individual matches as the unit of observation in regression analysis, with standard errors clustered at the session level. We also compare treatment means using Mann-Whitney tests with session-level averages as the unit of observation; while this is a more conservative approach, it provides only five observations per treatment. Because our design crosses the two interventions, we also estimate the average effect of each intervention from all 20 sessions. For each outcome, we regress the session-level average on an indicator for the visa fee, an indicator for the minimum wage, and their interaction (Appendix Table 7).

Table 3 provides mean values of the main variables in each treatment, separately for foreign and domestic matches. As expected, foreign workers get fewer jobs under both interventions. For example, while both types get approximately an equal share of jobs in the Baseline treatment, foreign workers get only 41 percent of the jobs in the Combined treatment. Alternatively, foreign workers' employment rate falls from 74 percent in the Baseline treatment to 61 percent in the Combined treatment. However, the foreign workers who do get matched in the other three treatments get higher wages than their domestic counterparts, with the largest difference in the Minimum Wage treatment.

The largest differences between foreign and domestic workers are in effort and renewal rates. Foreign workers provide substantially higher effort in all three treatments with an intervention than in the Baseline treatment. For example, relative to the Baseline treatment, the average foreign worker provides 32 percent higher effort in the Combined treatment while the average domestic worker provides only 11 percent more effort. In treatments with a visa fee, foreign matches are also renewed far more often, increasing from 55 percent in the Baseline treatment to 85 percent in the Visa Fee treatment. For domestic workers, the increase is more modest, from 48 percent to 57 percent for the same two treatments. Much of this gap comes from the workers themselves, since foreign workers seek to renew their contract in nearly every match once a visa fee is in place.

Table 4 reports pairwise comparisons of these outcomes against the Baseline treatment, which we draw on throughout this section.

3.2 Effects on Employment

Both interventions make foreign workers more expensive to hire from the job board. The visa fee adds 15 points to the cost of a new foreign hire, and the minimum wage forces firms to offer foreign workers at least 45 points. We therefore expect firms to shift their hiring toward domestic workers (Hypothesis 1). Since

[9] Because there are 6 firms, there can be at most six matches in each period, or 1,800 total matches across all treatments. There were eight instances in our experiment, each in a different session, where a firm failed to match with a worker.

Table 3. Summary Statistics

	Baseline	Visa Fee	Min Wage	Combined
Foreign matches				
Wage	40.48	46.41	53.34	50.84
Effort	6.13	7.61	7.14	8.09
Firm renews	0.61	0.86	0.61	0.82
Worker renews	0.79	0.97	0.86	0.96
Mutual renewal	0.55	0.85	0.57	0.81
Tenure length	3.22	5.40	3.23	5.46
Worker's payoff	31.53	34.33	42.38	37.72
Firm's payoff	20.83	26.60	18.09	26.40
Number of matches	223	205	196	184
Domestic matches				
Wage	42.51	42.92	45.66	49.17
Effort	6.13	6.25	6.09	6.80
Firm renews	0.53	0.67	0.60	0.63
Worker renews	0.78	0.79	0.81	0.81
Mutual renewal	0.48	0.57	0.52	0.56
Tenure length	2.70	3.55	3.07	3.29
Worker's payoff	33.59	33.55	36.61	38.78
Firm's payoff	18.76	19.54	15.27	18.81
Number of matches	227	242	251	264

Notes: This table reports average values per match. These are calculated by first taking the average across all matches within a session, then taking the mean of the five session-level averages for each treatment. The only exception is *Number of matches*, which shows the total matches in each treatment. Renewal rates show the fraction of matches in which a firm, worker, or both renew. *Tenure length* is the number of consecutive periods the firm and the worker have been together, counting the current period. Tenure begins when a firm and a worker are matched in the hiring phase and lasts for as long as the contract is renewed; however, if the same pair gets matched later through the hiring phase, it counts as a new relationship.

Table 4. Pairwise Comparisons against Baseline

	Visa Fee		Min Wage		Combined	
	Diff.	p-value	Diff.	p-value	Diff.	p-value
Foreign matches						
Wage	+5.93	0.095	+12.85	0.012	+10.36	0.008
Effort	+1.48	0.008	+1.01	0.151	+1.96	0.008
Mutual renewal	+0.30	0.008	+0.01	1.000	+0.26	0.032
Tenure length	+2.18	0.008	+0.01	0.841	+2.23	0.095
Employment rate	−6.00	0.462	−9.00	0.093	−13.00	0.045
Surplus per match	+8.58	0.056	+8.11	0.151	+11.76	0.032
Per-capita income	−0.24	0.675	+4.17	0.142	−0.36	1.000
Domestic matches						
Wage	+0.40	0.841	+3.14	0.548	+6.66	0.310
Effort	+0.12	1.000	−0.03	1.000	+0.67	0.548
Mutual renewal	+0.09	0.421	+0.04	0.841	+0.08	0.421
Tenure length	+0.86	0.151	+0.38	0.548	+0.59	0.841
Employment rate	+5.00	0.528	+8.00	0.093	+12.33	0.059
Surplus per match	+0.73	1.000	−0.47	1.000	+5.23	0.548
Per-capita income	+1.84	1.000	+4.99	0.222	+8.64	0.032

Notes: Each entry reports the difference between the treatment mean and the Baseline mean, along with the p-value of a two-tailed Mann-Whitney test using session-level averages as the unit of observation (five observations per treatment). Employment rates are in percentage points; all other outcomes are in the units reported in Table 3. Surplus per match is the sum of the firm's and the worker's payoff. Per-capita income is the total income of a worker type divided by the number of workers of that type (four) and the number of periods (fifteen), so it counts unemployed periods as zero income.

nearly all six jobs are filled in every period, any such shift shows up one-for-one as higher unemployment among foreign workers.

The employment rate of foreign workers falls from 74 percent in the Baseline treatment to 68 percent in the Visa Fee treatment ($p = 0.462$), 65 percent in the Minimum Wage treatment ($p = 0.093$), and 61 percent in the Combined treatment ($p = 0.045$), while the employment rate of domestic workers rises from 76 percent in the Baseline treatment to 88 percent in the Combined treatment. Because nearly all six jobs are filled in every period, these two movements mirror each other and should not be read as independent pieces of evidence. In the Combined treatment, a foreign worker is unemployed in 39 percent of periods, more than three times as often as a domestic worker (12 percent). The regressions that use all 20 sessions show that the minimum wage lowers the employment rate of foreign workers by 8 percentage points ($p = 0.034$). The visa fee lowers it by 5 percentage points, but this effect is not significant ($p = 0.168$). Hypothesis 1 is thus supported for the minimum wage and only in direction for the visa fee.

Firms restrict foreign workers' access to jobs when they post them. A job is open to foreign workers only if the firm offers visa sponsorship, and sponsorship becomes much less common when it carries a fee. Among the jobs accepted by domestic workers, the share that had offered sponsorship falls from 66 percent in the Baseline treatment to 19 percent in the Visa Fee treatment ($p = 0.056$) and 21 percent in the Combined treatment ($p = 0.032$), while it is 50 percent in the Minimum Wage treatment ($p = 0.548$).[10] Without a fee, most firms sponsor visas by default and let the two worker types compete for the same postings, whereas

[10]We use jobs accepted by domestic workers to measure openness because jobs accepted by foreign workers offer sponsorship by construction. The measure is based on accepted postings, and acceptance is selective. The selection, however, works against our finding. When fewer foreign workers are hired, more sponsoring postings remain available for domestic workers to accept, which would raise the measured share.

with a fee most firms post jobs that only domestic workers can take. A foreign worker who loses his job therefore has fewer postings to choose from, a point we return to in Section 3.5.

3.3 Wages

Although foreign workers have access to fewer jobs, the ones who do get hired are paid more. The average wage in foreign matches rises from 40.48 in the Baseline treatment to 46.41 in the Visa Fee treatment ($p = 0.095$), 53.34 in the Minimum Wage treatment ($p = 0.012$), and 50.84 in the Combined treatment ($p = 0.008$). Wages in domestic matches do not differ significantly from their Baseline level in any treatment (all $p \geq 0.31$), although they are somewhat higher in the Combined treatment (49.17 versus 42.51). Across all 20 sessions, the minimum wage raises the wage in foreign matches by 8.6 points ($p < 0.001$), in line with Hypothesis 2. The effect of the visa fee depends on whether a wage floor is in place (interaction $p = 0.042$). The fee goes with wages that are 5.9 points higher when there is no floor and 2.5 points lower when there is one, and its average effect is not significant ($p = 0.381$).

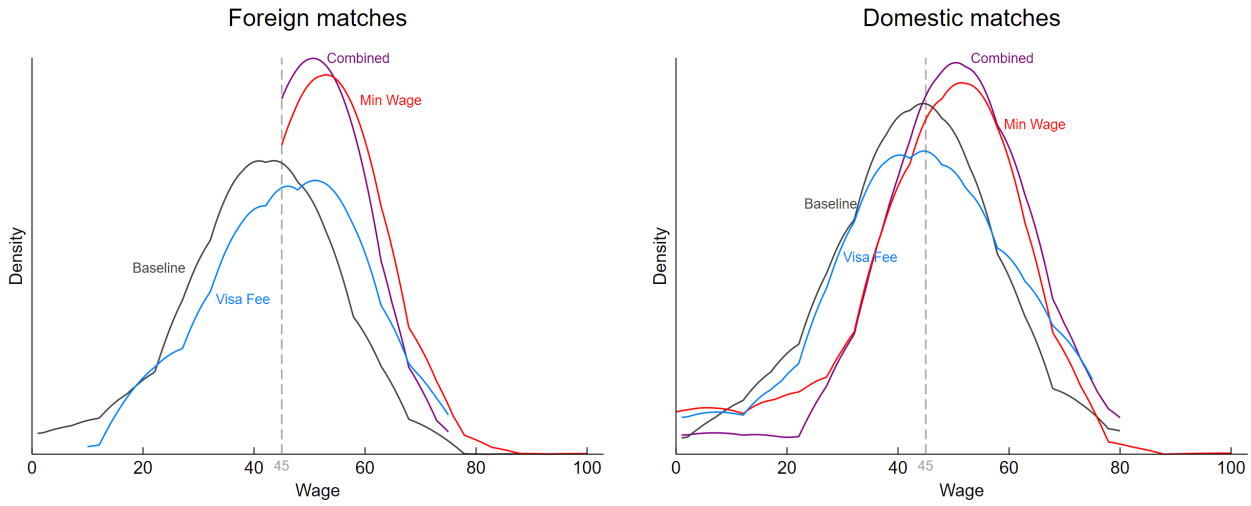


Figure 4. Distribution of Wages

Figure 4 shows the full wage distributions. The figure shows that the minimum wage binds. In the two treatments with a wage floor, the distribution of wages in foreign matches has no mass below 45, whereas the corresponding distribution for domestic matches extends well below it. The floor does not fully explain the higher wages, however, since the average wage in foreign matches exceeds it by 6 to 8 points in those treatments. In the Visa Fee treatment the distribution also shifts to the right without any legal floor, which suggests that firms choose to pay foreign workers more when they are costly to hire. This shift is only marginally significant, however, and it does not appear when the fee is added to a wage floor.

3.4 Effort

We expect the two interventions to raise the effort of foreign workers through different channels (Hypothesis 4). The visa fee works through the value of keeping the job. Renewal waives the fee, which gives firms a reason to retain their current foreign worker, so a foreign job is more likely to last. A job that lasts is worth more, and a foreign worker who loses it has a hard time finding another one. The threat of losing the job therefore disciplines foreign workers more strongly under the visa fee. The minimum wage works

through the wage itself. It forces firms to pay foreign workers at least 45 points, and workers who care about fairness reciprocate higher wages with higher effort. The wage gives us one way to tell the two channels apart. Reciprocity responds to the current wage, so the effect of the minimum wage should disappear once we control for the wage, whereas the effect of the visa fee should remain. The final period gives us another. Discipline depends on future employment, so the effect of the visa fee should disappear in period 15, whereas the effect of the minimum wage should remain.

The average effort of foreign workers is 6.13 in the Baseline treatment, 7.61 in the Visa Fee treatment, 7.14 in the Minimum Wage treatment, and 8.09 in the Combined treatment. The increases in the Visa Fee and Combined treatments are significant ($p = 0.008$ for both), while the increase in the Minimum Wage treatment is not significant at the session level ($p = 0.151$). The effort of domestic workers does not differ significantly across treatments, at 6.13, 6.25, 6.09, and 6.80, respectively (all $p > 0.5$). Foreign and domestic workers provide the same average effort in the Baseline treatment. The two worker types therefore do not differ inherently, and we attribute the effort differences in the other treatments to the interventions. Combining the two interventions produces the highest effort among foreign workers, but the increment over the visa fee alone is modest (8.09 versus 7.61, $p = 0.095$). Across all 20 sessions, the visa fee raises the effort of foreign workers by 1.22 units ($p = 0.001$) and the minimum wage raises it by 0.75 units ($p = 0.025$), with no significant interaction between the two ($p = 0.391$). Neither intervention affects the effort of domestic workers ($p = 0.379$ and $p = 0.577$).

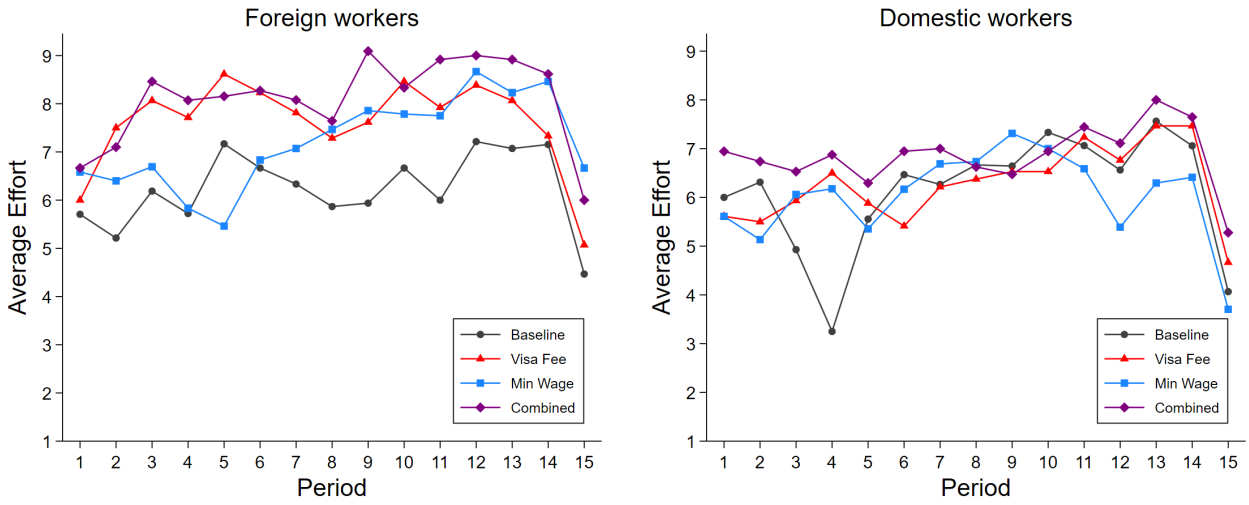


Figure 5. Average Effort Supplied

Figure 5 shows how these effort differences evolve over time. The effort of foreign workers separates from its Baseline level early and the gap persists in almost every period, while the effort of domestic workers follows a similar path in all four treatments. The figure also shows a drop in effort in the final period of every treatment. This drop is expected because there is no future employment to lose after period 15, so the threat of termination no longer disciplines workers.

A regression analysis, reported in Appendix Table 8, separates the two channels behind these effort differences. Without a wage control, the foreign worker interactions are large and significant for all three treatments, while none of the treatment dummies is significant. The interventions thus raised the effort of foreign workers and left the effort of domestic workers unchanged. Once we add the wage as a control, the interaction for the Minimum Wage treatment falls to -0.16 and is no longer significant, while the interactions

for the Visa Fee and Combined treatments remain at about 1.16 and significant. Because our data come from only 20 sessions, Appendix Table 10 also reports wild cluster bootstrap p-values for the OLS version of these regressions. This pattern supports Hypothesis 4. The minimum wage raises the effort of foreign workers only to the extent that it raises their wage, which is what we expect if they reciprocate the higher wage. The visa fee raises effort well beyond what the accompanying wages can explain, which is consistent with the disciplining channel.

The final period points in the same direction. In period 15, the average effort of foreign workers is 4.70 in the Baseline treatment and 4.92 in the Visa Fee treatment ($p = 1.000$), so the effect of the visa fee is gone once there is no contract left to renew. In the Minimum Wage treatment it is 6.80 ($p = 0.073$), close to the 7.18 that foreign workers provide in periods 1 to 14 of that treatment. Foreign workers who are paid more because of the wage floor keep working hard when they have no future employment to protect, as reciprocity predicts. In the Combined treatment, final-period effort is 5.90 ($p = 0.138$), which lies between the other two. A third specification in Appendix Table 8 uses data from the final period only, but the sample is small and the interactions are imprecisely estimated.

A possible concern is that these effort differences reflect which foreign workers stay employed. Because firms renew good performers (Section 3.5), the matches in the treatments with a visa fee increasingly come from successful, long-lasting relationships, so average effort could rise simply because the best foreign workers are retained. We therefore examine effort in the first period of each relationship, before any renewal decision has taken place. The same pattern appears in these fresh matches. The effort of foreign workers is 4.68 in the Baseline treatment, compared with 6.79 in the Visa Fee treatment ($p = 0.047$), 6.39 in the Minimum Wage treatment ($p = 0.222$), and 6.85 in the Combined treatment ($p = 0.056$), while the effort of domestic workers in fresh matches does not differ significantly across treatments (Appendix Table 13). Foreign workers work harder from the very first period of a relationship, which suggests that they respond to incentives and that selective retention does not drive the result.

Finally, the higher effort of foreign workers also brings them closer to what their firms ask for. In the Baseline treatment, the effort of foreign workers falls short of the desired effort by 1.59 units on average, whereas the shortfall is only 0.50 units in the Visa Fee treatment, though this difference is not statistically significant ($p = 0.151$).

3.5 Contract renewal

We now turn to the mechanism behind the effort results. We expect the visa fee to change the renewal incentives of both parties in a foreign match (Hypothesis 3). The firm's incentive comes from the fee waiver. Renewing the contract avoids paying the 15-point fee again, so a firm prefers to keep a well-performing foreign worker over an equally good foreign replacement from the job board. Only renewal avoids the fee, since hiring from the job board triggers it even if the firm re-hires its own previous worker. The worker's incentive comes from what he stands to lose. A foreign worker who loses his job can only accept postings that sponsor a visa, and such postings become scarce when sponsorship is costly (Section 3.2). The minimum wage gives the firm no such incentive because it applies whether a foreign worker is renewed or newly hired. It does reduce the number of postings that a foreign worker can accept, since he cannot take a job that pays less than 45 points.

The mutual renewal rate in foreign matches rises from 55 percent in the Baseline treatment to 85 percent in the Visa Fee treatment ($p = 0.008$) and 81 percent in the Combined treatment ($p = 0.032$), while it is 57 percent in the Minimum Wage treatment ($p = 1.000$). Renewal rates in domestic matches do not differ

significantly from their Baseline level in any treatment (all $p \geq 0.42$). Because contracts are renewed more often, relationships last longer. The average tenure length in foreign matches rises from 3.22 periods in the Baseline treatment to 5.40 in the Visa Fee treatment ($p = 0.008$) and 5.46 in the Combined treatment ($p = 0.095$), while it is 3.23 in the Minimum Wage treatment ($p = 0.841$). Across all 20 sessions, the visa fee raises the mutual renewal rate in foreign matches by 27 percentage points ($p = 0.003$) and their tenure length by 2.2 periods ($p = 0.006$), while the effects of the minimum wage are close to zero ($p = 0.858$ and $p = 0.967$).

Both sides of the market contribute to the higher renewal rates. In foreign matches, the share of firms choosing to renew rises from 61 percent in the Baseline treatment to 86 percent in the Visa Fee treatment and 82 percent in the Combined treatment ($p = 0.012$ and $p = 0.036$), and the share of foreign workers choosing to renew rises from 79 to 97 and 96 percent ($p = 0.012$ and $p = 0.036$). Under the visa fee, foreign workers almost always choose to renew. In the Minimum Wage treatment, 61 percent of firms and 86 percent of foreign workers choose to renew, and neither share differs significantly from its Baseline level ($p = 0.834$ and $p = 0.310$). This pattern is in line with Hypothesis 3. The fee waiver gives the firm a reason to stay in the relationship, and the poor re-employment prospects give the worker one.

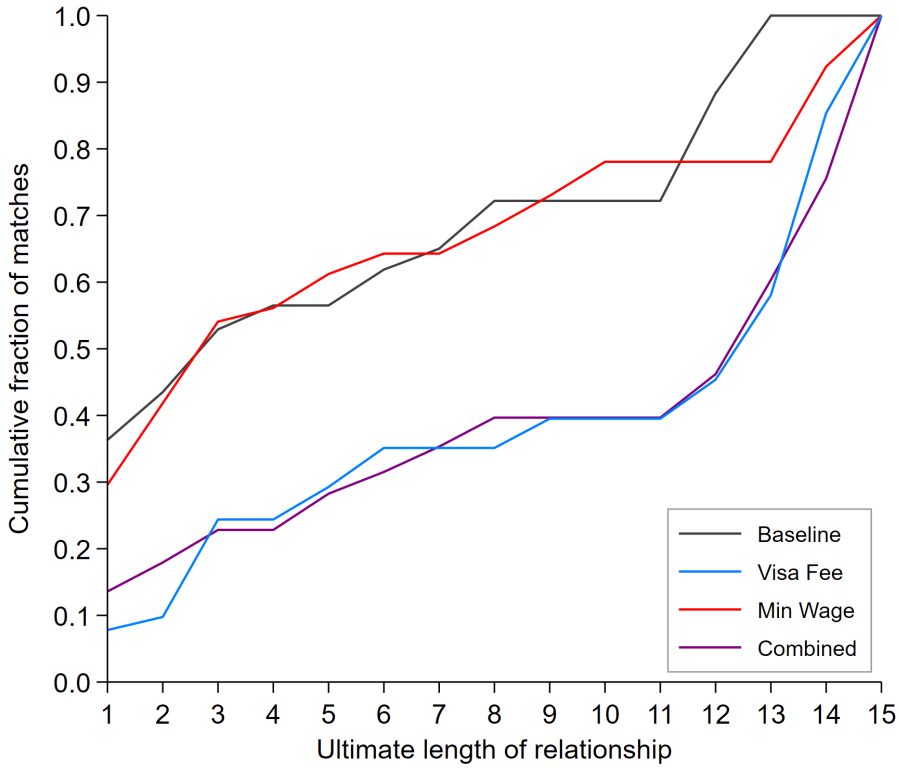


Figure 6. CDF of foreign matches.

Figure 6 shows how the visa fee changes the length of foreign workers' relationships. In the Baseline treatment, 36 percent of the matches with foreign workers take place in relationships that end after a single period, and 43 percent take place in relationships that ultimately last five or more periods. In the Visa Fee treatment, only 8 percent of these matches occur in single-period relationships, and 76 percent take place in relationships of five or more periods ($p = 0.016$).[11] Under the visa fee, most foreign workers therefore work

[11]The corresponding shares in the Combined treatment are 14 and 77 percent ($p = 0.032$), and in the Minimum Wage

in long-lasting relationships.

How do these long-term relationships discipline workers? Firms reward satisfactory effort with a new contract and punish unsatisfactory effort with termination. Figure 7 shows that firms in our experiment follow this rule closely. The probability that a firm renews the contract rises steeply with the worker's effort in the current period, from around 0.1 at the lowest effort levels to above 0.9 when the worker provides the maximum effort of 10. The gradient is similar in every treatment and for both worker types.

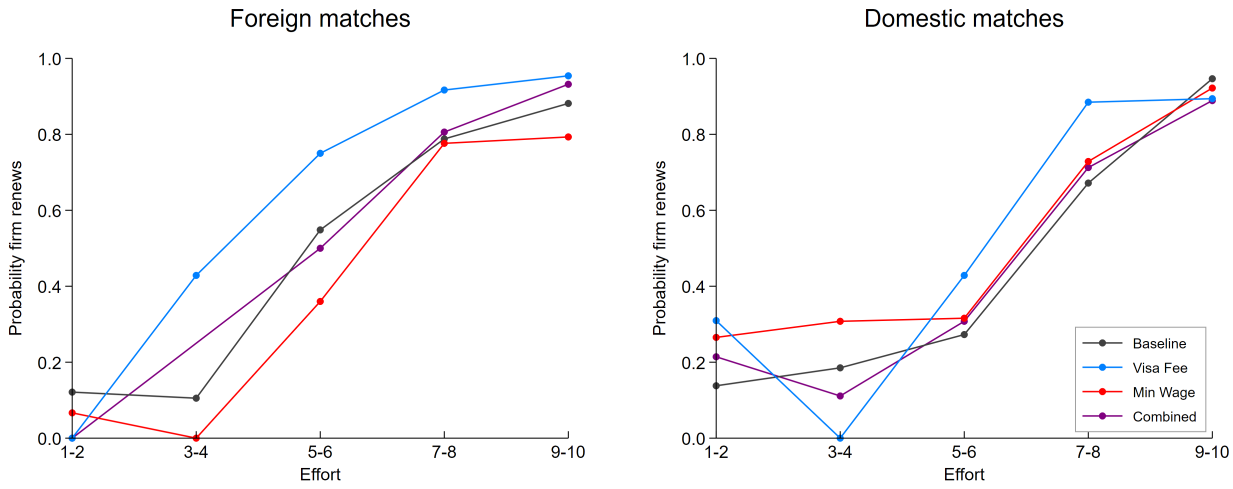


Figure 7. Probability of contract renewal by the firm.

A regression analysis, reported in Appendix Table 11, confirms that firms follow a policy of contingent renewal. Firms are significantly more likely to renew after higher effort and in longer relationships, and significantly less likely to renew when the worker falls short of the effort they expected. A second specification asks whether firms treat foreign and domestic workers differently within a treatment. Conditional on the worker's performance and tenure length, the foreign worker interactions are small and not significant in any treatment.[12] This specification includes session fixed effects, so it cannot compare firms under an intervention with firms in the Baseline treatment. We make that comparison next.

Table 5 compares across treatments what a worker stands to lose when his contract is not renewed. The first row shows how often a worker without a renewed contract is employed in the next period. For foreign workers, this probability falls from 0.55 in the Baseline treatment to 0.39 in the Visa Fee treatment ($p = 0.142$), 0.40 in the Minimum Wage treatment ($p = 0.095$), and 0.22 in the Combined treatment ($p = 0.008$). Both interventions make a foreign job harder to replace, and by a similar amount. Under the visa fee, firms stop offering sponsorship (Section 3.2). Under the minimum wage, many firms still offer sponsorship but post wages below 45 points, which foreign workers cannot accept. Only 42 percent of the jobs accepted by domestic workers in the Minimum Wage treatment were open to foreign workers, compared with 66 percent in the Baseline treatment ($p = 0.222$).

The two interventions differ in how firms behave. In the Visa Fee treatment, a firm renews a foreign worker who met its effort expectation 93 percent of the time, compared with 76 percent in the Baseline treatment ($p = 0.036$). It also renews a foreign worker who fell short of its expectation 60 percent of the

treatment 30 and 44 percent ($p = 1.000$).

[12] Tenure length is the result of earlier renewal decisions, so it could absorb part of a treatment difference. Excluding it does not change this result (Appendix Table 12).

Table 5. What Workers Stand to Lose from Non-Renewal

	Baseline	Visa Fee	Min Wage	Combined
Foreign workers				
Employed next period if contract not renewed	0.55	0.39	0.40	0.22
		(0.142)	(0.095)	(0.008)
Firm renews if worker met its effort expectation	0.76	0.93	0.70	0.92
		(0.036)	(0.834)	(0.093)
Firm renews if worker fell short of its expectation	0.24	0.60	0.25	0.55
		(0.056)	(0.905)	(0.095)
Total rent of an employed worker	59.1	124.6	96.5	186.9
		(0.548)	(0.222)	(0.016)
Domestic workers				
Employed next period if contract not renewed	0.63	0.63	0.70	0.77
		(0.675)	(0.142)	(0.094)
Firm renews if worker met its effort expectation	0.74	0.86	0.73	0.83
		(0.421)	(0.421)	(1.000)
Firm renews if worker fell short of its expectation	0.19	0.08	0.27	0.18
		(0.205)	(0.600)	(0.841)
Total rent of an employed worker	64.6	60.1	87.8	58.0
		(0.690)	(0.690)	(0.690)

Notes: All entries use periods 1 to 14 and are computed by first averaging within a session and then averaging across the five sessions of a treatment. Parentheses show p-values resulting from two-tailed Mann-Whitney tests comparing each treatment's mean to that of the Baseline treatment, using session-level averages as the unit of observation. The first row covers workers who are unemployed or whose contract was not renewed in the current period. A worker met the firm's effort expectation if his effort was at least as high as the effort the firm expected. The total rent in period t is the average income from period t to period 15 of workers who are employed in period t minus that of workers who are unemployed in period t, averaged over periods.

time, compared with 24 percent in the Baseline treatment ($p = 0.056$). The Combined treatment shows the same pattern, while the Minimum Wage treatment leaves both rates at their Baseline levels. Firms show no significant change toward domestic workers in any treatment. The fee waiver thus makes firms hold on to their foreign workers, and the minimum wage does not.

The greater tolerance for low effort under the visa fee weakens the threat of termination by itself. However, the job that a foreign worker protects is also worth more. The last row of Table 5 reports the total rent of an employed worker, measured as the difference between the income that employed and unemployed workers earn from the current period until the end of the experiment.[13] For foreign workers, the total rent is 59 points in the Baseline treatment, 125 in the Visa Fee treatment, 97 in the Minimum Wage treatment, and 187 in the Combined treatment. These figures vary widely across sessions and only the increase in the Combined treatment is significant ($p = 0.016$), so we read them as magnitudes.

3.6 Welfare

We begin by defining our welfare measures. We measure the surplus of a match as the sum of the firm's payoff and the worker's payoff, that is, the number of points the match creates for its two parties. Because the visa fee is deducted from the firm's payoff and paid to no one, the fee reduces surplus point for point whenever it is paid.[14] We measure the welfare of each worker type by per-capita income, which is the total

[13]This measure follows Table IV in Brown et al. (2004).

[14]Participants knew that the fee was simply subtracted and not paid to anyone. In the field, the fee would typically be government revenue, in which case surplus gross of the fee is the relevant measure. Gross of the fee, market surplus is 347.1 in the Visa Fee treatment ($p = 0.095$) and 370.4 in the Combined treatment ($p = 0.056$), so treating the fee as a transfer would

income earned by workers of a type in a session, divided by the number of such workers (four) and the number of periods (fifteen). Per-capita income accounts for unemployment because a worker without a job earns nothing in that period.

The higher effort documented above translates directly into surplus because each unit of effort generates 10 points for the firm while costing the worker at most 3 points. Table 6 reports the surplus and welfare measures by treatment. The surplus per foreign match rises from 52.36 in the Baseline treatment to 60.94 in the Visa Fee treatment ($p = 0.056$) and 64.12 in the Combined treatment ($p = 0.032$); in the Minimum Wage treatment it is 60.47 but the increase is not significant ($p = 0.151$). The surplus per domestic match, in line with the unchanged effort of domestic workers, does not differ from its Baseline level in any treatment (all $p > 0.5$). Across all 20 sessions, the surplus per foreign match rises by 6.1 points with the visa fee ($p = 0.031$) and by 5.6 points with the minimum wage ($p = 0.044$).

At the level of the whole market, the visa fee raises total output, but the gains in surplus are smaller. Total output, the sum of $10e$ over all matches in a period, rises from 370.8 in the *Baseline* treatment to 410.7 in the *Visa Fee* treatment ($p = 0.095$) and 439.7 in the *Combined* treatment ($p = 0.032$). Across all 20 sessions, the visa fee raises total output by 45.0 points per period ($p = 0.034$), while the minimum wage has no significant effect ($p = 0.236$). Market surplus per period also rises, from 316.6 in the *Baseline* treatment to 338.8 in the *Visa Fee* treatment ($p = 0.310$) and 361.5 in the *Combined* treatment ($p = 0.151$), but neither difference is significant. The market-level effect is smaller partly because foreign matches make up less than half of all matches and their share shrinks under the interventions, so the gains within foreign matches carry less weight in the market average. In addition, the visa fee removes 8 to 9 points per period from the market. Domestic workers play no role here, since their effort and their match surplus are unchanged. The remaining gap between the sizeable match-level gains and the insignificant market-level test reflects the variance across our five sessions per treatment.

Foreign workers do not capture any of the surplus they create. Their per-capita income is 23.47 in the Baseline treatment, 23.23 in the Visa Fee treatment, 27.63 in the Minimum Wage treatment, and 23.10 in the Combined treatment; none of these differences is significant (all $p \geq 0.14$), and neither intervention has a significant effect when we use all 20 sessions ($p = 0.130$ for the visa fee and $p = 0.195$ for the minimum wage). In the two treatments with a visa fee, per-capita income is within half a point of its Baseline level, which hides offsetting movements inside and outside the match. Inside the match, employed foreign workers earn more. Their wages are higher (Section 3.3), and although part of the increase is offset by the cost of the higher effort they provide, which rises from 9.0 points per match in the Baseline treatment to between 11.0 and 13.1 points in the other treatments, their payoff per match still rises from 31.53 in the Baseline treatment to 42.38 in the Minimum Wage treatment ($p = 0.008$) and 37.72 in the Combined treatment ($p = 0.016$). Outside the match, they are unemployed more often. In the Combined treatment the two movements offset each other almost fully. An employed foreign worker earns 6 points more per match than in the Baseline treatment, but he is unemployed in 39 percent of periods compared with 26 percent, and his per-capita income ends up within half a point of its Baseline level.

Domestic workers gain without changing their behavior. They are hired more often, and their wages are somewhat higher when the two interventions are combined. Their per-capita income rises from 25.55 in the Baseline treatment to 30.54 in the Minimum Wage treatment ($p = 0.222$) and 34.19 in the Combined treatment ($p = 0.032$), an increase of one third. Firms in foreign matches also appear to gain under the visa fee. Their payoff per match is 26.60 in the Visa Fee treatment and 26.40 in the Combined treatment,

strengthen the market-level comparisons below.

compared with 20.83 in the Baseline treatment, although these increases are not statistically significant ($p \geq 0.22$). Across all 20 sessions, the minimum wage raises the employment rate of domestic workers by 7.7 percentage points ($p = 0.039$) and their per-capita income by 5.9 points ($p = 0.067$).

The visa fee itself plays a small direct role, because firms largely avoid paying it. The fee is due only when a foreign worker is hired from the job board, and most foreign matches are renewed in the treatments with a visa fee. As a consequence, the fee is paid in only 21 percent of foreign matches in the Visa Fee treatment and 25 percent in the Combined treatment. Although firms formally pay the fee, their payoff in foreign matches is higher when the fee is in place. The burden of the visa fee falls on foreign workers, in the form of higher effort and more frequent unemployment.

Table 6. Surplus and Worker Welfare by Treatment

	Baseline	Visa Fee	Min Wage	Combined
Surplus per foreign match	52.36	60.94	60.47	64.12
		(0.056)	(0.151)	(0.032)
Surplus per domestic match	52.36	53.09	51.88	57.59
		(1.000)	(1.000)	(0.548)
Total output per period	370.8	410.7	389.6	439.7
		(0.095)	(1.000)	(0.032)
Market surplus per period	316.6	338.8	330.9	361.5
		(0.310)	(1.000)	(0.151)
Per-capita income, foreign workers	23.47	23.23	27.63	23.10
		(0.675)	(0.142)	(1.000)
Per-capita income, domestic workers	25.55	27.40	30.54	34.19
		(1.000)	(0.222)	(0.032)
Share of foreign matches paying the fee	–	0.21	–	0.25
Visa fees paid per period	–	8.4	–	9.0

Notes: Parentheses show p-values resulting from two-tailed Mann-Whitney tests comparing each treatment's mean to that of the Baseline treatment, using session-level averages as the unit of observation. The surplus of a match is the sum of the firm's and the worker's payoff; the visa fee, when paid, therefore reduces surplus. Total output is the sum of $10e$ over all matches in a period. Market surplus is the sum of surplus over all matches in a period. Per-capita income is the total income of a worker type divided by the number of workers of that type (four) and the number of periods (fifteen); it therefore counts unemployed periods as zero income. The fee is due only when a foreign worker is hired from the job board and is waived upon renewal.

4 Discussion

The goal of this study is to evaluate the effect of two policies that restrict the hiring of foreign workers, namely a visa sponsorship fee and a minimum wage that applies only to foreign workers. Specifically, we examine the effect of each policy on (i) which workers firms hire, (ii) the wages and effort within a match, (iii) the formation and duration of long-term employment relationships, and (iv) the welfare of firms and of each type of worker. Our Baseline treatment provides baseline values for each dependent variable that are used for comparison with the other treatments.

Our experiment shows that visa restrictions did not shrink the pie in our experimental labor market. They reorganized it. The visa fee turned foreign matches into long-lasting, high-effort relationships that create more surplus than any other matches in the market. Yet the workers who supply that additional effort end up exactly where they started, while the benefits flow to domestic workers, who work no harder, and to the firms that the fee was nominally meant to burden.

Our first main finding, that foreign workers supply substantially higher effort under both policies, arises through two different channels. The minimum wage raises effort only because it raises wages: once we control for the wage, its effect disappears entirely. The visa fee raises effort well beyond what wages can explain, which is consistent with the disciplining channel. The final-period results support this interpretation, since the disciplining effect of the fee vanishes when there is no future employment to lose.

Our second main finding concerns what happens to foreign workers outside the match. Both policies raise the price of foreign labor and reduce the quantity of foreign labor hired, so the foreign workers who do get hired earn more but face unemployment more often. These two movements almost exactly offset each other: per-capita income among foreign workers is statistically indistinguishable from Baseline in every policy treatment. The incidence of the policies therefore falls on foreign workers through higher effort and more frequent unemployment rather than on the firms that formally pay the fee, whose payoffs in foreign matches are, if anything, higher when the fee is in place.

An important limitation of our study is that the value of an outside option is determined entirely within the experimental market. A foreign worker who loses his job in our experiment can only be re-employed by one of the six firms in the same session, and only through a posting that offers sponsorship. In reality, a worker who loses visa sponsorship faces a far more consequential outside option, which may include leaving the country. Our design therefore likely understates the disciplining power of a sponsorship requirement, though it captures the direction of the effect.

Another limitation is the finite horizon. Our subjects knew that the experiment would end after period 15, which is why effort drops sharply in the final period across all treatments. Real employment relationships have no commonly known end date, so the endgame behavior we observe has no direct field counterpart. At the same time, the finite horizon is what allows us to test the disciplining channel cleanly, since the disappearance of the treatment effect in the final period is difficult to explain by anything other than continuation incentives.

Finally, our design holds the composition of the labor force fixed. There are always four foreign workers and four domestic workers, and neither the supply of foreign workers nor the number of firms responds to the policies. In the field, restrictions on hiring foreign workers change how many foreign workers seek employment in the first place, and may change how many firms enter. Future work could allow the number of foreign workers to respond to the policy environment, which would let the experiment speak to the selection margin as well as the effort and hiring margins we study here.

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Appendix

A Model of the Baseline Treatment

This appendix develops a theoretical model of the Baseline treatment. The model is a finitely repeated employment game between a firm and a worker, without foreign workers or policy interventions. We show how nonminimal effort can be sustained in a perfect Bayesian equilibrium, and we then compare the equilibrium with the behavior we observe in the Baseline treatment.

A.1 Setup

We analyze a game between a firm (F) and a worker (W), who interact for T periods. The pair is drawn at random from a labor market with an excess supply of labor. The worker is one of two types, *fair* with probability p and *selfish* with probability $1-p$. The worker knows his own type, while the firm knows only p. The two types differ only in how they evaluate payoffs. Let Π_W and Π_F denote the monetary payoffs of the worker and the firm. Conditional on being matched, the worker's utility is

$$U_W = \Pi_W - \alpha\,|\Pi_W - \Pi_F|,$$

where α defines the worker's type. The selfish type has $\alpha = 0$, and the fair type has $\alpha \in [\frac{1}{2}, 1)$. Thus, a selfish worker cares only about his own payoff, whereas a fair worker dislikes unequal outcomes in either direction.[15] Inequality aversion is resolved every period, so the worker compares his payoff with his firm's payoff in that period and not across periods.

Each period consists of three stages: a hiring stage, a working stage, and a renewal stage. In the hiring stage, the firm offers a wage $w \geq 0$ and the worker decides whether to accept it. Because labor is in excess supply, the firm fills its vacancy with certainty at any wage that some type of worker accepts. A worker, by contrast, succeeds in accepting an offer only with probability $\mu < 1$. With the remaining probability $1-\mu$, he remains unmatched and earns nothing that period.[16]

In the working stage, the worker chooses an effort level $e \in [1, \bar{e}]$, where $\bar{e}$ denotes maximal effort. Effort costs the worker $c(e)$, where $c'(e) > 0$, $c''(e) > 0$, and $c(1) = 0$. After the worker chooses his effort, the firm and the worker receive the payoffs

$$\Pi_F = \begin{cases} ve - w & \text{if matched} \\ 0 & \text{if unmatched,} \end{cases} \qquad \Pi_W = \begin{cases} w - c(e) & \text{if matched} \\ 0 & \text{if unmatched,} \end{cases}$$

where $v > 0$ is the firm's revenue from each unit of effort. We also assume $c'(\bar{e}) < v$, so the joint surplus of a match, $s(e) := ve - c(e)$, is increasing in effort and maximal effort is efficient. The firm is risk neutral and maximizes the expected sum of its per-period payoffs, without discounting. The worker likewise maximizes the expected sum of his per-period utilities. The firm observes the worker's effort, which may allow it to update its belief about the worker's type.

[15] This is a simplified version of the utility function of Fehr and Schmidt (1999), which allows different weights for favorable and unfavorable inequality.

[16] The probability μ captures the excess supply of workers, which means that some workers must remain unmatched.

In the renewal stage, the firm and the worker simultaneously decide whether to renew their contract for the next period. If both choose to renew, they skip the next period's hiring stage and are re-matched at the same wage. Neither party can propose a different wage through renewal. A firm that wants to change the wage must decline renewal and offer a new wage in the next hiring stage, where it may or may not be matched with the same worker. Whenever it posts a new wage, the firm is matched with a fair worker with probability p.[17]

A.2 Equilibrium

We solve the game by backward induction. We begin with period T, then turn to the renewal decision at the end of period $T-1$, and then to the effort threshold that this decision supports. The same threshold turns out to hold in every earlier period.

There is no renewal stage in period T, so the worker's effort choice is the last decision of the game. This choice depends on the worker's type. The selfish worker maximizes $\Pi_W = w - c(e)$, which is strictly decreasing in effort, so he chooses $e = 1$. The fair worker seeks to equalize Π_F and Π_W, which leads to the effort choice in Proposition 1.

Lemma 1. *Let $g(e) := ve + c(e)$. Then g is continuous and strictly increasing on $[1, \bar{e}]$, with $g(1) = v$. Hence g maps $[1, \bar{e}]$ onto $[v, g(\bar{e})]$ and admits an inverse g^{-1} on that range.*

Proof. Since $c'(e) > 0$, g is differentiable with $g'(e) = v + c'(e) > 0$, so g is continuous and strictly increasing. Moreover, $g(1) = v + c(1) = v$ because $c(1) = 0$. By the intermediate value theorem, g maps $[1, \bar{e}]$ onto $[v, g(\bar{e})]$, and strict monotonicity gives a well-defined inverse there. □

Proposition 1. *A fair worker supplies*

$$e^*(w) = \begin{cases} 1 & \text{if} \quad w < \frac{v}{2}, \\ g^{-1}(2w) & \text{if} \quad w \in \left[\frac{v}{2}, \frac{g(\bar{e})}{2}\right], \\ \bar{e} & \text{if} \quad w > \frac{g(\bar{e})}{2}. \end{cases}$$

Proof. Fix a wage w and let $\Delta(e) := \Pi_W - \Pi_F = 2w - c(e) - ve$ denote the payoff gap. Since $\Delta'(e) = -[v + c'(e)] < 0$, the gap is strictly decreasing in effort and changes sign at most once.

For $\Delta(e) > 0$, the fair worker's utility is $U_W = w - c(e) - \alpha\,[2w - c(e) - ve]$. Its derivative, $U_W'(e) = -c'(e) + \alpha\,[v + c'(e)]$, is positive whenever $c'(e) < \alpha v/(1-\alpha)$. This holds because $c'(e) \le c'(\bar{e}) < v \le \alpha v/(1-\alpha)$ for $\alpha \ge \frac{1}{2}$. For $\Delta(e) < 0$, the fair worker's utility is $U_W = w - c(e) - \alpha\,[c(e) + ve - 2w]$, so $U_W'(e) = -c'(e) - \alpha\,[v + c'(e)] < 0$. Utility therefore rises until the payoff gap closes and falls thereafter.

If $\Delta(1) \le 0$, that is, $w \le \frac{v}{2}$, utility is decreasing on the whole domain and $e^* = 1$. If $\Delta(\bar{e}) \ge 0$, that is, $w \ge \frac{1}{2}g(\bar{e})$, utility is increasing on the whole domain and $e^* = \bar{e}$. Otherwise, e^* is the unique root of Δ. Since $\Delta(e) = 0$ is equivalent to $g(e) = 2w$, that root is $g^{-1}(2w)$. □

Corollary 1. *$e^*(w)$ is continuous and nondecreasing for all $w \ge 0$. Additionally, on $\left(\frac{v}{2}, \frac{g(\bar{e})}{2}\right)$, $e^*(w)$ is*

[17] For simplicity, we assume that the share of fair workers among unmatched workers stays the same in every period. Allowing this share to evolve endogenously is outside the scope of this model.

strictly increasing and strictly concave, with

$$\frac{de^*}{dw} = \frac{2}{v + c'(e^*(w))} > 0 \qquad \textit{and} \qquad \frac{d^2e^*}{dw^2} = \frac{-4c''(e^*(w))}{\left[v + c'(e^*(w))\right]^3} < 0.$$

Proof. On the middle branch, differentiating $2w = ve + c(e)$ gives $de^*/dw = 2/[v + c'(e^*)] > 0$, and differentiating again gives $d^2e^*/dw^2 = -4c''(e^*)/[v + c'(e^*)]^3 < 0$, so e^* is strictly increasing and strictly concave there. Since g^{-1} is continuous on $[g(1), g(\bar{e})]$ and takes the value 1 at $w = \frac{v}{2}$ and $\bar{e}$ at $w = \frac{1}{2}g(\bar{e})$, the three branches agree at the two thresholds, so e^* is continuous. It is nondecreasing because it is constant outside $[\frac{v}{2}, \frac{1}{2}g(\bar{e})]$ and strictly increasing inside. □

Proposition 1 gives the fair worker's best response to the wage. If the wage is too low or too high, in particular $w < \frac{v}{2}$ or $w > \frac{g(\bar{e})}{2}$, the worker's problem has a corner solution, at $e^* = 1$ and $e^* = \bar{e}$ respectively. In the former case, the worker earns less than the firm even when he supplies minimal effort. In the latter case, he earns more than the firm even when he supplies maximal effort. For wages in between, the worker can choose an effort that equalizes the two payoffs.

Knowing how each type of worker will respond, the firm chooses a wage in the hiring stage to maximize its expected payoff,

$$\begin{aligned}\mathbb{E}\Pi_F(w) &= p\left[ve^*(w) - w\right] + (1-p)\left[v - w\right] \\ &= v + vp\left[e^*(w) - 1\right] - w.\end{aligned}$$

With a selfish worker choosing $e = 1$ and a fair worker choosing $e^*(w)$ as in Proposition 1, the firm's expected payoff is

$$\mathbb{E}\Pi_F(w) = \begin{cases} v - w & \text{if} \quad w < \frac{v}{2}, \\ v + vp\left[g^{-1}(2w) - 1\right] - w & \text{if} \quad w \in \left[\frac{v}{2}, \frac{g(\bar{e})}{2}\right], \\ v + vp\left[\bar{e} - 1\right] - w & \text{if} \quad w > \frac{g(\bar{e})}{2}. \end{cases}$$

For $w < \frac{v}{2}$ and $w > \frac{g(\bar{e})}{2}$, the firm's expected payoff is decreasing in w. Hence $w = 0$ yields a higher expected payoff than any other $w < \frac{v}{2}$, and $w = \frac{g(\bar{e})}{2}$ yields a higher expected payoff than any $w > \frac{g(\bar{e})}{2}$. On the middle domain, $w \in [\frac{v}{2}, \frac{g(\bar{e})}{2}]$, the firm's expected payoff is strictly concave by Corollary 1, and its derivative is

$$\frac{d\,\mathbb{E}\Pi_F}{dw} = \frac{2vp}{v + c'(e^*(w))} - 1.$$

The sign of this derivative at the two ends of the middle domain determines whether the maximum lies in its interior. At $w = \frac{v}{2}$, where a fair worker supplies $e^* = 1$, the derivative is positive if and only if $v(2p-1) > c'(1)$. At $w = \frac{g(\bar{e})}{2}$, where a fair worker supplies $e^* = \bar{e}$, the derivative is negative if and only if $v(2p-1) < c'(\bar{e})$. If both conditions hold, that is, $c'(1) < v(2p-1) < c'(\bar{e})$, the maximum lies in the interior and satisfies $v(2p-1) = c'(e^*(w))$. If instead $v(2p-1) \leq c'(1)$, $\mathbb{E}\Pi_F$ is decreasing over the entire middle domain and the maximum lies at the lower end, where a fair worker supplies $e^* = 1$. If $v(2p-1) \geq c'(\bar{e})$, $\mathbb{E}\Pi_F$ is increasing over the entire middle domain and the maximum lies at the upper end, where a fair worker supplies $e^* = \bar{e}$. Letting e_T denote the effort a fair worker supplies at the maximum of the middle domain,

we have

$$e_T := \begin{cases} 1 & \text{if} \quad v(2p-1) \le c'(1), \\ (c')^{-1}(v(2p-1)) & \text{if} \quad c'(1) < v(2p-1) < c'(\bar{e}), \\ \bar{e} & \text{if} \quad v(2p-1) \ge c'(\bar{e}). \end{cases}$$

The firm's problem therefore reduces to a comparison between two candidates, $w = 0$ and the maximum of the middle domain. On the middle domain, each wage induces a unique effort from a fair worker according to $e^* = g^{-1}(2w)$ (Proposition 1), which can be rewritten as $w = \frac{1}{2}g(e)$. We can interpret $w = \frac{1}{2}g(e)$ as the payoff-equalizing wage that induces effort e from a fair worker.

Substituting $w = \frac{1}{2}g(e)$ into the firm's expected payoff turns the choice of a wage into the choice of an effort level to induce. The firm earns half of the joint surplus, $\frac{1}{2}s(e)$, if it is matched with a fair worker, and $v - \frac{1}{2}g(e)$ if it is matched with a selfish worker. As a function of the induced effort $e \in [1, \bar{e}]$, the firm's expected payoff over the middle domain is

$$\begin{aligned} \mathbb{E}\Pi_F(e) &= p\,\tfrac{1}{2}s(e) + (1-p)\left[v - \tfrac{1}{2}g(e)\right] \\ &= v + vp\,(e-1) - \tfrac{1}{2}g(e). \end{aligned}$$

The firm's other candidate is $w = 0$, which yields v. We assume that $\frac{1}{2}s(\bar{e}) > v$, so half of the joint surplus at maximal effort exceeds what the firm earns from a worker who supplies minimal effort at a zero wage. Without this assumption, the equilibrium is trivial, with the firm always paying $w = 0$.

Lemma 2. *Let*

$$V(p) := \max_{e \in [1,\bar{e}]} \left\{ v + vp\,(e-1) - \tfrac{1}{2}g(e) \right\}.$$

Then

(i) the maximum is attained at e_T;

(ii) V is continuous, convex, and nondecreasing on $\left[\frac{1}{2}, 1\right]$, with $V'(p) = v\,(e_T - 1)$;

(iii) $V\left(\frac{1}{2}\right) = \frac{v}{2}$ and $V(1) = \frac{1}{2}s(\bar{e})$;

(iv) there is a unique $\tilde{p} \in \left(\frac{1}{2}, 1\right)$ satisfying $V(\tilde{p}) = v$.

Proof. Write $\phi(e, p) := v + vp\,(e-1) - \frac{1}{2}g(e)$, so that $\partial\phi/\partial e = vp - \frac{1}{2}\left[v + c'(e)\right]$, which is positive if and only if $c'(e) < v(2p-1)$. Since c' is strictly increasing, ϕ is strictly concave in e. Its maximizer on $[1, \bar{e}]$ is therefore 1 when $v(2p-1) \le c'(1)$ and $\bar{e}$ when $v(2p-1) \ge c'(\bar{e})$, and it otherwise solves $c'(e) = v(2p-1)$. This is the definition of e_T, which gives (i).

For (ii), $\phi(e, \cdot)$ is affine in p for each fixed e, so V is a pointwise maximum of affine functions and is therefore convex and continuous. The envelope theorem gives $V'(p) = \partial\phi/\partial p = v\,(e_T - 1) \ge 0$, so V is nondecreasing.

For (iii), at $p = \frac{1}{2}$ we have $v(2p-1) = 0 < c'(1)$, so $e_T = 1$ and $V\left(\frac{1}{2}\right) = v - \frac{1}{2}g(1) = \frac{v}{2}$ by Lemma 1. At $p = 1$ we have $v(2p-1) = v > c'(\bar{e})$, so $e_T = \bar{e}$ and $V(1) = v\bar{e} - \frac{1}{2}g(\bar{e}) = \frac{1}{2}s(\bar{e})$.

For (iv), $V\left(\frac{1}{2}\right) = \frac{v}{2} < v$ and $V(1) = \frac{1}{2}s(\bar{e}) > v$ by the maintained assumption, so continuity gives at least one root. Suppose there were two. Then V would be constant at v on the interval between them, so $V' = 0$ there, which means $e_T = 1$ and hence $V = \frac{v}{2}$ there by the computation in (iii). This contradicts $V = v$ because $v > 0$. Hence the root is unique and lies strictly between $\frac{1}{2}$ and 1. □

The function V records the best the firm can do while paying a wage that a fair worker reciprocates. Its argument is the share of fair workers, because that share determines how much of the wage bill comes back as effort. Part (iv) identifies the share at which the firm is exactly indifferent between paying such a wage and paying nothing, and we denote this share by $\tilde{p}$.

Proposition 2. *In period T the firm offers*

$$w_T^* = \begin{cases} 0 & \text{if} \quad p < \tilde{p}, \\ \frac{1}{2}g(e_T) & \text{if} \quad p > \tilde{p}, \end{cases}$$

and is indifferent between the two at $p = \tilde{p}$.

Proof. The firm's expected payoff is maximized either at $w = 0$, where it equals v, or at the maximum over the middle domain, which equals $V(p)$ and is attained at $w = \frac{1}{2}g(e_T)$. By Lemma 2, V is nondecreasing and $V(p) = v$ has the unique root $\tilde{p}$, so $V(p) < v$ for $p < \tilde{p}$ and $V(p) > v$ for $p > \tilde{p}$. □

The firm pays a positive wage only when enough workers are fair to make the payment worthwhile. Below $\tilde{p}$, the wage bill is too often wasted on a worker who returns minimal effort, so the firm pays nothing and accepts minimal effort from everyone. We write $w^* := \frac{1}{2}g(e_T)$ for the positive wage in the second case.

Corollary 2. *If $p > \tilde{p}$, then $e_T > 1$, and in period T a fair worker supplies e_T and earns $\frac{1}{2}s(e_T)$, while a selfish worker supplies 1 and earns $\frac{1}{2}g(e_T)$. Both amounts are strictly positive.*

Proof. If $e_T = 1$, then $V(p) = \frac{v}{2} < v$, which contradicts $p > \tilde{p}$. Hence $e_T > 1$. At $w^* = \frac{1}{2}g(e_T)$ we have $2w^* = g(e_T)$ with $e_T \in [1, \bar{e}]$, so w^* lies in the middle domain and Proposition 1 gives $e^*(w^*) = g^{-1}(g(e_T)) = e_T$. The fair worker then earns $w^* - c(e_T) = \frac{1}{2}g(e_T) - c(e_T) = \frac{1}{2}s(e_T)$, and the selfish worker supplies $e = 1$ and earns $w^* - c(1) = \frac{1}{2}g(e_T)$. Both amounts are strictly positive because s and g are increasing with $s(1) = g(1) = v > 0$. □

Corollary 3. *If $p < \tilde{p}$, then in period T every worker earns zero whether or not he is matched.*

Proof. By Proposition 2, $w_T^* = 0$. A matched worker then earns $-c(e)$, which both types maximize at $e = 1$, giving zero because $c(1) = 0$. An unmatched worker earns zero by definition. □

These two corollaries divide the analysis. When $p < \tilde{p}$, a worker gains nothing from holding a job in the final period, so the prospect of losing one disciplines nobody in period $T-1$. The same argument then applies in every earlier period, and the game unravels to minimal effort throughout. We therefore maintain $p > \tilde{p}$ for the rest of the analysis, which is the case in which the final period leaves something worth protecting.

We assume the firm posts w^* in every hiring stage. Proposition 2 fixes the wage in the final period, where the only thing a wage does is trade the wage bill against the effort a fair worker returns. In earlier periods, a wage does more than that, because renewal carries it forward, so a firm that wanted a different wage would have to break the match before period T to be rid of it. We therefore take the wage as given at w^* and do not derive it for earlier periods.

We now move back to the renewal stage at the end of period $T - 1$. Renewal continues the match at the standing wage, so the two parties decide whether to carry that wage into period T or return to the hiring stage.

Lemma 3. *Suppose a match enters the renewal stage of period $T-1$ at wage w^*. Both worker types strictly prefer renewal to declining it.*

Proof. A worker who renews is matched in period T at w^* with certainty. A worker who declines enters the hiring stage of the next period, where the wage is w^*, and is matched with probability μ. His expected utility is therefore at most μ times the utility of a match lasting as long as the one he declined. This is strictly smaller because $\mu < 1$ and that utility is strictly positive for both types by Corollary 2. The same comparison applies in any period, since declining never matches him sooner than renewing would. □

A worker who renews is employed in period T with certainty, whereas one who returns to the hiring stage is employed only with probability μ. Since a job in period T is worth something to both types by Corollary 2, both prefer to keep the one they have.

Proposition 3. *Consider a firm that holds a standing wage w and believes its worker is fair with probability p. At the renewal stage of period $T-1$, the firm declines renewal whenever $w \neq w^*$ and is indifferent when $w = w^*$.*

Proof. Renewing at w gives the firm $\mathbb{E}\Pi_F(w)$ evaluated at the belief p. Declining gives $\max_{w'} \mathbb{E}\Pi_F(w')$, which equals $V(p)$ for $p > \tilde{p}$ and is attained only at w^*. The maximizer is unique because $\mathbb{E}\Pi_F$ is strictly decreasing below $\frac{v}{2}$ and above $\frac{g(\bar{e})}{2}$ and strictly concave in between. Hence $\mathbb{E}\Pi_F(w) < V(p)$ for every $w \neq w^*$, and the two coincide at $w = w^*$. □

Renewal carries the standing wage into period T without allowing an adjustment, so a firm that holds any wage other than w^* does better to decline and post w^* instead. A firm that already holds w^* gains nothing from either choice. It posts before knowing who accepts, so it values a fresh draw and a retained worker of unknown type equally. This result is what makes our assumption about the wage more than a convenience, since a firm holding any other wage at the end of period $T-1$ would abandon it.

We assume the firm renews when it is indifferent. This convention matters later, because the equilibrium requires the firm to renew a worker who has met its demands, and a worker who behaves exactly as every type does teaches the firm nothing.

Lemma 4. *At the renewal stage of any period $t < T$, a firm that holds a worker known to be fair at wage w^* strictly prefers renewal and gains $v(1-p)(e_T - 1)$ relative to declining. A firm that holds a worker known to be selfish strictly prefers to decline and gains at least $vp\,(e_T - 1)$ relative to renewing.*

Proof. Take $t = T-1$ first. A firm that renews a worker known to be fair earns $ve_T - w^* = \frac{1}{2}s(e_T)$ in period T, while declining earns $V(p) = v + vp\,(e_T - 1) - \frac{1}{2}g(e_T)$. Using $\frac{1}{2}s(e_T) = ve_T - \frac{1}{2}g(e_T)$, the difference is

$$\tfrac{1}{2}s(e_T) - V(p) = v\,(e_T - 1) - vp\,(e_T - 1) = v(1-p)(e_T - 1),$$

which is strictly positive because $e_T > 1$ by Corollary 2. A firm that renews a worker known to be selfish earns $v - w^*$ in period T, and

$$V(p) - [v - w^*] = vp\,(e_T - 1) > 0.$$

Now take $t < T-1$, and suppose play follows the strategies in Proposition 5. A worker known to be fair supplies $\bar{e}$ in every period from $t+1$ to $T-1$, and so does a fresh draw of either type, so the two options coincide until period T and the difference is the one computed above. A worker known to be selfish anticipates being separated at the end of period $t+1$, since the firm's preference to decline does not depend on t. He therefore supplies 1 in that period, and the firm earns $v - w^*$ there against $\frac{1}{2}s(\bar{e})$ from a fresh draw, after which the two options coincide. The gain from declining is therefore $v(\bar{e} - 1)$, which exceeds $vp\,(e_T - 1)$. □

The firm's renewal decision therefore depends on what it knows about the worker, not on the wage. A worker known to be fair is worth more than a fresh draw, and one known to be selfish is worth less, so the firm keeps the first and replaces the second.

We now turn to what a worker stands to lose from separation. Let u_t^θ denote the period-t utility of a matched worker of type $\theta \in \{\mathrm{f}, \mathrm{s}\}$, where f denotes the fair type and s the selfish type. The *employment premium* Δ_t^θ is the difference between what such a worker expects from entering period t matched and what he expects from entering it unmatched.

Lemma 5. *$\Delta_T^{\mathrm{s}} = (1-\mu)\, w^*$ and $\Delta_T^{\mathrm{f}} = (1-\mu)\,[w^* - c(e_T)]$. If a matched worker of type θ is renewed at the end of period t, then*

$$\Delta_t^\theta = (1-\mu)\left[u_t^\theta + \Delta_{t+1}^\theta\right].$$

Proof. Let W_t^θ and N_t^θ denote the expected utility of a type-θ worker who enters period t matched and unmatched respectively, so that $\Delta_t^\theta = W_t^\theta - N_t^\theta$. A worker who enters matched and is renewed has $W_t^\theta = u_t^\theta + W_{t+1}^\theta$. A worker who enters unmatched is matched with probability μ, in which case he faces the same continuation, and is otherwise unmatched for the period, so $N_t^\theta = \mu\left[u_t^\theta + W_{t+1}^\theta\right] + (1-\mu)N_{t+1}^\theta$. Subtracting gives

$$\Delta_t^\theta = (1-\mu)\left[u_t^\theta + W_{t+1}^\theta - N_{t+1}^\theta\right] = (1-\mu)\left[u_t^\theta + \Delta_{t+1}^\theta\right].$$

In period T there is no continuation, so $\Delta_T^\theta = (1-\mu)\, u_T^\theta$. By Corollary 2, $u_T^{\mathrm{s}} = w^*$ and $u_T^{\mathrm{f}} = w^* - c(e_T)$, since a fair worker matched at w^* supplies e_T and faces no payoff inequality. □

The premium measures what the threat of separation is worth. A worker who loses his job does not lose it forever, since he returns to the hiring stage and is re-employed with probability μ. Only the fraction $1-\mu$ of the value of the job is therefore at stake. The recursion says the same thing one period at a time, with the current period's utility and the whole of next period's premium both exposed to the same risk.

From period $T-1$ backwards, the firm can do something it could not do in the final period, namely make renewal conditional on the effort it observes. We describe such a policy by a threshold $\hat{e}$, with the firm renewing if and only if the worker supplies at least $\hat{e}$. A worker who wants the match to continue must then weigh what meeting the threshold costs him against what separation would cost him. He complies if the utility he gives up this period is no greater than his employment premium, and otherwise supplies his myopic best response, which is 1 for the selfish worker and e_T for the fair worker.

We now restrict attention to the case in which a fair worker's payoff-equalizing effort is maximal, that is,

$$v(2p-1) \geq c'(\bar{e}),$$

so that $e_T = \bar{e}$. This is a second restriction on the share of fair workers, separate from $p > \tilde{p}$, and the two are compatible because both hold as p approaches one. Under this restriction, no threshold can impose a loss on a fair worker. He already supplies maximal effort for reasons of his own, so his effort is set by payoff equalization and the renewal threat has nothing left to ask of him. The threshold therefore binds only on the selfish worker, and the two types comply for different reasons.

Lemma 6. *In the working stage of any period $t < T$, a selfish worker facing threshold $\hat{e}$ supplies $\hat{e}$ if $c(\hat{e}) \leq \Delta_{t+1}^{\mathrm{s}}$, and supplies 1 otherwise.*

Proof. A selfish worker who supplies $\hat{e}$ earns $w^* - c(\hat{e})$ this period and enters period $t+1$ matched. One who supplies less is separated, so he earns at most $w^* - c(1) = w^*$ this period and enters period $t+1$ unmatched. His best deviation is $e = 1$, since effort is costly and any effort below $\hat{e}$ leads to the same continuation. Complying is therefore weakly better if and only if

$$[w^* - c(\hat{e})] - w^* + \Delta^{\mathrm{s}}_{t+1} \geq 0,$$

which is $c(\hat{e}) \leq \Delta^{\mathrm{s}}_{t+1}$. □

Because c is continuous and strictly increasing with $c(1) = 0$, it maps $[1, \bar{e}]$ onto $[0, c(\bar{e})]$ and has an inverse there. By Lemmas 5 and 6, the largest threshold that the renewal threat can support in period $T-1$ is therefore

$$e^S(\mu) := \begin{cases} c^{-1}((1-\mu)w^*) & \text{if} \quad (1-\mu)w^* < c(\bar{e}), \\ \bar{e} & \text{if} \quad (1-\mu)w^* \geq c(\bar{e}), \end{cases}$$

which we call the selfish worker's *highest sustainable effort*. It is an upper bound on what the firm can demand, and the worker supplies whatever the firm demands up to this bound. It is continuous and nonincreasing in μ, because a worker who finds another job easily has less to lose from separation.

We restrict attention to values of μ at which the threat sustains maximal effort,

$$c(\bar{e}) \leq (1-\mu)\, w^*,$$

so that $e^S(\mu) = \bar{e}$.

Together, the two restrictions fix the threshold at $\bar{e}$, so it responds to neither μ nor p in the region we study. The wage, in turn, is fixed by assumption. The model is therefore a benchmark for what the renewal threat can sustain, and it is not designed to deliver comparative statics.

The argument so far concerns period $T-1$, where the worker has one period of employment left to protect. In earlier periods he has more to protect, so the same threat should be at least as strong. The next result confirms this and shows that the threat is weakest in period $T-1$.

Lemma 7. *Suppose the firm applies the threshold $\bar{e}$ in every period before T and both types meet it. Then $\Delta^\theta_t \geq \Delta^\theta_{t+1}$ for each type θ and every $t < T$, with strict inequality for the fair type and, for the selfish type, whenever $c(\bar{e}) < (1-\mu)w^*$. Each sequence converges to a finite limit as $T - t$ grows.*

Proof. Under the stated hypothesis, a matched worker of either type supplies $\bar{e}$ in every period $t < T$, so $u^\theta_t = w^* - c(\bar{e})$ for $t < T$. In period T, a fair worker supplies $\bar{e}$ and a selfish worker supplies 1, so $u^{\mathrm{f}}_T = w^* - c(\bar{e})$ and $u^{\mathrm{s}}_T = w^*$. By Lemma 5, $\Delta^\theta_T = (1-\mu)u^\theta_T$ and $\Delta^\theta_t = (1-\mu)\left[u^\theta_t + \Delta^\theta_{t+1}\right]$ for $t < T$.

For the fair type, $\Delta^{\mathrm{f}}_{T-1} - \Delta^{\mathrm{f}}_T = (1-\mu)\Delta^{\mathrm{f}}_T$, which is strictly positive because $\Delta^{\mathrm{f}}_T = (1-\mu)\,[w^* - c(\bar{e})] = (1-\mu)\frac{1}{2}s(\bar{e}) > 0$. For the selfish type,

$$\Delta^{\mathrm{s}}_{T-1} - \Delta^{\mathrm{s}}_T = (1-\mu)\,[(1-\mu)w^* - c(\bar{e})]\,,$$

which is nonnegative under the maintained restriction and strictly positive when that restriction holds strictly. For $t < T-1$, the map $\Delta \mapsto (1-\mu)\,[w^* - c(\bar{e}) + \Delta]$ is increasing in Δ, so the sign of the first step propagates backwards and each sequence is monotone. Each sequence is bounded above by the fixed point $(1-\mu)\,[w^* - c(\bar{e})]\,/\mu$, so it converges. □

The premium is smallest in the last period in which it matters, so the constraint in period $T-1$ is the tightest one in the game. A threshold that is sustainable in period $T-1$ is sustainable in every earlier period.

We restrict attention to stationary renewal policies, under which the firm applies the same threshold in every period before T. Two considerations support this restriction. The first is tractability. A firm free to condition its threshold on the period would weakly prefer to do so, demanding more in early periods when the premium is larger. The second is that the experimental design carries the desired effort forward unchanged when a contract is renewed, so a firm cannot revise its stated demand within a relationship.

Proposition 4. *At the wage w^*, the firm's optimal threshold is $\hat{e} = \bar{e}$, and both types supply $\bar{e}$ in every period $t < T$.*

Proof. Consider first a threshold $\hat{e} \leq \bar{e}$ that both types meet. A fair worker supplies $\bar{e}$ regardless, since $e_T = \bar{e}$ under the maintained restriction, and a selfish worker supplies $\hat{e}$ by Lemma 6. The firm's per-period payoff is $p\,[v\bar{e} - w^*] + (1-p)\,[v\hat{e} - w^*]$, which is increasing in $\hat{e}$, so the firm prefers the largest such threshold. By Lemmas 6 and 7 and the restriction $c(\bar{e}) \leq (1-\mu)w^*$, both types meet the threshold $\hat{e} = \bar{e}$ in every period $t < T$, and no higher threshold is feasible.

It remains to check that the firm does not prefer a threshold below $\bar{e}$. Any $\hat{e} < \bar{e}$ is met by a selfish worker with effort $\hat{e}$ and by a fair worker with effort $\bar{e}$, so the firm learns the worker's type at the end of the period. By Lemma 4, it then separates from a worker known to be selfish. Anticipating separation, a selfish worker gains nothing from supplying $\hat{e}$ and supplies 1 instead, which yields the firm at most $p\,[v\bar{e} - w^*] + (1-p)\,[v - w^*]$ per period. This is strictly less than $v\bar{e} - w^*$, the firm's payoff at $\hat{e} = \bar{e}$. □

Two forces push the threshold to the top. The firm's payoff rises with the effort it demands, so it asks for as much as the threat will bear. Any lower demand would also separate the types, since a fair worker would still supply $\bar{e}$ while a selfish worker would supply only what was asked. A selfish worker who expects to be identified and replaced then has no reason to comply at all.

Proposition 5. *The following strategies and beliefs constitute a perfect Bayesian equilibrium. The firm offers $w^* = \frac{1}{2}g(\bar{e})$ in every hiring stage and renews if and only if the worker supplied $\bar{e}$. It holds the belief p about any worker who has supplied $\bar{e}$ in every period, and it places probability one on the selfish type for any worker who has ever supplied less. Both types accept an offer of w^*, which both strictly prefer to remaining unmatched, and renew whenever offered. Both types supply $\bar{e}$ in every period $t < T$. In period T, a fair worker supplies $\bar{e}$ and a selfish worker supplies* 1.

Proof. Beliefs follow Bayes' rule wherever possible. Both types supply $\bar{e}$ in every period $t < T$, so effort is uninformative on the equilibrium path and the belief remains p. Any effort below $\bar{e}$ is off the path, but the belief there is not free. Supplying less than $\bar{e}$ lowers a fair worker's current utility, since $\bar{e}$ is his payoff-equalizing effort under the maintained restriction, and it also forfeits renewal. The deviation is therefore strictly worse for him under every continuation. For a selfish worker, the same deviation raises current utility and is worse only through the loss of the premium. Probability one on the selfish type is therefore the only belief that does not attribute to the fair type a deviation that is worse for him than the equilibrium under every continuation. This is the restriction imposed by the intuitive criterion of Cho and Kreps (1987), and the equilibrium satisfies it.

Worker optimality in period T follows from Corollary 2. In periods $t < T$, worker optimality follows from Lemma 6 for the selfish type, whose constraint holds at $\hat{e} = \bar{e}$ by the maintained restriction in period $T-1$ and by Lemma 7 in every earlier period. It is immediate for the fair type, who supplies $\bar{e}$ as his

payoff-equalizing effort. Acceptance and renewal follow from Lemma 3, whose argument applies in every period because the premium is positive throughout.

The wage in period T is optimal by Proposition 2. In earlier periods it equals w^* by assumption, so the hiring stage requires no further argument. The threshold is optimal by Proposition 4. Renewal after $\bar{e}$ is optimal by Proposition 3 together with the tie-breaking convention, and separation after a shortfall is strictly optimal by Lemma 4, since the belief there places probability one on the selfish type. □

The equilibrium runs on a single threat. A worker who falls short is identified as selfish, and a firm that holds a worker it knows to be selfish does better with a fresh draw, so the firm would carry out its threat to separate. Because the threat is credible and the premium exceeds the cost of maximal effort, a selfish worker supplies maximal effort in every period but the last, where he has nothing left to protect.

The equilibrium has two further implications. The first concerns how renewal depends on effort.

Corollary 4. *On the equilibrium path, the probability of renewal is zero for any effort below $\bar{e}$ and one at $\bar{e}$.*

Proof. The firm's strategy in Proposition 5 renews if and only if the worker supplied $\bar{e}$. □

The second implication concerns how long matches last, and it follows from the effort result.

Corollary 5. *On the equilibrium path, no match separates before period T, and a pair matched in period 1 remains together until the end of the game.*

Proof. Both types supply $\bar{e}$ in every period $t < T$ by Proposition 5, so the firm renews, and both types renew by Lemma 3. No match therefore separates before period T, so a pair matched in period 1 remains together until the end of the game. □

If every pair in the market played these strategies, no firm would post a new wage after period 1, and the set of matched workers would be fixed from then on. This statement extends the two-player model to the market as a whole, which the model itself does not cover.

This equilibrium is not the only one. Finitely repeated games of this kind admit many equilibria. In particular, the strategies in which no firm ever pays more than the minimum and no worker ever supplies more than minimal effort also form an equilibrium, supported by beliefs that no wage will be reciprocated. We study the equilibrium above because it is the one in which the renewal stage does the work that the experimental design gives it, and because it delivers the highest effort that the threat of separation can sustain.

A.3 A numerical example

We illustrate the equilibrium with parameters close to those of the experimental design. Let $v = 10$, $\bar{e} = 10$, and

$$c(e) = 0.1e^2 + 0.9e - 1.$$

This cost function satisfies the assumptions of the setup, with $c(1) = 0$, $c'(e) = 0.2e + 0.9 > 0$, and $c''(e) = 0.2 > 0$. It also satisfies $c'(\bar{e}) = 2.9 < 10 = v$, so maximal effort is efficient, and $\frac{1}{2}s(\bar{e}) = 41 > 10 = v$, so a wage that buys maximal effort from a fair worker is worth paying. The schedule approximates the one used in the experiment and agrees with it exactly at $e \in \{1, 5, 6, 10\}$.

A fair worker's payoff-equalizing effort is interior only for p between 0.555 and 0.645, and $\tilde{p} = \frac{59}{90} \approx 0.656$ lies above that range. In this example, the restriction $e_T = \bar{e}$ is therefore implied by $p > \tilde{p}$.

The equilibrium wage is $w^* = \frac{1}{2}g(\bar{e}) = 59$. A firm and a fair worker each earn 41 in every period, which is half the surplus of 82 that maximal effort creates. In period T, a selfish worker supplies minimal effort and earns 59, leaving his firm with -49. At $p = \tilde{p}$, the firm's expected payoff in period T is exactly 10, which is what it would earn by paying nothing, and above $\tilde{p}$ the wage is strictly better.

The remaining restriction is on the matching probability. Since $c(\bar{e}) = 18$ and $w^* = 59$, maximal effort is sustainable when $\mu \leq \frac{41}{59}$. For any such μ, a selfish worker stands to lose at least as much from separation as maximal effort costs him, and he supplies maximal effort in every period until the last.

A.4 Comparison with the experimental data

The Baseline treatment is consistent with the qualitative predictions of the model, but not with its magnitudes. Three patterns in the data match the equilibrium. First, workers supply nonminimal effort before the final period. Average effort in periods 1 to 14 is 6.32, and workers supply minimal effort in only 12 percent of matches. Second, effort drops in the final period, when there is no renewal left to protect. Average effort falls to 4.27 in period 15, and it falls in each of the five Baseline sessions. Third, firms make renewal conditional on effort. The share of firms choosing to renew rises from 0.14 when the worker supplies minimal effort to 0.93 when he supplies maximal effort.

The magnitudes differ from those of the equilibrium. Firms' renewal decisions rise gradually with effort, instead of in a single step at maximal effort (Corollary 4), and workers supply maximal effort in only 11 percent of matches in periods 1 to 14. Wages average 41.7 points, well below the equilibrium wage of 59 in the numerical example, and workers receive 62 percent of the joint surplus instead of half. Matches also separate often. Both parties renew in only 52 percent of matches in periods 1 to 14, whereas Corollary 5 predicts that no match separates before the final period. These gaps are not surprising, because the equilibrium we study delivers the highest effort that the threat of separation can sustain, and the game has many other equilibria.

B Appendix: Regression Analysis and Robustness Checks

B.1 Factorial regressions on session averages

Table 7 uses all 20 sessions to estimate the average effect of each intervention. For each outcome, we compute the session-level average and regress it on a visa fee indicator, a minimum wage indicator, and their interaction, with one observation per session. We code each indicator as $+\frac{1}{2}$ when the intervention is present and $-\frac{1}{2}$ when it is absent. With this coding, the coefficient on each indicator is the average of its effect with and without the other intervention, and the coefficient on the interaction is the difference between these two effects.

Table 7. Factorial Regressions on Session Averages

	Visa fee		Minimum wage		Interaction	
	Coef.	p-value	Coef.	p-value	Coef.	p-value
Foreign matches						
Wage	+1.72	0.381	+8.64	<0.001	−8.42	0.042
Effort	+1.22	0.001	+0.75	0.025	−0.53	0.391
Mutual renewal	+0.27	0.003	−0.01	0.858	−0.05	0.725
Tenure length	+2.20	0.006	+0.03	0.967	+0.04	0.976
Employment rate	−5.00	0.168	−8.00	0.034	+2.00	0.776
Surplus per match	+6.12	0.031	+5.65	0.044	−4.93	0.354
Per-capita income	−2.38	0.130	+2.02	0.195	−4.29	0.170
Domestic matches						
Wage	+1.96	0.601	+4.70	0.219	+3.11	0.678
Effort	+0.41	0.379	+0.26	0.577	+0.59	0.528
Mutual renewal	+0.07	0.253	+0.02	0.781	−0.04	0.724
Tenure length	+0.54	0.214	+0.06	0.895	−0.64	0.450
Employment rate	+4.67	0.190	+7.67	0.039	−0.67	0.923
Surplus per match	+3.22	0.386	+2.02	0.584	+4.98	0.500
Per-capita income	+2.75	0.373	+5.89	0.067	+1.81	0.767
Market						
Total output per period	+45.00	0.034	+23.93	0.236	+10.27	0.795
Market surplus per period	+26.45	0.109	+18.53	0.252	+8.36	0.792

Notes: Each row reports an OLS regression of the session-level average of the outcome on a visa fee indicator, a minimum wage indicator, and their interaction, using all 20 sessions (one observation per session). Each indicator equals $+\frac{1}{2}$ when the intervention is present and $-\frac{1}{2}$ when it is absent, so each main-effect coefficient is the average effect of that intervention across the two levels of the other, and the interaction coefficient is the difference between its effect with and without the other intervention. p-values are two-sided and based on conventional standard errors with 16 degrees of freedom. Outcomes are defined as in Tables 3, 4, and 6; employment rates are in percentage points.

B.2 Determinants of effort

Table 8 reports censored regressions of the worker's effort on treatment dummies, a foreign worker dummy, and their interactions. Because effort is restricted to values between 1 and 10, we estimate two-limit tobit regressions with censoring at 1 and 10, with standard errors clustered on sessions. Each interaction measures how much a policy changes the effort of foreign workers over and above its effect on domestic workers.

Regression (1) shows that the interaction terms are large and significant for all three policies, while none of the treatment dummies themselves is significant. Regression (2) adds the wage as a control. The wage

has a strong effect on effort: an increase of ten points raises effort by roughly two units. Controlling for the wage, the Minimum Wage interaction drops to essentially zero and loses all significance, while the Visa Fee and Combined interactions remain at about 1.16 and highly significant. Regression (3) uses data from the final period only, where no renewal is possible; none of the interaction terms is significant, while the wage effect remains strong. We caution that this regression uses only the 118 final-period matches, so the interactions are imprecisely estimated and the evidence is the absence of a detectable fee effect rather than a precisely estimated zero.

Two caveats apply to the comparison between regressions (1) and (2). First, the wage is itself an outcome of the treatments, so this decomposition is descriptive rather than causal; firms may, for example, pay more in matches where they expect more effort. Second, tobit coefficients measure effects on the underlying uncensored effort scale and are therefore larger than effects on observed effort. Ordinary least squares yields smaller coefficients but the same pattern of significance in every specification (Table 9).

Table 8. Determinants of Effort

	(1)	(2)	(3)
	All periods	All periods	Period 15 only
Visa Fee	0.212	0.029	1.250
	(0.683)	(0.454)	(1.985)
Min Wage	−0.216	−0.891**	−0.385
	(0.671)	(0.419)	(2.954)
Combined	0.847	−0.505	−1.243
	(0.735)	(0.315)	(2.092)
Foreign worker	−0.082	0.268	1.260
	(0.703)	(0.371)	(2.904)
Visa Fee × Foreign worker	1.976**	1.155***	−1.360
	(0.906)	(0.438)	(3.070)
Min Wage × Foreign worker	1.583**	−0.163	0.411
	(0.803)	(0.644)	(4.470)
Combined × Foreign worker	1.833*	1.158**	2.423
	(0.939)	(0.496)	(3.012)
Wage		0.188***	0.343***
		(0.012)	(0.060)
Period	0.507***	0.589***	
	(0.100)	(0.085)	
Period^2	−0.028***	−0.035***	
	(0.006)	(0.005)	
Constant	4.476***	−3.641***	−13.359***
	(0.557)	(0.721)	(2.921)
Observations	1,792	1,792	118
Left-censored	229	229	51
Right-censored	333	333	19

Notes: The estimation procedure is a two-limit tobit regression with censoring at effort levels 1 and 10, with robust standard errors clustered on sessions (in parentheses). The omitted treatment is Baseline. *** indicates significance at the 1-percent level; ** at the 5-percent level; * at the 10-percent level.

B.3 Effort regressions by ordinary least squares

Table 9 re-estimates the first two specifications of Table 8 by ordinary least squares. The coefficients are smaller than the tobit coefficients, as expected since tobit estimates refer to the uncensored effort scale, but the pattern is identical: the foreign worker interactions are significant for all three policies without the wage control, and once the wage is controlled for, the Minimum Wage interaction disappears while the Visa Fee and Combined interactions remain significant.

Table 9. Determinants of Effort, OLS

	(1)	(2)
Visa Fee	0.107	0.032
	(0.443)	(0.290)
Min Wage	−0.130	−0.456
	(0.507)	(0.282)
Combined	0.692	−0.129
	(0.555)	(0.256)
Foreign worker	0.036	0.304
	(0.520)	(0.293)
Visa Fee × Foreign worker	1.308**	0.700**
	(0.637)	(0.347)
Min Wage × Foreign worker	1.114*	−0.151
	(0.590)	(0.496)
Combined × Foreign worker	1.196*	0.746**
	(0.671)	(0.378)
Wage		0.125***
		(0.006)
Period	0.378***	0.446***
	(0.071)	(0.065)
Period^2	−0.021***	−0.026***
	(0.004)	(0.004)
Constant	4.873***	−0.625
	(0.395)	(0.412)
Observations	1,792	1,792
R^2	0.076	0.405

Notes: Ordinary least squares with robust standard errors clustered on sessions (in parentheses). The omitted treatment is Baseline. *** indicates significance at the 1-percent level; ** at the 5-percent level; * at the 10-percent level.

B.4 Wild cluster bootstrap

The effort regressions cluster standard errors on only 20 sessions, and conventional cluster-robust inference can over-reject with this few clusters. Table 10 therefore reports wild cluster bootstrap p-values for the foreign worker interactions in the two specifications of Table 9. We impose the null hypothesis when generating the bootstrap samples, draw Rademacher weights at the session level, and use 99,999 replications. For comparison, the table also reports conventional p-values based on the t distribution with 19 degrees of freedom.

Without the wage control, only the Visa Fee interaction is significant at the 10 percent level under the bootstrap. With the wage control, the Visa Fee and Combined interactions are close to the 10 percent level,

while the Minimum Wage interaction is far from significance. The difference between the Visa Fee and Minimum Wage interactions is significant at the 10 percent level under conventional inference but not under the bootstrap.

Table 10. Wild Cluster Bootstrap p-values for the Effort Regressions

	(1) Without wage			(2) With wage		
	Coef.	Conv. p	Boot. p	Coef.	Conv. p	Boot. p
Visa Fee × Foreign worker	1.308	0.054	0.089	0.700	0.058	0.101
Min Wage × Foreign worker	1.114	0.074	0.125	−0.151	0.765	0.783
Combined × Foreign worker	1.196	0.091	0.129	0.746	0.063	0.094
Tests of equality						
Visa Fee = Min Wage interaction	0.194	0.680	0.701	0.850	0.068	0.133
Combined = Min Wage interaction	0.082	0.874	0.874	0.897	0.073	0.105

Notes: Coefficients are from the OLS regressions in Table 9; for the tests of equality, the coefficient column reports the difference between the two interactions. Conventional p-values use standard errors clustered on sessions and the t distribution with 19 degrees of freedom. Bootstrap p-values are from the restricted wild cluster bootstrap (null imposed) with Rademacher weights drawn at the session level and 99,999 replications, and are symmetric two-sided p-values based on the cluster-robust t-statistic.

B.5 Probability of contract renewal

Table 11 reports probit regressions of the firm's renewal decision. The dependent variable is a dummy equal to one if the firm chooses to renew, and the sample covers periods 1 to 14 because there is no renewal decision after the final period. Besides the worker's effort, we include how much the effort exceeded or fell short of the firm's stated expectation, which we label positive and negative surprise, and the tenure length at the time of the decision.[18]

Regression (1) shows that the firm's decision responds strongly to performance. Renewal is significantly more likely after higher effort, significantly less likely when the worker falls short of what the firm expected, and significantly more likely the longer the tenure of the relationship. Regression (2) adds a foreign worker dummy and its interactions with the treatment dummies, none of which is significant: conditional on the worker's performance and tenure length, we cannot detect any difference in how firms treat foreign and domestic workers in any treatment.

B.6 Renewal regression without the tenure length control

Tenure length is the outcome of past renewal decisions, so its inclusion in Table 11 could in principle absorb a treatment difference in the firms' renewal rule. Table 12 therefore re-estimates regression (2) of Table 11 without tenure length. The foreign worker dummy and all its interactions with the treatment dummies remain insignificant, confirming that we cannot detect a treatment-specific renewal rule for foreign workers.

B.7 Effort in the first period of a relationship

Table 13 reports average effort in fresh matches, that is, in the first period of a relationship, before any renewal decision has taken place. These matches are free of the selective retention that builds up over a

[18] Positive surprise is $\max\{e - e^{exp}, 0\}$ and negative surprise is $\max\{e^{exp} - e, 0\}$, where e is the effort and e^{exp} is the effort the firm reported expecting during the working phase.

Table 11. Probability of Contract Renewal by the Firm

	(1)	(2)
Effort	0.179***	0.178***
	(0.040)	(0.042)
Positive surprise	0.061	0.063
	(0.061)	(0.058)
Negative surprise	−0.392***	−0.393***
	(0.099)	(0.099)
Tenure length	0.172***	0.166***
	(0.032)	(0.031)
Foreign worker		0.091
		(0.138)
Visa Fee × Foreign worker		0.169
		(0.284)
Min Wage × Foreign worker		−0.295
		(0.272)
Combined × Foreign worker		0.060
		(0.241)
Session fixed effects	Yes	Yes
Observations	1,674	1,674
Pseudo R^2	0.423	0.425

Notes: The estimation procedure is a probit regression with robust standard errors clustered on sessions (in parentheses). The dependent variable equals one if the firm chooses to renew the contract. The sample covers periods 1 to 14. Treatment main effects are absorbed by the session fixed effects. *** indicates significance at the 1-percent level; ** at the 5-percent level; * at the 10-percent level.

Table 12. Probability of Contract Renewal without the Tenure Length Control

Effort	0.241***
	(0.045)
Positive surprise	−0.030
	(0.047)
Negative surprise	−0.426***
	(0.109)
Foreign worker	0.170
	(0.188)
Visa Fee × Foreign worker	0.277
	(0.322)
Min Wage × Foreign worker	−0.386
	(0.339)
Combined × Foreign worker	0.166
	(0.302)
Session fixed effects	Yes
Observations	1,674
Pseudo R^2	0.387

Notes: Probit regression with robust standard errors clustered on sessions (in parentheses). The dependent variable equals one if the firm chooses to renew the contract. The sample covers periods 1 to 14. Treatment main effects are absorbed by the session fixed effects. *** indicates significance at the 1-percent level; ** at the 5-percent level; * at the 10-percent level.

relationship. The effort of foreign workers in fresh matches is substantially higher in the policy treatments than in Baseline, while the effort of domestic workers in fresh matches is the same everywhere. The sample of fresh foreign matches is small in the fee treatments precisely because relationships last so long there, which limits the power of these tests.

Table 13. Average Effort in the First Period of a Relationship

	Baseline	Visa Fee	Min Wage	Combined
Foreign matches	4.68	6.79	6.39	6.85
p-value vs Baseline		0.047	0.222	0.056
Number of matches	108	42	88	45
Domestic matches	4.70	4.49	4.46	5.54
p-value vs Baseline		0.690	0.690	0.690
Number of matches	123	113	132	125

Notes: The sample contains only matches in the first period of a relationship (tenure length equal to one). Each entry is computed by first averaging within a session and then averaging across the five sessions of the treatment. The p-values are from two-sided Mann-Whitney tests with session averages as independent observations.

C Experiment Instructions

Participants were provided with a printed handout containing instructions. They were free to refer to this handout at any time during the experiment. The following six pages contains the instructions for the base treatment.

Instructions

- You are about to participate in a labor market experiment.

- There are 14 participants in today's experiment.

- The 14 of you will be divided into three groups as follows:
  - 6 **firms**,
  - 4 **domestic workers**, and
  - 4 **foreign workers**.

- Each of you will be given a unique ID that will indicate your role.
  - **Firms'** IDs will be: Firm1, Firm2, Firm3, Firm4, Firm5, Firm6
  - **Domestic workers'** IDs will be: DW1, DW2, DW3, DW4
  - **Foreign workers'** IDs will be: FW1, FW2, FW3, FW4

- You will be known to others by that ID for the entire experiment.

- You can earn **points** in the experiment. Each point is worth **5 cents**. At the end of the experiment, your total points will be converted to dollars, and paid to you along with a participation fee of $7.

Overview of Experimental Procedures

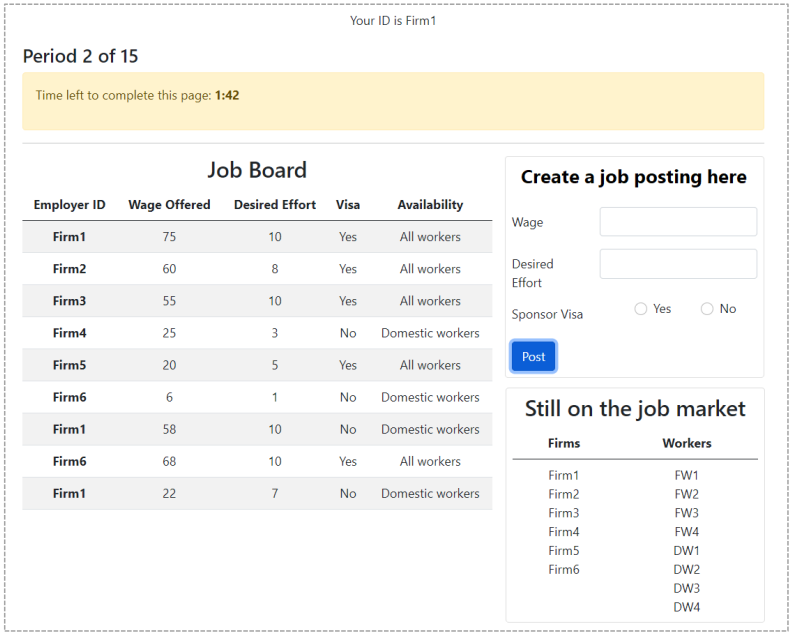
- You will get an initial endowment of 100 points.
- There will be 15 periods.
- In each period, you will have the opportunity to earn more points.
- Each period will consist of 3 phases:
    1. Hiring Phase
    2. Working Phase
    3. Renewal Phase
- The Hiring Phase will last 3 minutes. During this phase, firms can post jobs on a Job Board and workers can accept jobs. To post a job, a firm must specify **three things**:
    1. the wage that the firm will pay the worker,
    2. the amount of effort the firm desires from the worker,
    3. and finally, if the firm is willing to sponsor a visa for this job. Foreign workers are only able to accept jobs that are willing to sponsor a visa. If a foreign worker accepts the job, the firm will need to pay an additional **visa sponsorship fee of 15 points**.
- **Each firm can hire at most one worker, and each worker can accept at most one job.** Firms can post as many jobs as they like, and posted jobs can be accepted at any time during the Hiring Phase. As soon as a worker accepts a job, the hiring firm's other postings get cancelled.
- In the Working Phase, workers decide how much effort to actually put into the job. **The worker is not obliged to put in the effort desired by his firm.** Choosing a greater actual effort costs the worker more points.
- Firms' and workers' earnings are calculated based on the actual effort chosen by workers.
- In the Renewal Phase, firms and workers decide if they would like to renew their current contract, i.e., work with the same person and at the same wage in the next period. If both parties decide to renew, they skip the next period's Hiring Phase. If a firm renews a contract with a foreign worker, the visa sponsorship fee is waived for the next period.
- At the end of the experiment, your final points balance will be exchanged into dollars, and paid to you along with your $7 participation fee.

Experimental Procedures in Detail

1. The Hiring Phase

Each period starts with a Hiring Phase. During the Hiring Phase, firms can post jobs on a Job Board and workers can accept jobs available on the Job Board.

Your decision screen in the Hiring Phase will look something like this:



- The top of the screen will show your ID (and therefore your role), the period of the experiment, and the time remaining in the current Hiring Phase. **The Hiring Phase in each period has a time limit of 3 minutes.** After this time, no jobs can be posted or accepted. The Hiring Phase ends when either all 6 firms have hired a worker or when the time is up.
- The left-hand side of the screen will show a Job Board that updates in real-time and provides the same information to all firms and workers.
- The right-hand side of the screen will be slightly different for firms and workers. Firms will see the option to post jobs (like in the image above). Workers will not see this option but will see an "Accept" button next to each job posting.
- The bottom-right of the screen will show which firms and workers are still looking.

(Hiring Phase continued)

If you are a Firm:

- You will have the opportunity to post jobs on the Job Board.
- To post a job, you must enter the following three things:
    1. **The wage that you will pay your worker**. This is a number between 0 and 100 and measured in points. This amount will be taken from your points balance and given to the worker who accepts your job.
    2. **The effort you desire from your worker**. This is a number between 1 and 10.
    3. **Whether you are willing to sponsor a visa**. If you choose No, then only domestic workers will be able to accept this job. If you choose Yes, then both foreign workers and domestic workers will be able to accept the job. Note that if a foreign worker accepts your job, you will be charged a visa fee of 15 points.
- After you click "Post", you will not be able to make changes to the job posting.
- You may post as many jobs as you wish.
- When a worker accepts one of job postings, you will be notified about which worker accepted which posting.
- As you can hire only one worker, as soon as one of your jobs postings is accepted, all your other postings will be automatically cancelled.
- If a foreign worker accepts your job, then you will also need to pay a visa sponsorship fee of 15 points. However, this fee may be waived for the next period if both you and the foreign worker choose to renew a contract.
- You are not obliged to post a job. If you do not wish to hire a worker in any period, simply let the 3-minute timer run out.

If you are a Worker:

- You will have the opportunity to accept jobs. To accept a job, simply click on the "Accept" button next to the job posting.
- If an "Accept" button is unclickable, then that job is not available for you. This could be if:
    a) Another worker accepted this job,
    b) You are a foreign worker and the job does offer visa sponsorship, or
    c) The job posting got cancelled because another job posted by this firm got accepted.
- The *Availability* column of the Job Board may help explain why the "Accept" button is unclickable.
- When you accept a job, you will see details of the job you accepted.
- As you can accept only one job, as soon as you accept a job, all "Accept" buttons will be disabled.
- You are not obliged to accept a job. If you do not wish to work in any period, simply let the 3-minute timer run out.

2. The Working Phase

Workers who accepted a job in the Hiring Phase will now choose how much **actual effort** they wish to put in. **The amount of effort desired by the firm is not binding for the worker.** The worker can choose the exact effort that the firm desired, but he can also choose a higher or a lower effort. The actual effort is a number between 1 and 10.

The worker incurs an **exertion cost** depending on the actual effort level he chooses. The higher the actual effort, the greater his exertion cost. The exact exertion cost (in points) for each actual effort is displayed in the table below:

Actual Effort	1	2	3	4	5	6	7	8	9	10
Exertion Cost (points)	0	1	2	4	6	8	10	12	15	18

While workers choose their actual effort, firms are asked about their expectations. Specifically, we ask firms how much *actual effort* they expect their workers to put in, and also how sure they are about their expectations. Firms' responses are not shared with workers.

Firm's Income

If none of the firm's job postings get accepted, then the firm receives an income of 0 points in that period. If one of the firm's jobs is accepted, then the firm's income depends on the worker's actual effort and the wage of the job. If the job is accepted by a foreign worker, the firm also has to pay a fixed visa sponsorship fee of 15 points.

The firm's income is determined as follows:

$$\textbf{Firm's Income} = 10 \times \textbf{Actual Effort} - \textbf{Wage} - \underset{\textbf{(if applicable)}}{\textbf{Visa Fee}}$$

Thus, the greater the effort chosen by the worker, the higher the firm's income. At the same time, the lower the wage, the higher the firm's income.

Worker's Income

If the worker does not accept a job in the Hiring Phase, he receives an income of 0 points in that period. If the worker accepts a job, his income is his wage minus his exertion cost.

The worker's income is determined as follows:

$$\textbf{Worker's Income} = \textbf{Wage} - \textbf{Exertion Cost}$$

Thus, the higher the wage, the higher the worker's income. Further, the lower the worker's actual effort, the higher his income.

The income of all firms and workers are determined in the same way. **Therefore, each firm can calculate its worker's income, and each worker can calculate his firm's income.**

It is possible to incur a loss in a period. If you incur a loss, it will simply be deducted from your points balance, just like gains are added to your points balance.

At the end of the Working Phase, you will see an income summary for the current period as well as all previous periods. This summary will tell you the ID of the worker/firm you worked with in each period, your worker/firm's income, and your income.

3. Renewal Phase

After seeing their income summary, firms and workers will be asked if they want to **renew their current contract for the next period.** and work with the same person and at the same wage in the next period.

A contract gets renewed if both the firm and the worker choose **Yes**. If at least one of them chooses **No**, the contract does not get renewed.

If a contract gets renewed, **the visa sponsorship fee (of 15 points) will be waived** for the next period. (Otherwise, the visa sponsorship fee is due every time a foreign worker accepts a job from the Job Board.)

In case of a contract renewal, the firm and worker will not have a decision to make in the Hiring Phase. However, they will still be able to see the job board as other firms and workers post and accept jobs. Moreover, the worker will still need to choose an **actual effort** in the Working Phase. The worker will not be obliged to choose the same actual effort as last time, but will be free to choose any number between 1 and 10.