Health Coverage and Farmworker Productivity

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Abstract

Farmworkers are often subject to hazardous working conditions, experience a disparity in health insurance coverage and are vulnerable to chronic health conditions and injury. Although recent health care mandates have improved access to health care, many agricultural employers still do not offer coverage for their employees. Because farmworkers tend to be seasonal, and sometimes migratory, worker health is often considered a common property resource. If farmers cannot retain the benefits due to offering worker healthcare coverage, the market for firm-provided coverage fails and workers are not covered. We estimate the economic value of offering health coverage to farmworkers and their employers using a structural search, match, and bargaining model. We find that farmworkers with employer-provided health coverage are significantly more productive than those without and, on average, generate an additional $0.78 in economic surplus for each hour worked. Employers who offer health coverage retain an additional $0.60 of economic surplus for each hour of work performed by their employees due to a health productivity premium, after accounting for the cost of offering insurance. Farmworker healthcare coverage, therefore, is not a common property resource and represents a viable strategy to attract, retain and care for valuable employees.

Keywords: bargaining power, farm labor, healthcare, productivity, search-and-matching
JEL Codes: J22, Q12, Q18

Agricultural work is notoriously demanding, and one of the most dangerous in terms of long-term health impacts from working in the fields over long periods of time (Mobed, Gold, & Schenker 1992; Nordstrom, et al. 1995; Villarejo & Baron 1999; Hansen & Donohue 2003). While best-practices among farm managers are changing, there are still real and important questions regarding the health status of agricultural workers, whether they have access to the same type of coverage as other workers, and the impact of health care coverage on operational outcomes (Boggess & Bogue 2016). In a perfect world, farm managers recognize the productivity gains available from ensuring (or insuring) the health of their workers, but worker health among migratory and seasonal laborers is akin to a common property resource (Dizioli & Pinheiro 2016) as individual employers cannot capture the productivity gains from improving the health of either transient or seasonal workers. As a consequence, firms may underinvest to their own detriment, and likely to the detriment of the workers themselves (Aizawa & Fang 2020). Others consider worker health and safety as a productive input akin to investments in human capital, so we adopt a similar approach in examining the returns to employer-provided healthcare among agricultural workers (Dey & Flinn 2005; Fang & Gavazza 2011; Aizawa & Fang 2020; Kim 2022). In this paper, we use a model of worker search-matching-and-bargaining to estimate the equilibrium effect of offering healthcare coverage to farmworkers on worker wages, productivity, and farm profitability.

We model an employer's decision to offer healthcare coverage in equilibrium, meaning that employers and employees negotiate over the terms of employment, and the features of the contract are therefore agreeable to both parties. Including healthcare as a contract term is important because, in most workplace environments in the U.S., employers provide healthcare coverage.[1] As such, an employer's position on whether to offer healthcare benefits boils down to a central tension between the cost of providing coverage and the benefits of potentially-greater productivity and fewer, shorter absences for health-related reasons.[2]

[1] In the U.S., coverage is associated with employment—as most (54.6%) citizens obtain healthcare coverage either directly from their own employer, or indirectly through their spouse's employer (Statista 2021).

[2] In this regard, healthcare coverage differs from ensuring safe workplaces (Pagell, et al. 2014, 2015) in that safety is a non-negotiable element of any employment contract.

Using an equilibrium approach is necessary because the mechanisms involved on both sides are complicated, and productivity is rarely observed in the data. Whereas workers with healthcare coverage may be more productive and therefore justify earning a higher wage, the relative attractiveness of jobs that provide healthcare coverage may also mean that workers are willing to take less compensation, in the form of wages, for greater indirect compensation through healthcare coverage (Dey & Flinn 2005, 2008; Fang & Gavazza 2011; Dizioli & Pinheiro 2016; Aizawa & Fang 2020). We capture the two-sided nature of employment contracts and estimate the effect of coverage on equilibrium outcomes for the employer and employee, including employment productivity and job duration.

Healthcare coverage can address both components of lost productive time, increase a worker's capacity for work, and lead to a health productivity premium. That is, since healthcare coverage leads to higher utilization of healthcare services (Xu, Mishra & Linderman 2023; Finkelstein et al. 2012), it is likely that covered workers stay healthy longer, and if they experience a health challenge, a healthy worker may have a lower probability of leaving work due to illness. In instances when a worker must expend resources to engage in self-protection, this results in cognitive or physical strain (Das et al. 2008). In response to this strain, workers without coverage may assign less resources to their job, fall behind the productivity of their healthy-worker counterparts and, with repetitive, manual labor, fatigue more easily and have lower output (KC 2020). Further, less healthy workers are absent more frequently, and spend more time out of the workplace when sick or injured (Dizioli & Pinheiro 2016). We formally model the health productivity premium, or the idea that unhealthy workers have less capacity for work (e.g., lower processing rate in Gubler, Larkin, & Pierce 2018) by using healthcare coverage as a variable that affects productivity, and the durations of employment and unemployment.

Interest in farmworker healthcare coverage and the effect of coverage on the economic sustainability of farm work rose after implementation of the Affordable Care Act (ACA), and the associated expansion of state-level Medicaid plans, insurance subsidies, and taxbased penalties. Kandilov & Kandilov (2022) use a multistate sample of workers from the National Agricultural Workers Survey (NAWS) to find that implementing the ACA lead to a significant increase in government-sponsored insurance coverage and healthcare utilization, but had little effect on the supply of labor, with a slight increase in workers' farm hours and no change in non-farm hours. Their evidence suggests that newly gained health insurance "may contribute to healthier workers" (Kandilov & Kandilov 2022, pg 1029). Similarly, Donkor & Perloff (2022) use the NAWS data to show that the ACA reduced farmworkers' inefficient use of high-cost hospital services and substantially greater use of preventative care. We complement this research and go one step further by examining the consequences of increased healthcare coverage and primary care utilization on productivity and employment-duration outcomes. While higher levels of coverage are an important policy outcome, we argue that coverage is a means to an end since, when farm managers decide on whether to offer health insurance coverage, the more distal effect on worker productivity is quite important.

We estimate the effect of healthcare coverage on productivity in the context of agricultural farm work. Farm work in the U.S. tends to require relatively low levels of skill and is fairly predictable in terms of the types of tasks that need to be performed, but it is physically demanding. Working in harsh conditions over long periods of time, farmworkers have many physical health risks due to their working environments, which can have long-term health consequences (Mobed, Gold, & Schenker 1992; Nordstrom, et al. 1995; Villarejo & Baron 1999; Hansen & Donohue 2003). In an agricultural setting, workers' health has a real implication for productivity.[3]

We estimate our structural model of worker outcomes using a repeated cross-sectional data sample from the National Agricultural Workers Survey (NAWS). NAWS has become a standard data source for studying agricultural production, including the impact of immigration on wages (Richards 2018), the decline in farmworker migration (Fan et al. 2015), the

[3] Arguably, healthcare coverage for U.S. farmworkers is more than just a job benefit because the nature of the farm work leads, almost inevitably, to job-related injuries and health-related reductions in productivity.

impact of legal status on earnings (Isé & Perloff 1995), the elasticity of labor supply (Li & Reimer 2020), worker injury (Tonozzi & Layne 2016) and, in a topic closely related to our own, the effect of implementing the Affordable Care Act (ACA) on farmworker healthcare coverage (Kandilov & Kandilov 2021, Donkor & Perloff 2022). As the only U.S. data source that describes both worker healthcare coverage and wage outcomes, NAWS is ideally suited for our purposes.

We focus our attention on workers who tend to do very similar jobs, in similar geographic settings, which minimizes any potential differences in workers' job requirements or their estimated job performance. In order to ensure comparability across workers, we isolate a sample of U.S. farmworkers employed primarily in the specialty crop industry in the state of California (CA). Our sample captures over $24,000$ worker records over a 32 year sample period from 1989 through 2020. The NAWS data provide annual work histories for each survey subject, which allows us to parameterize an econometric model of job search, matching, and bargaining. It also contains sufficient information on job outcomes, which allows us to estimate the relationship between worker attributes, productivity, duration, and healthcare status.[4] Where necessary, we supplement the NAWS data with industry-level worker-share-of-output data from the Quarterly Census of Employment and Wages (QCEW) in order to help identify variation in worker bargaining power over time and across industries, as in Flinn (2006).

We begin our analysis by examining the data for patterns using simple linear regression models of wages, employment duration, and unemployment duration on a set of controls and a healthcare coverage indicator variable. We make no claims that these models are able to recover causal estimates of healthcare coverage on each of our employment outcomes, as our objective in estimating these models is only to uncover any associative relationship between

[4]Because workers select into the jobs they choose, identifying the impact of healthcare coverage on productivity requires that we control for wage and retention effects in order to isolate the independent effects of coverage on productivity outcomes. Further, as workers search optimally for new jobs, and employers seek the most productive employment matches possible (Burdett and Mortensen 1998), it is very likely that health, and the need for coverage, enters into the search-and-bargaining process (Cahuc, Postel-Vinay & Robin 2006).

coverage and job outcomes. Controlling for the endogeneity of healthcare coverage, our summary analysis finds that healthcare coverage is positively related to wages and job duration for CA farmworkers. After controlling for experience, education, and other demographic factors, we find that wages are some 8.2% higher for covered workers. Our maintained hypothesis, however, holds that the true relationship between healthcare coverage and worker performance is an equilibrium outcome, determined through negotiation between workers and their employers, and workers' subsequent work activities.

Our structural model of job search, matching, and bargaining equilibrium shows that the average employment match surplus per hour of work, or the average amount of economic surplus generated by workers for each hour of work (i.e., the productive value of the match relative to the implicit reservation wage), is some 20% higher for covered workers ($4.72 vs. $3.94). This value is an equilibrium result, so it controls for the fact that employers and employees are endogenously matching into employment contracts in which the employer is likely to choose employees that it deems worthy of the coverage risk, and workers choose employers they believe provide the most favorable combination of compensation, health and safety benefits. We also find that job duration rises in the likelihood that a workers is covered, meaning that workers are either more likely to stay healthy while on the job, or simply remain with an employer that provides healthcare coverage, as opposed to finding another job that may lack coverage. Finally, our structural findings show that workers earn some 23% of the match value due to their exercise of bargaining power in the employment contract.

We contribute to the literature on how healthcare coverage affects farmworker productivity by demonstrating that the employer-provided healthcare coverage (1) increases the workers' capacity for work, evidenced by higher wages and job duration, (2) improves employee retention and firm profitability, and (3) allows employers to generate higher levels of economic surplus from each worker contract. Covered workers are more productive most likely due to a health productivity premium or the idea that coverage improves utilization of preventative care (Finkelstein et al. 2012; Donkor & Perloff 2022), which leads to healthier workers (Kandilov & Kandilov 2022), and translates to more farm hours worked or a higher rate of production (Gubler et al. 2018). More generally, our work adds to an understudied element of productivity, namely how job-related benefits can address physical or psychological capacity constraints inherent in manual labor, using a relatively homogeneous sample of workers engaged in highly demanding work.

Second, we contribute to the empirical labor-economics literature by documenting the wage and employment-duration effects of healthcare coverage for a set of relatively low-income workers who work in jobs that are inherently either dangerous or likely to negatively affect their health over time. We recognize that the productivity effects of healthcare are only identified in equilibrium as an employer's decision to offer coverage, and an employee's decision to take a job that offers coverage, are subject to many often-competing incentives that we can only disentangle in an equilibrium framework. While others document the value of using an equilibrium approach in general employment contexts (Dey & Flinn 2005; Fang & Gavazza 2011; Aizawa & Fang 2020; Kim 2022) we are the first to do so for agricultural workers.

Third, we contribute to the management literature in providing evidence on the profitability of offering healthcare coverage to farmworkers. While the general operations-management literature highlights the limitations of worker exploitation (Roth & Zheng 2020), and more recent studies have focused on worker well-being (Corbett 2023), we are the first show that offering healthcare coverage for workers who are likely to be more at-risk than other occupations is another profit-enhancing operational decision.

In the next section of the paper, we present a well-understood model of labor-market equilibrium (Dey & Flinn 2005; Flinn 2006) and explain the implications of equilibrium search, matching, and bargaining for how healthcare provision can affect market wages and employment duration. We also show how we estimate the parameters of our structural model using maximum likelihood methods. We explain our identification strategy and data sources in the third section and summarize our sample from the NAWS data set. In the fourth section, we present a full set of results, including reduced-form and structural models, as well as a simulation of firm-level implications of offering health insurance coverage. In the final section, we conclude and offer some suggestions for future research that build on our findings.

Empirical Model

Theoretical Model of Employment Bargaining

We apply a model of labor market search, matching, and bargaining developed by Flinn (2006) to examine equilibrium employment and productivity outcomes among our sample of farmworkers. Job duration, unemployment, productivity, and wages are each equilibrium outcomes in the sense that firms search optimally for workers, workers search optimally for jobs, and search occurs until the point at which the marginal benefit of additional search effort is just equal to the marginal cost of doing so (Stigler 1961). When both firms and workers optimize, the "employment surplus," or the amount of value created by the worker for the firm, is at a maximum. Our framework departs from the usual "take it or leave it" assumption in the labor economics literature (Burdett & Mortensen 1998; Van den Berg & Ridder 1998; Eckstein & Van den Berg 2007) by allowing workers and firms to bargain over wage outcomes. Negotiation between firms and workers, or their representative, means that the amount of employment surplus is shared between workers and firms according to their relative bargaining power, which is exogenous to each party and is usually determined by attributes, interpreted as negotiating "skill" (Nash 1950; Muthoo 1999), and estimated with the data.[5]

[5]Our model belongs in the general class of "imperfectly competitive" labor market models in which both workers and firms can profit from the employment relationship. In these models, imperfection refers to the existence of search frictions, and not the usual market power relationships of monopsony hiring or monopoly labor unions (Bhaskar, Manning, and To 2002; Manning 2003; Ashenfelter, Farber, and Ransom 2010; Ransom and Oaxaca 2010; Hamilton et al. 2022).

A number of other authors have used a formal model of search-and-matching outcomes, and our study builds on their contributions. For example, Flinn (2006) examines how minimum wage laws affect equilibrium wages and employment, Dey & Flinn (2005) consider how wages differ between those who have healthcare and those who do not, and Flabbi & Moro (2012) consider gender differences in compensation. We are the first, however, to explore how wage, employment duration, and productivity outcomes for low-skilled farm workers depend on the presence of healthcare coverage. In this section, we provide a brief explanation of the core of our theoretical model, and use this model to derive several testable empirical relationships between healthcare coverage and wages, productivity, job duration, and unemployment duration.

Following the standard approach in this literature (Pissarides 2000; Flinn 2006), our model assumes that match productivity (ϕ) is distributed across the sample of workers according to a distribution function, $f(\phi)$, which is assumed to be log-normal and is determined by the production technology used by the firm. We follow Flinn (2006) in what follows, and assume that both firms and workers observe the productive value of the match, ϕ, and that match productivity depends on whether the worker has healthcare coverage (h) or not (Dey and Flinn 2005; Aizawa & Fang 2020) so that $\phi(h) > 0$, $\phi'(h) > 0$, and $\phi''(h) < 0$. The exogenous rate of job termination for employed workers is δ, the exogenous rate of job contacts, or the rate at which jobs are created, for unemployed workers is τ, and the discount rate is $\beta > 0$. Workers negotiate with an exogenously determined amount of bargaining power, $\lambda \in (0, 1)$, which reflects the share of the match surplus they retain from the employment relationship.

Labor is considered the only factor of production, so firms earn zero profit, and derive no value from participating in the labor market if they do not employ workers. The profit from employing a worker is the difference between their productivity value and the wage, or $\phi(h) - w$, where w is the wage paid to employees. Employers and employees negotiate according to a Nash (1950) bargaining framework in which the strength of each player's bargaining position depends on the value of their next best alternative, or their "disagreement profit" in Nash bargaining terminology. From the worker's perspective, the disagreement profit is the value of staying unemployed, during which time they are assumed to continue searching for a job, so their next best alternative is the value of ongoing job search efforts, denoted by W_u. At a certain point, there is a threshold wage, the critical match value, $\phi(h)^*$, that determines whether an unemployed worker will accept a job offer. The critical match value is given by $\phi(h)^* = \beta W_u$, and determines whether labor will be supplied, as all values of $\phi(h)$ that meet or exceed $\phi(h)^*$ will result in employment while those that are lower will not. Once a worker accepts a job offer, the value of employment depends on the wage, $W_e(w)$.

With these assumptions, the value to a worker of taking a job is the present value of their wage, plus the expected present value of reverting to unemployment, or:

$$W_e = \frac{w + \delta W_u}{\beta + \delta}, \tag{1}$$

where the "effective" discount rate includes a risk premium for the possibility of becoming unemployed. At the same time, the value of unemployed search is equal to the reservation wage (or the utility of consuming leisure, R) plus the expected present value of the surplus earned from taking a job at any wage greater than the critical match value:

$$\beta W_u = R + \frac{\lambda \tau}{\beta + \delta} \int\limits_{\beta W_u} [\phi(h) - \beta W_u] df(\phi(h)), \tag{2}$$

where the expected value is over the entire distribution of possible match values above the reservation value.

From the firm's perspective, the value of employing a worker with productivity level $\phi(h)$ is simply the present value of the amount of employment surplus, discounted at the same rate as the employee, or:

$$W_f = \frac{\phi(h) - w}{\beta + \delta}, \tag{3}$$

where the wage is assumed to include the cost of healthcare coverage implied by h.

Once a match occurs, employers and employees bargain for wages at all values of $\phi(h) \geq \phi(h)^*$, that solve the generalized Nash-bargaining problem:

$$w(\phi(h), W_u) = \arg\max_w [W_e(w) - W_u]^\lambda \left[\frac{\phi(h) - w}{\beta + \delta}\right]^{1-\lambda}, \tag{4}$$

where λ measures the share of employment surplus earned by the employee, and $(1 - \lambda)$ the share earned by the employer, recalling that the disagreement profit for the firm is zero. In the absence of any consideration for minimum wages, the wage that solves (4) is given by:

$$w(\phi(h), W_u) = \lambda\phi(h) + (1 - \lambda)\beta W_u, \tag{5}$$

where recall that $\beta W_u = \phi(h)^*$ is the threshold match value for the employee. However, minimum wages are an important feature of the low-skilled, agricultural labor market (22% of our sample), so we follow Flinn (2006) in modifying the problem to explicitly allow for the imposition of minimum wages on market-driven wage bargaining.

Minimum wages constrain the wages employers can pay. However, because employers earn some surplus on each employee, depending on the realized values of ϕ and λ, they have the ability to give up some surplus to hire workers with ϕ greater than the minimum wage (w_m) even though the minimum wage may be greater than the equilibrium wage suggested by (5). To see this more formally, assume the value of unemployed search is now a function of the minimum wage, and solve for the threshold value of $\hat{\phi}(h)$ that holds when $w = w_m$, or

$$\hat{\phi}(w_m, W_u(w_m)) = \frac{w_m - (1 - \lambda)W_u(w_m)}{\lambda},$$

so the minimum wage defines regions of the equilibrium match value that separate workers who are paid clearly above the minimum wage, those who are paid the minimum wage, and those who are not hired at all. Because minimum wages impose a discontinuity on the distribution of wages, the value of unemployed search becomes:

$$\beta W_u(w_m) = R + \frac{\tau}{\beta+\delta}\left\{\int_{w_m}^{\hat{\phi}} [w_m - \beta W_u(w_m)]df(\phi) + \lambda \int_{\hat{\phi}}^{\infty} [\phi(h) - \beta W_u(w_m)]df(\phi)\right\}, \quad (6)$$

which changes the solution for the equilibrium market wage. Substituting (6) back into the Nash bargaining problem in (4) and solving for the equilibrium wage distribution leads to:

$$g(w; W_u(w_m)) = \left\{\begin{array}{ll} [f'(\hat{\phi}(w, W_u(w_m))]/\lambda f(w_m), & w > w_m \\ [f(w_m) - f(\hat{\phi}(w, W_u(w_m)))]/f(w_m), & w = w_m \\ 0, & w < w_m \end{array}\right\}, \quad (7)$$

for workers that are paid above the minimum wage, at the minimum wage, or who are not hired, respectively. The equilibrium wage distribution in (7) suggests that healthcare coverage has a positive return to worker wages, productivity, job duration, and firm profit, which we refer to as the health productivity premium.

Empirical Model of Wage Determination

We estimate the model with data on observed wages (w_i) and the amount of time spent unemployed during the past year (t_i) for a repeated cross-section of some $N = 24,151$ worker-year observations for employees in the California specialty-crop industry. We describe our data in more detail below but find that it is sufficient to identify all of the parameters of the wage distribution above, including the Nash bargaining parameter, λ, that determines the share of employment surplus earned by employees, and by firms. In this section, we derive the log-likelihood function developed by Flinn (2006) that is used to estimate the parameters of search, matching, and bargaining models such as ours.

Because minimum-wage employment is common in agriculture, we follow Flinn (2006) and break the likelihood function into three parts: (1) the probability that a worker is unemployed for a duration of t weeks, (2) the probability that a worker is employed and paid a wage that is equal to the minimum wage, and (3) the probability that a worker is employed and paid more than the minimum wage.

For the first component of the likelihood function, we have to assume a distribution for unemployment durations, in general. In this regard, like Flinn (2006), we follow common practice and assume the distribution of the population duration function is negative exponential, so we write the individual-density of job duration as the mean, or:

$$pr(t|u) = \tau f(w_m) \exp(-\tau f(w_m) t), \tag{8}$$

where the parameters and minimum wage variable are as defined above. We use the parametric rate of job destruction to infer that the probability of a worker becoming unemployed during the year is:

$$pr(u) = \frac{\delta}{\delta + \tau f(w_m)}. \tag{9}$$

Multiplying the conditional probability of observing a spell of length t, given that the worker is unemployed, by the marginal probability of becoming unemployed gives the joint probability of observing an employee becoming unemployed for a period of length t, or:

$$pr(t, u) = \frac{\delta \tau f(w_m) \exp(-\tau f(w_m) t)}{\delta + \tau f(w_m)}, \tag{10}$$

and we assume f is log-normal, with parameters μ for the mean and σ for the standard deviation.

Second, we derive the likelihood-component that captures the probability that a worker is employed and paid the minimum wage. Recall that the primary implication of a minimum wage regime is to constrain the range of equilibrium productivity values to those that lie above the minimum wage. With this in mind, the likelihood contribution from minimum-wage employees is given by:

$$pr(w = w_m, e) = \frac{\tau\left[f(w_m) - f\left(\frac{w_m - (1-\lambda)\beta W_u(w_m)}{\lambda}\right)\right]}{\delta + \tau f(w_m)}, \tag{11}$$

which represents the probability a worker is employed (e) but is paid the minimum wage, so the firm is willing to give up some surplus in order to hire a worker that still produces value greater than the level of the minimum wage.

A third segment of workers are employed and paid above the minimum wage. For these workers, the minimum wage is still relevant, however, as it remains an element of the value of unemployed search which, in turn, determines the threshold match value for employment. The probability of observing a wage w for an employed worker, therefore, is the product of the conditional probability of observing a worker being paid above the minimum wage, conditional on being employed, and the probability of observing a particular wage above the minimum. The second element of this expression, therefore, is given by:

$$pr(w|w > w_m, e) = \frac{\frac{1}{\lambda} f'\left(\frac{w - (1-\lambda)\beta W_u(w_m)}{\lambda}\right)}{f\left(\frac{w_m - (1-\lambda)\beta W_u(w_m)}{\lambda}\right)}, \tag{12}$$

as the wage has to exceed the match-minimum of $\frac{w_m - (1-\lambda)\beta W_u(w_m)}{\lambda}$. Meanwhile, the conditional probability that a worker's wage is above the minimum, conditional on employment, is:

$$pr(w > w_m|e) = \frac{f\left(\frac{w_m - (1-\lambda)\beta W_u(w_m)}{\lambda}\right)}{f(w_m)}. \tag{13}$$

Multiplying these two expressions together provides the joint probability, and likelihood contribution, of observing a wage w that is above the minimum w_m for an employed worker:

$$f(w, w > w_m, e) = \frac{\frac{\tau}{\lambda} f'\left(\frac{w - (1-\lambda)\beta W_u(w_m)}{\lambda}\right)}{\delta + \tau f(w_m)}. \tag{14}$$

Combining all three elements, taking logs, and summing over all individuals in the data set provides a likelihood function that recovers all of the parameters of interest:

$$
\begin{aligned}
LLF = {} & [\ln(\tau) - \ln(\delta + \tau f(w_m))] + d_U[\ln(\delta) + \ln f(w_m)] - \\
& \tau f(w_m) d_U t_i + d_M \ln\left(f(w_m) - f\left(\frac{w_m - (1-\lambda)\phi^*}{\lambda}\right)\right) - \\
& d_H \ln(\lambda) + d_H \ln\left(f'\left(\frac{w_i - (1-\lambda)\phi^*}{\lambda}\right)\right),
\end{aligned} \tag{15}
$$

where d_U is a binary indicator of whether the worker is unemployed ($d_u = 1$) or employed ($d_u = 0$), d_M is a binary indicator that the worker is paid above the minimum wage, and d_H is a binary indicator that the worker is paid above the minimum wage. With this likelihood function, we estimate the implicit minimum wage as $\phi^* = \beta W_u(w_m)$, and capture the fact that productivity is a function of healthcare coverage by allowing the distribution f to be a linear function of a binary healthcare indicator (h) that takes a value of one when the worker has healthcare coverage and zero when they do not. In the application below, we also allow the rates of job creation (τ) and destruction (δ) to depend on the healthcare variable as an extension to our base model in (15). In the next section, we provide more detail on the data we use to estimate this model and provide some model-free evidence of the impact of healthcare coverage on worker productivity and longevity.

Data and Identification

California is the largest producer of labor-intensive agricultural products in the U.S., so we focus our analysis on employees who work on California farms. We use confidential, employee-level data from the NAWS (DOL 2022), which is a nationally- and regionally-representative sample of non-H-2A crop farmworkers.[6] Although others use national samples from the

[6] The H-2A program is a non-immigrant guest worker program established under the 1986 Immigration Reform and Control Act (IRCA). Unlike the H-1B and H-2B programs that apply to workers in the technology and hospitality industries, respectively, the H-2A visa program is not subject to an annual cap, but employers must follow regulations on worker safety, health and sanitation, transport, shelter, and wages

NAWS data, and use differences in healthcare coverage policies among states to identify the effect of policy-variation on coverage (Kandilov & Kandilov 2022; Donkor & Perloff 2022), our focus on productivity means that we need to restrict our sample to workers that are as comparable as possible. Even if we focus on one sub-sector of the agricultural industry, specialty crops for example, productivity and production conditions between Michigan and California are very different and differ in ways that simple fixed effects cannot absorb. Therefore, our focus on California is necessarily driven by our empirical focus.

The NAWS contains data on each farmworker's wage, their duration of unemployment during the previous 52 weeks, the number of years they have been employed with their current farm employer, the crop they were working in at the time of the survey, their job task (e.g., harvest, semi-skilled, supervisor, etc.), and a host of demographic variables, including age, gender, educational attainment, the number of years they have been engaged in farm work, foreign-born and legal status, and several variables that identify the nature of employer health coverage. Kandilov & Kandilov (2022) provide a summary of the extent of healthcare coverage variables available in the NAWS data (their Table 1, panel B). Among the healthcare coverage variables in NAWS, we use the NAWS variable D22 for our measure of health coverage, which is a binary variable that equals one if the answer is yes (and zero if the answer is no) to the question "If you are injured at work or get sick as a result of your work, does your employer provide health insurance or provide or pay for your health care?" Figure 1 shows the share of California's non-H-2A crop farm workforce that had access to health coverage between 1988 and 2022 using this variable.[7]. Figure 1 shows that health coverage increased significantly during the 1990s but has fluctuated around the 80% mark ever since. Using data from the National Health Interview Survey (NHIS), Figure 2 compares health coverage status across all sectors of the economy in the western US to the average farmworker

(U.S. Department of Labor, 2022).

[7]We examine the robustness of our findings to other measures of healthcare, including our maintained D22 variable plus a measure of workers compensation (D23) and coverage for health issues that do not occur on the job (D24). Our results remain qualitatively the same for each of these other measures of healthcare coverage.

in the western US between 2010 and 2020, revealing a significant disparity, meaning that even since passage of the ACA, farmworkers are less likely to be covered than workers in other sectors of the economy.

[Figure 1 here]

[Figure 2 here]

Table 1 shows a set of summary statistics from our sample of California farmworkers. Roughly 20% of the workers were female. According to the NAWS, about half of the farm workforce was undocumented over our sample period, and the average worker had about 14 years of farm work experience, 7 years of education, was 36 years old, and was unemployed for about 8 weeks during the previous year.

While male and female workers have similar levels of health coverage, undocumented workers are about three percentage points less likely to receive coverage, revealing a disparity due to a lack of legal status. Similarly, workers with less than 12 years of schooling are three percentage points less likely to have access to health coverage. Importantly, in our reduced-form and structural analyses, we control for these individual characteristics to help mitigate bias that may arise from human capital accumulation or selection into treatment. To directly address selection into treatment, we also estimate a set of Heckman (1978) endogenous treatment models.[8] Our Heckman selection models provide evidence that less healthy farm employees are more likely to work for employers that provide health coverage. This "negative selection" into health coverage suggests that Ordinary Least Squares (OLS) wage estimates are biased downwards because less productive workers tend to earn lower wages. In the next section, we present model-free evidence to investigate the link between employer-provided health coverage and the wages and duration of employment and unemployment.

[Table 1 here]

[8]These models are identical to the classic Heckman (1979) selection models that corrects for censored outcome variables except they correct for selection into treatment (having access to health coverage) and use all the available data for the outcome variable, as opposed to using only observations that exceed some censored value.

Econometrically identifying the bargaining parameter (λ) – the parameter that divides the amount of employment surplus between the employee and the employer – is notoriously difficult in data that includes only unemployment duration and hourly wages. Fundamentally, worker-based data like our NAWS sample represents observations from only the supply-side (worker side) of the employer-employee equilibrium. Variation in wages and unemployment duration is able to capture workers' threat point, or disagreement profit in the Nash (1951) framework, but not the employers'. Others remedy this weakness in worker-level survey data by using matched employee-employer data (Cahuc et al. 2006), but there are no similar data sets for U.S. agricultural workers. Therefore, we follow Flinn (2006) in using data that captures the "demand side," or employer side, of the equilibrium to help identify worker bargaining power.[9]

In our application, we use data on the variability of labor's share of revenue, by industry, to estimate a flexible bargaining-power function that is more likely to be identified than if we were to use the worker-only information in the NAWS.[10] Specifically, we use data on the labor-share of revenue for workers in the agricultural production industry to help measure employers' bargaining power. Our revenue and labor-compensation data are defined as total gross receipts for all firms and total compensation for production workers, respectively, and are from USDA-NASS for NAICS codes 111 - 115 (USDA-NASS). Over the sample period, the average labor-share is 21.1% of value (s.d.= 5.9%) with a minimum value of 1.8% and maximum of 32.2%. In line with Flinn (2006), our assumption in using these data is that the labor share of revenue captures variation in the marginal revenue product of workers across industries and time with constant-returns to scale.

With these data, we embed a least-squares estimator for the bargaining power parameter

[9] Estimates of our model without demand-side information as in Flinn (2006) show that the bargaining-power parameter appear to be well-identified using only worker-side information, but we choose to follow his approach due to both conceptual issues in identifying λ and for comparability with others in this literature. Our results below show estimates both with and without demand-side data.

[10] Flinn (2006) uses the labor-share of revenue for one large fast-food company for the year 1996 because it is a dominant employer among minimum-wage workers (18 to 24-year-olds) that is publicly traded, so their financial data is readily available.

(λ) into the likelihood function for equilibrium wages with search-and-bargaining (15) above, where λ is a simple linear function of the labor share of revenue in each industry. We estimate both in one procedure, so the estimate of λ reflects both demand- and supply-side information as in Flinn (2006). In this way, we are able to identify the bargaining power parameter.

Results

Reduced-Form Evidence

We begin our empirical analysis by estimating a set of OLS regression models, controlling for demographics, crop, job task, and year fixed effects,[11] in order to explore the statistical association between healthcare coverage and the wages, duration of employment, and duration of unemployment among farm employees. The results are presented in Tables 2, 3 and 4, respectively. In each table, we supplement our OLS analysis with a Heckman endogenous treatment model (see column (5)). Table 2 column (4) indicates that employer-provided health coverage is associated with a 4.3% increase in real wages, adjusted for all the covariates. This result reveals a statistically significant positive correlation between health insurance and wage compensation, suggesting that employers who offer health coverage are able to retain a more productive workforce. The estimate in column (5) reveals that, once we control for negative selection into treatment using the Heckman two-step correction, health coverage is associated with an 7.9% increase in wages. Figure 3 shows the average wage of employees with and without health coverage, revealing that a wage premium exists almost uniformly across the sample period.

[11] Weighted with the NAWS sample probability weights (variable PWTYCRD). The NAWS data analysis guide (DOL, 2018, p.21 - 25) recommends using balanced repeated replication (BRR) weights to generate survey design-corrected standard errors for regression parameter estimates. However, since 2016, BRR weights have not been available in the NAWS datasets. In the absence of BRR weights, which should be available when the next round of survey data is released, the DOL recommends using a Taylor linearized variance estimator (TLVE). However, research by Chowdhury (2013) indicates that TLVEs can overestimate standard errors by up to 25% and that BRR weighted standard errors are preferred. As such, we do not use the TLVE approach and rely upon bootstrapped standard errors instead.

[Figure 3 here]

The other parameters that identify the statistical association between human capital variables and wages are consistent with theoretical expectations. Older workers tend to earn more (up to a point), female workers tend to earn less, education leads to higher wages, undocumented workers are at a disadvantage relative to legally-authorized workers, and workers with more relevant work experience tend to earn more. While these results are suggestive of a positive impact of health insurance on productivity, we do not interpret them as causal. Instead, we use this exercise to show that the relationship warrants further investigation. In the next section, we generate structural estimates of the impact of health insurance on the productivity of farmworkers using the search, match, and bargaining framework described in Section 2.

[Table 2 here]

Next we turn our attention to job tenure to examine whether our simple regression framework provides evidence of a relationship between health coverage and the length of employment. Our reduced-form analysis indicates that, when examining similar employees, those who have access to health coverage stay employed with their employers for longer periods of time. The coefficient on the health coverage variable in column (5) of Table 3 indicates that among workers with the same demographic composition and farm work experience, those who have health insurance stay employed with their current farm employer about 65% longer than those without. Older workers and those who are foreign-born tend to stay with an employer longer, but undocumented workers have a slightly lower duration of employment relative to legally authorized workers.

[Table 3 here]

When examining the relationship between health coverage for employed workers and the duration of unemployment during the previous year using the simple OLS regression (column (4) of Table 4), we are unable to reject the hypothesis of no statistical relationship. Although this coefficient is positive, it is not statistically significant at any conventional level of significance. Thus, at a first glance, the summary evidence suggests that health coverage is not a significant factor in determining the length of unemployment. However, once we perform the Heckman correction, the coefficient becomes highly significant and positive (see column (5)). These results are consistent with a scenario in which employees who have health coverage maintain a certain loyalty to their employer because the employer offers health coverage (Table 3), but they are more likely to be unemployed during the off-season when the employer has less demand for their labor. Industry sources say it is common to require farm employees to take time off during the winter, and employees often have an opportunity to obtain unemployment insurance benefits during that period of time.

[Table 4 here]

Structural Estimates

The results from equation (15) are in Table 5.[12] Model 1 does not allow the productivity distribution to be affected by health coverage status, but it allows one to generate an estimate of the average match value and economic surplus created in the labor market for each hour of work, irrespective of whether the employer offers health insurance.[13] Our parameter estimates from Model 1 suggest that, on average, employees generated \$7.68 worth of match value per hour (in \$2020) over our sample period and had an average critical match value of \$3.18, suggesting that \$4.49 of match surplus was split among employers and employees. Farmworkers retained 23% (or \$1.03) of this surplus while employers retained the other 77% (\$3.46). Further, in this model, as in all the other models, the Heckman endogenous-treatment parameter (IMR) is positive and significant, suggesting that healthcare is not only an important attribute, but forms part of the equilibrium bargain between workers and their employers.

[12]The estimates in Table 5 are based on healthcare coverage as measured by question D22 in the NAWS survey, as described above. In Appendix B, we offer estimates in which healthcare is defined as either D22 or D23, which examines the effect of offering workers compensation to farm employees. Our results remain very similar. We also estimate the structural model using healthcare defined as either D22, D23, or D24 (coverage for injuries or sickness incurred off-the-job) and our findings again remain very similar.

[13]The mean value of the productivity distribution, which follows a log-normal distribution, characterizes the average match value and is calculated as follows: $e^{\mu+.5\sigma^2}$.

[Table 5 here]

In Model 2, we allow μ, the mean of the log-normal productivity distribution, to vary by health coverage status. The results for Model 2 reveal that health insurance creates \$0.35 in value per hour worked relative to the baseline match value of \$7.40 for employees without health insurance. In Model 2, workers retain the same share of the economic surplus as in Model 1, but those with health insurance retain \$1.05 of match surplus, while those without retain \$0.97. In terms of the mechanisms described above, our findings in Table 5 for Model 2 show that, controlling for selection into healthcare insurance and hence the fact that inherently more productive workers may choose jobs that offer healthcare insurance, productivity increases when workers are offered healthcare coverage. All else constant, health insurance coverage improves employee outcomes, even when their percentage-share of employment surplus does not change.

Model 3 additionally allows δ, the job destruction rate, to vary by health coverage status. In this specification, the job destruction rate is five percentage points higher for workers with employer-provided health coverage, while the other estimates remain very similar to those described above for Model 2. While perhaps counterintuitive, we interpret the finding that job destruction rises with healthcare coverage as implying that employers offering healthcare may be more careful in selecting the types of workers they employ, and are more likely to terminate marginal workers while retaining only those who "make the cut."

Models 4 and 5 are our most flexible specifications. They both allow for the job creation and destruction rates (τ and δ), as well as the mean of the productivity distribution (μ) to vary by health coverage status. The bargaining power parameter λ in Model 4 is estimated with supply side data only, while Model 5 also uses the demand side data. Our estimates from these models are very consistent with those from the other specifications. These results indicate that health coverage is associated with a three percentage point higher job creation rate and a six percentage point increase in the job destruction rate, in addition to higher average productivity. Since the magnitude of job destruction is twice that of job creation, this suggests that employers use a more stringent criteria to evaluate existing employees and maybe more likely to dismiss under-performing workers. Still, employers who offer healthcare are more likely to create jobs than those who do not, regardless of their willingness to keep hired employees on the payroll.

Controlling for the endogeneity of selection into healthcare, the results from Model 5, our preferred specification, indicate that workers with health coverage create \$0.78 in additional economic surplus per hour relative to the baseline of \$3.94. Workers with health coverage retain an additional \$0.18 in economic surplus for each hour worked relative to their implicit reservation wage, while employers retain the rest.

In fact, employers retain some 77% (i.e., $1 - .2284$) of the surplus from the employer-employee work relationship and gain an extra \$0.60 per hour in surplus when they offer health insurance, relative to their baseline share of the surplus (\$3.04) when they do not offer healthcare benefits. We also find that health coverage is associated with a three percentage point higher job creation rate and a six percentage point increase in the job destruction rate, in addition to higher average productivity. The fact that the job destruction and creation rates are both positively impacted by health coverage status suggests that employers may be more picky about the workers they retain, but that health insurance is likely being offered as a recruiting incentive to attract a larger pool of workers. Increased scrutiny among employers may help addres endogenous employee selection into jobs that offer healthcare coverage, in other words, firms that offer expensive healthcare may be faster to fire workers who do not produce enough to cover the cost of their coverage. On the other hand, firms that offer coverage are better able to attract workers and ”create” new jobs for workers seeking jobs with attractive benefits. Ultimately, our results suggest that, all else equal, when employers provide health coverage to their employees, they are able to retain a more productive workforce, and higher firm profit. Employers also retain a disproportionate share of the bargaining power so they are indeed able to retain some of the incremental benefit of healthcare coverage – above the cost of offering coverage – so the common property argument for not providing healthcare does not hold up to our empirical analysis.

Our findings imply that employers who do not offer their employees health coverage are missing out on a significant economic opportunity to retain a more productive workforce and increase the economic value of the employee-employer match. Therefore, our analysis suggests that health coverage increases worker productivity by promoting worker health.

While prior research finds that firm-sponsored wellness programs do not necessarily increase productivity (Jones, Molitor, & Reif 2020) and that safer work environments reduce the survival rate of firms (Pagell et al. 2020), our findings suggest that when medical expenses are covered by the employer, such that when marginal workers who are on the fence about seeking medical care actually seek treatment, they become more productive and are able to generate more economic value for the firm. Providing healthcare insurance may indeed have a common property element (Aizawa & Fang 2020), but our findings suggest that most of the economic benefit generated by offering healthcare coverage is indeed appropriated by firms. Ultimately, we find that offering health insurance could help improve firm profitability and engagement with the worker community.

Simulations

In order to make our empirical estimates more concrete, we conduct a series of counterfactual simulations. We carry out experiments with different levels of healthcare coverage and calculate outcomes of economic relevance to firms in the agriculture industry. Specifically, we simulate the impact of healthcare coverage on: (1) worker wages, (2) annual worker income, (3) employment surplus, and (4) firm profit. We describe the details of these simulations in Appendix A, and report our findings in Table 6 below. In general, however, each simulation involves allowing the variable h to vary over a range that includes the base case, or observed healthcare, and a reduction of healthcare by up to 20% (in increments of 10%) and an increase of healthcare coverage by up to 20% (again in 10% increments). We show the results of our simulations in Table 6 below.

[Table 6 here]

In Simulations 1 and 2 in Table 6, we examine the effect of healthcare coverage on worker wages. At the observed levels of healthcare coverage, the average real wage over all workers is approximately \$11.08 / hour, but the average wage falls to \$10.80 / hour with a 20% reduction in the probability of coverage, and rises to \$11.39 / hour if healthcare coverage rates increase by 20% from their current level. Recall that this simulation reflects an equilibrium outcome, so our experiment shows not only what the higher productivity of more healthy workers is worth to employers, net of the cost of health-insurance provision, but the outcome of their searching for, finding, and negotiating with workers under different healthcare coverage scenarios. Although others argue that workers may take lower pay in order to obtain healthcare coverage (Aizawa & Fang 2020, a compensating differential) the net effect in our data is the opposite, that employers are willing to not only pay for healthcare, but pay more for the higher productivity that it creates.

In Simulation 2, we scale our wage simulations out to an annual income level, adjusting for the average number of weeks worked per employee, and the number of hours worked per week. On an annual basis, this simulation shows that workers earn $\$22,085$ / year in real income under the base scenario, but annual income would rise to $\$22,691$ / year if healthcare coverage rates were to rise by 20%. This finding shows the potential gain in real welfare for workers in the agricultural industry from expanding healthcare coverage. Although our structural model does not allow for healthcare coverage to affect the number of hours worked per week, Kandilov & Kandilov (2022) show that the effect is likely to be minimal so we assume our approximation is accurate and we can simply scale hourly earnings by the total amount of work per year.

In Simulations 3 and 4, we turn our attention to the implications of healthcare coverage for firm-level outcomes. In Simulation 3, for instance, we examine how different levels of healthcare are likely to impact the amount of surplus earned by the firm, after adjusting for the reservation match value for employees (ϕ^*), and the negotiated share earned by firms

$(1-\lambda)$. Simulation 3 shows that the firm-share of surplus in the base scenario (observed healthcare) is \$3.04 / hour for each hired worker, but falls to \$2.94 / hour with a 20% reduction in the probability of coverage, and rises to \$3.13 / hour if healthcare were to rise by 20%. Because our equilibrium model implicitly accounts for the cost of hiring workers, and providing healthcare, this finding shows that offering healthcare insurance is still a net benefit to firms in the agriculture industry, as their share of employment surplus rises if healthcare coverage rates rise. Moreover, Simulation 4 shows that this finding extends to firm profit, even after taking into account the equilibrium effects of healthcare on increasing both the rate at which workers enter the industry, and leave (see parametric result in Table 5). After adjusting for employee movements, and aggregating over all employees, firm profit is $\$7,436$ in the base scenario, but falls to $\$6,879$ per worker per year if healthcare coverage is reduced by 20%, and rises to $\$8,024$ per worker per year if current coverage rates are increased by 20%. Our simulation results, therefore, clearly show that it is in firm's interest to offer some healthcare coverage, or to expand current coverage rates.

Our simulation findings are perhaps not surprising, given that most farm work includes manual labor and is physically taxing, but represents the first empirical estimate of the economic value of healthcare coverage to farmworkers. Successful farmers understand the value of treating employees well, and our estimates validate farmers' improving worker welfare, regardless of any policy mandate to do so. Further, even though most farmworkers are seasonal, and some are migratory, healthcare coverage does not appear to be a common property resource as employers are able to appropriate and retain enough benefit from offering healthcare coverage to make offering this benefit financially viable.

Conclusion and Implications

Agriculture is a key industry in the US economy, as millions of people depend upon it for their livelihoods, while the rest of society depends upon upstream and downstream markets connected to it through the agri-food supply chain. Farmworkers are an essential part of this system because they provide a critical service that keeps our nation fed, but they are typically exposed to more health dangers than the rest of the population and tend to have less health coverage. Health coverage has important implications for farmworker welfare, and the economic value they generate for our farm economy. As the COVID-19 pandemic made very clear, farmworker health is not only important to the workers themselves, but the resilience and viability of agricultural supply chains more generally.

In this paper, we estimate the effect of healthcare coverage on farmworker wages, productivity, and job duration using a structural model of labor-market equilibrium. Modeling labor-market outcomes in an equilibrium framework like this is necessary as we do not observe actual productivity, nor can we control for differences among workers who are paid at the minimum wage, above the minimum wage, or who are not employed at all. Further, productivity outcomes depend not only on worker behavior, but the hiring and management decisions of the firms that hire them. Wage, productivity, and duration outcomes are therefore highly complex outcomes that reflect the strategic interaction of searching employees, searching employers, and their relative bargaining powers. We estimate an econometric model of search, match, and bargaining, mediated by firms that offer healthcare as a benefit, using a well-understood survey data set (NAWS) covering some $24,000$ agricultural workers in labor-intensive jobs in the state of California over a 1989-2020 time period.

We find that health insurance coverage translates into several benefits in the employer-employee equilibrium. First, on the supply side, health insurance coverage results in higher worker productivity, wages and income. Second, there is a job duration or longevity benefit, whereby workers with health insurance tend to stay employed longer, most likely because covered workers are more inclined to access medical care and stay healthy. The effect on unemployment duration was inconclusive.

We test our core hypotheses that healthcare coverage affects productivity, wages, and job duration by allowing key parameters to vary according to worker health coverage status and use a flexible structural specification to estimate changes in the search-and-match process. First, we find that the productivity benefit of covered workers translates into higher employment surplus ($0.78 / hour), with employers retaining some 77% of the surplus generated from healthcare provision ($0.60 / hour). Recall that this is an equilibrium result, and we control for employee selection into jobs that offer healthcare. Therefore, we interpret this result as implying that even though more productive employees select into jobs that offer healthcare, employers are nonetheless able to retain some of the surplus that remains from paying higher wages and covering the cost of healthcare. Second, we find that the equilibrium rate of job creation is higher when firms offer healthcare benefits than otherwise. At a firm level, a higher rate of job creation means that firms are better able to attract workers, controlling for the selection effect, when they offer healthcare coverage. Given that agriculture, and particularly our setting in the California specialty crop industry, is in chronic labor shortage, the ability to attract new workers is a key competitive advantage. Third, we also find that the rate of job destruction rises in the likelihood of offering healthcare coverage, which we interpret as employers' more careful scrutiny of employee performance and job suitability given employers' higher investment in retaining employees. Taken together, our results suggest that employer-participation in employee health leads to broad reinforcing benefits for both parties, advancing a virtuous cycle of more successful employers attracting better employees, and those employees enjoying better health and economic outcomes.

Our findings are important because we show that farmers who provide healthcare benefits to their workers are better off than those who do not, in the sense that, on average, they earn a greater amount of surplus on every hour of work performed. From an employee perspective, workers are better off as healthcare coverage causes them to stay with the same employer longer, enjoy better health, and earn more for every hour they work. Rather than a public good, therefore, economic incentives suggest that worker health is a "private good" in the sense that the profit from providing healthcare insurance is appropriable by firms, so they should indeed willingly provide healthcare coverage. Although empirical findings in this regard are beyond the scope of this paper, firms will likely to attract better workers as a result.

Our research is not without weaknesses. First, although the NAWS data remains the best source for studying worker-level outcomes, its sample of farmworkers in each state and industry is nonetheless relatively small compared to other data sets for the general population. However, we are confident that the Department of Labor sampling procedures ensure that NAWS is as representative as possible. Second, our structural model provides insights into bargaining power and employment surplus that are not available through reduced-form methods, but it is subject to the same criticisms as any other structural approach. Namely, if the theory behind the structure is incorrect, then the implied relationships among the structural parameters will also be incorrect. Because the Flinn (2006) has been applied many times to study other types of labor market outcomes, however, our structural estimates are at least comparable to those generated in these other applications. Finally, healthcare coverage is a complicated topic, and there are many nuances involved in measuring the type of access provided to workers. We consider several of the "definitions of healthcare" in the NAWS data (Kandilov & Kandilov 2022), however, and our findings are generally robust to whatever type of healthcare employees have.

References

[1] Aizawa, N., & Fang, H. (2020). Equilibrium labor market search and health insurance reform. *Journal of Political Economy*, 128(11), 4258-4336.

[2] Allen, J., Clark, R., & Houde, J. F. (2019). Search frictions and market power in negotiated-price markets. *Journal of Political Economy*, 127(4), 1550-1598.

[3] Antle, J. M., & Pingali, P. L. (1994). Pesticides, productivity, and farmer health: A Philippine case study. *American Journal of Agricultural Economics*, 76(3), 418-430.

[4] Antonisse, L., Garfield, R., Rudowitz, R., & Artiga, S. (2018). The effects of Medicaid expansion under the ACA: updated findings from a literature review.

[5] Arcury, T., & Quandt, S. (1998). Occupational and environmental health risks in farm labor. *Human Organization*, 57(3), 331-334.

[6] Aust, I., Matthews, B., & Muller-Camen, M. (2020). Common Good HRM: A paradigm shift in Sustainable HRM?. *Human Resource Management Review*, 30(3), 100705.

[7] Bagger, J., Fontaine, F., Postel-Vinay, F., & Robin, J. M. (2014). Tenure, experience, human capital, and wages: A tractable equilibrium search model of wage dynamics. *American Economic Review*, 104(6), 1551-96.

[8] Bagger, J., & Lentz, R. (2019). An empirical model of wage dispersion with sorting. *Review of Economic Studies*, 86(1), 153-190.

[9] Baid, D., Hayles, E., & Finkelstein, E. A. (2021). Return on investment of workplace wellness programs for chronic disease prevention: a systematic review. *American Journal of Preventive Medicine*, 61(2), 256-266.

[10] Berkowitz, S. A., Seligman, H. K., & Choudhry, N. K. (2014). Treat or eat: food insecurity, cost-related medication underuse, and unmet needs. *The American Journal of Medicine*, 127(4), 303-310.

[11] Brown, M., Flinn, C. J., & Schotter, A. (2011). Real-time search in the laboratory and the market. *American Economic Review*, 101(2), 948-74.

[12] Burdett, K., & Mortensen, D. T. (1998). Wage differentials, employer size, and unemployment. *International Economic Review*, 257-273.

[13] Cahuc, P., Postel-Vinay, F., & Robin, J. M. (2006). Wage bargaining with on-the-job search: Theory and evidence. *Econometrica,* 74(2), 323-364.

[14] Chang, T., Graff Zivin, J., Gross, T., & Neidell, M. (2016). Particulate pollution and the productivity of pear packers. *American Economic Journal: Economic Policy*, 8(3), 141-69.

[15] Cole, H. L., Kim, S., & Krueger, D. (2019). Analysing the effects of insuring health risks: On the trade-off between short-run insurance benefits versus long-run incentive costs. *Review of Economic Studies*, 86(3), 1123-1169.

[16] Currie, J., & Madrian, B. C. (1999). Health, health insurance and the labor market. *Handbook of Labor Economics*, 3, 3309-3416.

[17] Das, A., Pagell, M., Behm, M., & Veltri, A. (2008). Toward a theory of the linkages between safety and quality. *Journal of Operations Management*, 26(4), 521-535.

[18] Dey, M. S., & Flinn, C. J. (2005). An equilibrium model of health insurance provision and wage determination. *Econometrica*, 73(2), 571-627.

[19] Dey, M., & Flinn, C. (2008). Household search and health insurance coverage. *Journal of Econometrics*, 145(1-2), 43-63.

[20] Dizioli, A., & Pinheiro, R. (2016). Health insurance as a productive factor. *Labour Economics*, 40, 1-24.

[21] Department of Labor. (2018). An Introduction to analyzing the NAWS public access data.

[22] Donkor, K. B., & Perloff, J. M. (2022). The effects of the Affordable Care Act on seasonal agricultural workers. *Journal of the Agricultural and Applied Economics Association*, 1(4), 435-445.

[23] Eckstein, Z., & Van den Berg, G. J. (2007). Empirical labor search: A survey. *Journal of Econometrics*, 136(2), 531-564.

[24] Einav, L., Lee, S., & Levin, J. (2019). The impact of financial incentives on health and health care: Evidence from a large wellness program. *Health Economics*, 28(2), 261-279.

[25] Fan, M., Gabbard, S., Pena, A. A., & Perloff, J. (2015). Why do fewer agricultural workers migrate now? *American Journal of Agricultural Economics*, 97(3), 665-679.

[26] Fang, H., & Gavazza, A. (2011). Dynamic inefficiencies in an employment-based health insurance system: Theory and evidence. *American Economic Review*, 101(7), 3047-77.

[27] Finkelstein, A., Taubman, S., Wright, B., Bernstein, M., Gruber, J., Newhouse, J. P., Allen, H., and Baicker, K. (2012). The Oregon health insurance experiment: evidence from the first year. *Quarterly Journal of Economics*, 127(3), 1057-1106.

[28] Flabbi, L., & Moro, A. (2012). The effect of job flexibility on female labor market outcomes: Estimates from a search and bargaining model. *Journal of Econometrics*, 168(1), 81-95.

[29] Flinn, C. J. (2006). Minimum wage effects on labor market outcomes under search, matching, and endogenous contact rates. *Econometrica*, 74(4), 1013-1062.

[30] Flinn, C., & Mullins, J. (2015). Labor market search and schooling investment. *International Economic Review*, 56(2), 359-398.

[31] Flinn, C., Gemici, A., & Laufer, S. (2017). Search, matching and training. *Review of Economic Dynamics*, 25, 260-297.

[32] Gilleskie, D. B. (1998). A dynamic stochastic model of medical care use and work absence. *Econometrica*, 1-45.

[33] Gkiza, I. G., & Nastis, S. A. (2017). Health and women's role in agricultural production efficiency. *Applied Economic Perspectives and Policy*, 39(3), 428-440.

[34] Graff Zivin, J., & Neidell, M. (2012). The impact of pollution on worker productivity. *American Economic Review*, 102(7), 3652-73.

[35] Gruber, J., & Madrian, B. C. (1994). Health insurance and job mobility: The effects of public policy on job-lock. *ILR Review*, 48(1), 86-102.

[36] Gruber, J., & Madrian, B. C. (2002). Health insurance, labor supply, and job mobility: A critical review of the literature. NBER Working paper, No. 8817 (https://www.nber.org/papers/w8817).

[37] Hansen, E., & Donohoe, M. (2003). Health issues of migrant and seasonal farmworkers. *Journal of Health Care for the Poor and Underserved*, 14(2), 153-164.

[38] Heckman, J. (1978). Dummy endogenous variables in a simultaneous equation system. *Econometrica*, 46(4), 931-959.

[39] Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica*, 47(1), 153-161.

[40] Isé, S., & Perloff, J. M. (1995). Legal status and earnings of agricultural workers. *American Journal of Agricultural Economics*, 77(2), 375-386.

[41] Jones, D., Molitor, D., & Reif, J. (2019). What do workplace wellness programs do? Evidence from the Illinois workplace wellness study. *Quarterly Journal of Economics*, 134(4), 1747-1791.

[42] Kandilov, A. M., & Kandilov, I. T. (2022). The impact of the Affordable Care Act Medicaid expansions on agricultural workers' health insurance coverage, medical care

utilization, and labor supply. *American Journal of Agricultural Economics*, 104(3), 1026-1049.

[43] KC DS (2020). *Worker productivity in operations management. Foundations and Trends in Technology, Information and Operations Management*, 13(3), 151-249.

[44] Kim, P. (2022). Labor Market Search, Illness, and the Value of Employer-Sponsored Health Insurance (Doctoral dissertation, The University of North Carolina at Chapel Hill).

[45] Lazear, E. P., & Oyer, P. (2007). Personnel Economics. *NBER Working Papers*, no. 13480.

[46] Li, A., & Reimer, J. (2020). The US market for agricultural labor: Evidence from the National Agricultural Workers Survey. *Applied Economic Perspectives and Policy*, 43(3), 1125-1139.

[47] Liao, P. A., & Taylor, J. E. (2010). Health care reform and farm Women's off-farm labor force participation: evidence from Taiwan. *Journal of Agricultural and Resource Economics*, 281-298.

[48] Mobed, K., Gold, E. B., & Schenker, M. B. (1992). Occupational health problems among migrant and seasonal farm workers. *Western Journal of Medicine*, 157(3), 367.

[49] Muthoo, A. (1999). *Bargaining theory with applications*. Cambridge University Press.

[50] Nash Jr, J. F. (1950). The bargaining problem. *Econometrica*, 18(2), 155-162.

[51] Nordstrom, D. L., Layde, P. M., Olson, K. A., Stueland, D., Brand, L., & Follen, M. A. (1995). Incidence of farm-work–related acute injury in a defined population. *American Journal of Industrial Medicine*, 28(4), 551-564.

[52] Pagell, M., Johnston, D., Veltri, A., Klassen, R., & Biehl, M. (2014). Is safe production an oxymoron? *Production and Operations Management*, 23(7), 1161-1175.

[53] Pagell, M., Klassen, R., Johnston, D., Shevchenko, A., & Sharma, S. (2015). Are safety and operational effectiveness contradictory requirements: The roles of routines and relational coordination. *Journal of Operations Management*, 36, 1-14.

[54] Pagell, M., Parkinson, M., Veltri, A., Gray, J., Wiengarten, F., Louis, M., & Fynes, B. (2020). The tension between worker safety and organization survival. *Management Science*, 66(10), 4863-4878.

[55] Pissarides, C. A. (2000). *Equilibrium unemployment theory*. Cambridge, MA: MIT Press.

[56] Postel–Vinay, F., & Robin, J. M. (2002). Equilibrium wage dispersion with worker and employer heterogeneity. *Econometrica*, 70(6), 2295-2350.

[57] Roth, A., & Zheng, Y. (2021). A tale of two food chains: the duality of practices on well-being. *Production and Operations Management*, 30(3), 783-801.

[58] Statista. (2021). Percentage of U.S. population with employment-based health insurance from 1987 to 2021. (https://www.statista.com/statistics/323076). Accessed October 12, 2022.

[59] Stigler, G. J. (1961). The economics of information. *Journal of Political Economy*, 69(3), 213-225.

[60] Sunding, D., & Zivin, J. (2000). Insect population dynamics, pesticide use, and farmworker health. *American Journal of Agricultural Economics*, 82(3), 527-540.

[61] Taber, C., & Vejlin, R. (2020). Estimation of a Roy/search/compensating differential model of the labor market. *Econometrica*, 88(3), 1031-1069.

[62] Tonozzi, T. R., & Layne, L. A. (2016). Hired crop worker injuries on farms in the United States: A comparison of two survey periods from the National Agricultural Workers Survey. *American Journal of Industrial Medicine*, 59(5), 408-423.

[63] U.S. Department of Labor, National Agricultural Statistics Service. (2022).

[64] U.S. Department of Labor. (2022). H-2A: Temporary agricultural employment of foreign workers. (https://www.dol.gov/agencies/whd/agriculture/h2a). Accessed December 13, 2022.

[65] Van den Berg, G. J., & Ridder, G. (1998). An empirical equilibrium search model of the labor market. *Econometrica*, 1183-1221.

[66] Villarejo, D., & Baron, S. L. (1999). The occupational health status of hired farm workers. *Occupational Medicine*. 14(3), 613-635.

[67] Xu, E., Mishra, A., and Linderman, K. (2023). How does physical access affect emergency department use? Evidence from insurance coverage expansion. forthcoming, *Management Science*.

[68] Zilberman, D., Schmitz, A., Casterline, G., Lichtenberg, E., & Siebert, J. B. (1991). The economics of pesticide use and regulation. *Science*, 253(5019), 518-522.

Appendix A: Experimental Procedures

In this Online Supplement, we describe our experimental, or counterfactual simulation, procedures in more detail. For each simulation, we aim to conduct a clean experiment in which we compare outcomes with the observed level of healthcare in the data, with extreme cases in which the probability of healthcare coverage is reduced by 10% and 20%, and then increased by the same amounts. Because the current probability of coverage is roughly 80%, measured as the frequency of coverage in our data, these values represent a movement to complete coverage, and a reduction to approximately 60% probability of coverage. We consider scenarios that represent intermediate steps in each direction (reducing and increasing healthcare coverage by 10%) in order to demonstrate the path of each outcome as healthcare coverage varies. Note that the healthcare variable in our model (h) is discrete, so the experimental variation we consider should be interpreted as changing the probability that a particular employee is covered.

For the first two employee-level simulations in Table 6, we simulate changes in the equilibrium wage distribution in equation (7) with varying levels of h. Healthcare coverage affects equilibrium wages in the theoretical model through the productivity-match function ($\phi(h)$) which is manifest in this model through the mean-parameter of the log-normal distribution for f, or μ. In each of the 4 simulated outcomes, we recalculate the equilibrium wage by allowing μ to vary with the level of h and then allowing each part of the distribution in (7) to change accordingly. Because this model represents a distribution of wages, we calibrate the resulting probability values to observed wages so that the observed levels of healthcare generate the observed wage values. We then change the level of healthcare by varying the value of h through a range of -20% through $+20\%$, in 10% increments, and measure the equilibrium wages that result. For the simulated values of income, we multiply the equilibrium wage result by the number of weeks worked (i.e., 52 - t_i) and the number of hours observed for each employee. In Table 6, we report the mean and standard deviation across all $N = 24,151$ observations.

For the second-two, firm-level outcomes in Table 6, we report changes in equilibrium surplus, and firm profit from the theoretical model of firm surplus in equations (3) and (4) above. In Simulation 3 of Table 7, we report net surplus, which is the gross surplus $\exp(\mu + 0.5\sigma^2)$ less the reservation productivity from employees (ϕ^*) and the allocation between employers according to the Nash bargaining power parameter (λ). For this calculation, we simply average over all observations in the data set to arrive at an average-firm level surplus from each employee, to each firm that employs them. For Simulation 4, we multiply net surplus by the number of employees drawn from unemployment due to job creation (τ) and those lost from employment due to job destruction (δ) to arrive at an estimate of the aggregate profit implications of the firm-allocation of employment surplus, and movements in and out of the labor market. We interpret the result as the aggregated profit implications for firms that employ all workers in our data set.

For each simulation, we compare the outcome relative to the base case scenario, and report both percentage differences relative to the base, and calculate t-ratios. We do not report t-ratios in the table, but note that all are statistically different from the base case at a 5% level.

Appendix B: Structural Robustness Check

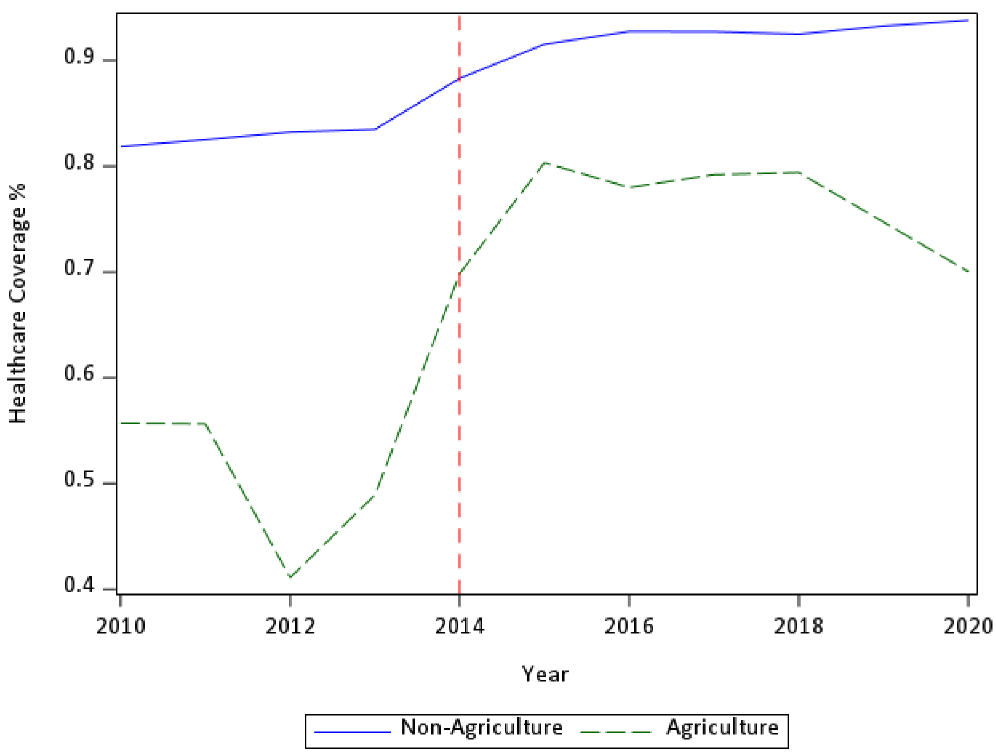
In this appendix, we examine the robustness of our structural estimates to our definition of healthcare. In this table, we define a worker as having healthcare coverage if they report affirmative to either question D22 (our maintained definition) or D23 (compensated for days missed due to injuries or sickness incurred on the job). Table B below shows that our estimates are robust to our definition of healthcare coverage.

[Table B here]

Figure 1: Share of Farmworkers with Employer-Provided Health Coverage in California Specialty Crop Industry, 1989-2020

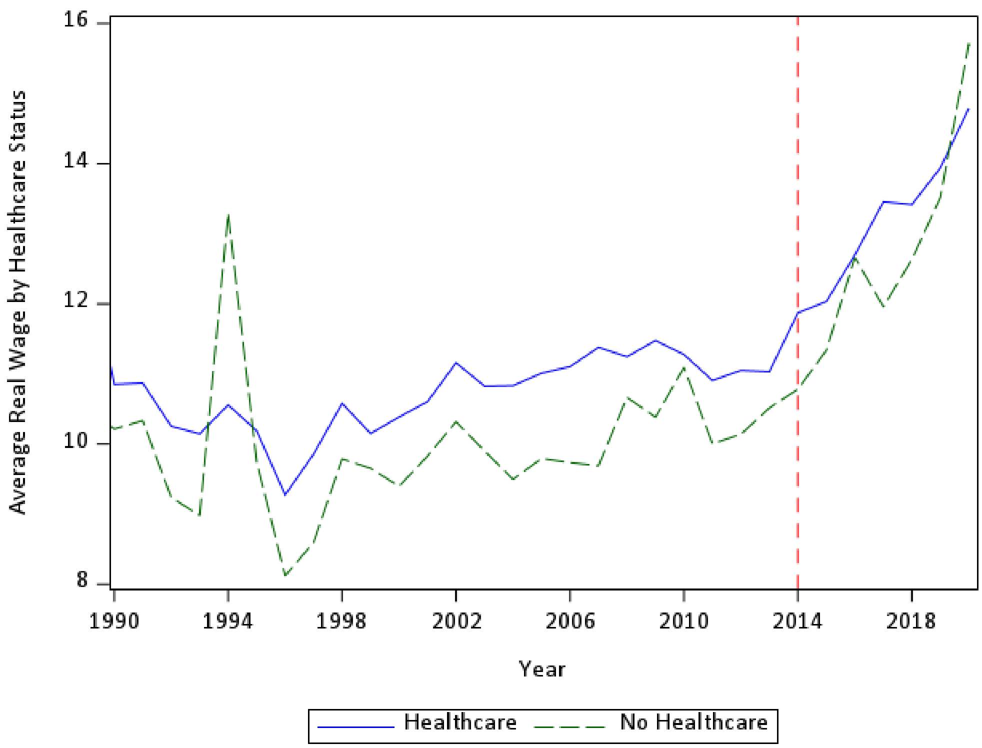
Note: Data from National Agricultural Workers Survey, U.S. Department of Labor, 1989-2020, sample of farmworkers from California specialty crop industry. Figure shows general rise in coverage over time, relative to implementation of state-level Medicaid expansion facilitated by the Affordable Care Act in 2014 (the red reference line).

Figure 2: Coverage of Farmworkers in Agriculture Relative to Workers in Other Industries, Western U.S., 2010-2020



Note: Data from National Health Information Survey, Centers for Disease Control and Prevention, 2010-2010, sample of farmworkers and workers in other sectors of the economy in the Western U.S. Figure shows gap in coverage between farmworkers and workers in other sectors, particularly since Medicaid expansion, premium subsidies and individual mandate (since removed) due to the implementation of the ACA in 2014 (the red reference line).

Figure 3: Average Wage for Farmworkers in California Specialty-Crop Industry, with and without Coverage, 1989-2020



Note: Data from National Agricultural Workers Survey, U.S. Department of Labor, 1989-2020, sample of farmworkers from California specialty crop industry. Figure shows relationship between healthcare coverage and wages over time, relative to the implementation of state-level Medicaid expansion facilitated by the Affordable Care Act in 2014 (the red reference line).

Table 1. Selected Summary Statistics

Variable	Definition	Units	Mean	Std. Dev.	Min	Max
Health Coverage	NAWS D22	1 = Yes	0.830	0.376	0	1
Real Wage	NAWS WAGET1 / CPI	$	11.022	3.138	2.671	44.777
Minimum Wage	State Minimum Wage / CPI	$	8.999	1.227	6.634	12.148
Age	Years of Age	#	36.185	12.580	14	88
Female	Gender	1 = Female	0.191	0.393	0	1
Education	Years of School	#	7.469	3.483	1	21
Foreign Born	Binary	1 = Yes	0.947	0.224	0	1
Undocumented	Binary	1 = Yes	0.472	0.499	0	1
Years Farmwork	Years of Farmwork	#	13.833	11.362	0	78
Duration of Employment	Years with Same Employer	#				
Duration of Unemployment	Weeks in Last Year Unemployed	#	7.639	9.917	0	52

Note: All data from 1989 - 2022 sample of California crop-farmworkers from the National Agricultural Workers Survey (NAWS, U.S. Department of Labor). NAWS variable D22 is the answer to the question ”If you are injured at work, or get sick as a result of your work, does your employer provide health insurance or provide or pay for your health care?” N = 24,151 for all variables.

Table 2. Reduced Form Wage Model

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.
Health Coverage	0.0470***	0.0065	0.0420***	0.0060	0.0425***	0.0061	0.0432***	0.0060	0.0792*	0.0426
Age	0.0119***	0.0011	0.0090***	0.0010	0.0091***	0.0010	0.0091***	0.0009	0.0085***	0.0013
Age^2	-0.0001***	0.0000	-0.0001***	0.0000	-0.0001***	0.0000	-0.0001***	0.0000	-0.0001***	0.0000
Female	-0.0239***	0.0073	-0.0466***	0.0059	-0.0488***	0.0059	-0.0526***	0.0060	-0.0529***	0.0060
Education	0.0110***	0.0008	0.0048***	0.0007	0.0048***	0.0007	0.0049***	0.0007	0.0046***	0.0007
Foreign	-0.0432***	0.0137	0.0062	0.0124	0.0022	0.0126	-0.0000	0.0122	-0.0011	0.0120
Undocumented	0.0023	0.0014	-0.0106***	0.0013	-0.0106***	0.0013	-0.0105***	0.0013	-0.0101***	0.0014
Farm Work Exp.	0.0062***	0.0004	0.0038***	0.0004	0.0039***	0.0004	0.0040***	0.0004	0.0037***	0.0003
N	24,150		24,150		24,150		24,150		24,150	
Year	No		Yes		Yes		Yes		Yes	
Crop	No		No		Yes		Yes		Yes	
Task	No		No		No		Yes		Yes	
Heckman	No		No		No		No		Yes	

Note: Table uses data from the National Agricultural Workers Survey (NAWS), confidential version, for the fiscal years 1989 - 2022. Our sample uses crop-farmworkers from California, who are primarily employed in the specialty crop industry. Regressions are weighted with the NAWS probability weighting variable (PWTYCRD). Standard errors are bootstrapped. The outcome variable is the natural log of the real hourly wage at the farm where the worker was employed at the time of the survey (NAWS variable WAGET1). Nominal wage values are adjusted to constant $2020 using a Consumer Price Index retrieved from https://www.bls.gov/cpi). This table shows a positive association between employer-provided health coverage and worker wages. A single asterisk (*) indicates significance at a 10% level, ** at 5%, and *** at 1%.

Table 3. Reduced-Form Model for Duration with Current Employer

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.
Health Coverage	0.3176***	0.0229	0.3324***	0.0255	0.3358***	0.0258	0.3295***	0.0255	0.6496***	0.1696
Age	0.0414***	0.0045	0.0356***	0.0044	0.0349***	0.0044	0.0331***	0.0043	0.0271***	0.0054
Age^2	-0.0004***	0.0001	-0.0004***	0.0001	-0.0004***	0.0001	-0.0004***	0.0001	-0.0003***	0.0001
Female	0.0055	0.0269	-0.0217	0.0257	-0.0219	0.0260	-0.0226	0.0276	-0.0254	0.0279
Education	0.0138***	0.0027	0.0056**	0.0028	0.0047	0.0029	0.0027	0.0030	0.0002	0.0036
Foreign	0.0724*	0.0421	0.1230***	0.0428	0.1267***	0.0436	0.1347***	0.0439	0.1250***	0.0452
Undocumented	-0.0250***	0.0045	-0.0459***	0.0056	-0.0459***	0.0055	-0.0437***	0.0056	-0.0397***	0.0061
Farm Work Exp.	0.0405***	0.0015	0.0371***	0.0015	0.0371***	0.0015	0.0366***	0.0014	0.0347***	0.002
N	23,977		23,977		23,977		23,977		23,977	
Year	No		Yes		Yes		Yes		Yes	
Crop	No		No		Yes		Yes		Yes	
Task	No		No		No		Yes		Yes	
Heckman	No		No		No		No		Yes	

Note: Table uses data from the National Agricultural Workers Survey (NAWS), confidential version, for the fiscal years 1989 - 2022. Our sample uses crop-farm workers from California, who are primarily employed in the specialty crop industry. Regressions are weighted with the NAWS probability weighting variable (PWTYCRD). Standard errors are bootstrapped. The outcome variable is the natural log of the number of years the worker had been employed with the current employer at the time of the survey (NAWS variable D27). The table shows a positive association between employer-provided health coverage and duration with the current employer. A single asterisk (*) indicates significance at a 10% level, ** at 5%, and *** at 1%.

Table 4. Reduced-Form Model for Unemployment Duration with Current Employer

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.
Health Coverage	0.0857**	0.0385	0.0860**	0.0390	0.0651	0.0399	0.0675*	0.0409	1.0092***	0.2744
Age	-0.0490***	0.0083	-0.0406***	0.0082	-0.0383***	0.0079	-0.0383***	0.0078	-0.0558***	0.0092
Age^2	0.0005***	0.0001	0.0004***	0.0001	0.0004***	0.0001	0.0004***	0.0001	0.0006***	0.0001
Female	1.1973***	0.0534	1.2488***	0.0506	1.2676***	0.0496	1.2452***	0.0523	1.2371***	0.0526
Education	-0.0226***	0.0057	-0.0064	0.0058	-0.0026	0.0057	-0.0034	0.0057	-0.0108*	0.0059
Foreign	-0.2476**	0.1253	-0.3788***	0.1249	-0.3590***	0.1259	-0.3607***	0.1240	-0.3896***	0.1234
Undocumented	-0.1444***	0.0136	-0.1135***	0.0138	-0.1139***	0.0136	-0.1130***	0.0135	-0.1012***	0.0131
Farm Work Exp.	-0.0037	0.0029	0.0013	0.0028	0.0006	0.0027	0.0008	0.0026	-0.0048	0.0033
N	24,150		24,150		24,150		24,150		24,150	
Year	No		Yes		Yes		Yes		Yes	
Crop	No		No		Yes		Yes		Yes	
Task	No		No		No		Yes		Yes	
Heckman	No		No		No		No		Yes	

Note: Table uses data from the National Agricultural Workers Survey (NAWS), confidential version, for the fiscal years 1989 - 2022. Our sample uses crop-farm workers from California, who are primarily employed in the specialty crop industry. Regressions are weighted with the NAWS probability weighting variable (PWTYCRD). Standard errors are bootstrapped. The outcome variable is the natural log of the number of weeks the worker was unemployed over the last 52 weeks (NAWS variable NWWEEKS). Tablee shows a positive association between employer-provided health coverage and duration of unemployment. A single asterisk indicates significance at a 10% level, ** at 5%, and *** at 1%.

Table 5. Structural Model Estimates

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.
τ	0.1230***	0.0021	0.1235***	0.0021	0.1234***	0.0021	0.1029***	0.0033	0.1030***	0.0033
$\tau - Healthcare$							0.0283***	0.0037	0.0284***	0.0038
δ	0.1848***	0.0042	0.1850***	0.0042	0.1464***	0.0054	0.1352***	0.0065	0.1352***	0.0065
$\delta - Healthcare$					0.0479***	0.0056	0.0627***	0.0078	0.0627***	0.0078
μ	2.0144***	0.0068	1.9782***	0.0113	2.0000***	0.0107	1.9369***	0.0192	1.9371***	0.0193
$\mu - Healthcare$			0.0470***	0.0109	0.0208***	0.0103	0.1030***	0.0204	0.1035***	0.0204
σ	0.2175***	0.0100	0.2160***	0.0099	0.2155***	0.0099	0.2231***	0.0099	0.2238***	0.0099
ϕ	3.1834***	0.0054	3.1834***	0.0054	3.1834***	0.0054	3.1835***	0.0055	3.1785***	0.0054
λ	0.2297***	0.0011	0.2297***	0.0011	0.2297***	0.0011	0.2296***	0.0011	0.2284***	0.0011
IMR	0.0268***	0.0036	0.0268***	0.0037	0.0268***	0.0037	0.0267***	0.0041	0.0267***	0.0041
Year FE?	Yes		Yes		Yes		Yes		Yes	
Crop FE?	Yes		Yes		Yes		Yes		Yes	
Task FE?	Yes		Yes		Yes		Yes		Yes	
Demographics?	Yes		Yes		Yes		Yes		Yes	
Demand Side Data?	No		No		No		No		Yes	
N	24,151		24,151		24,151		24,151		24,151	
LLF	-72,542.84		-72,524.27		-72,499.52		-72,470.73		-72,564.53	
AIC/N	6.012		6.011		6.009		6.006		6.014	

Note: Demographic Attributes include age, age squared, gender, education, foreign status, years in farm work, immigration status, and an indicator for healthcare coverage. Model 2 allows match-productivity (μ) to depend on healthcare coverage status. Model 3 allows the rate of job destruction (δ) to depend on healthcare, while Model 4 allows the rate of job creation (τ) to vary with healthcare status. Model 5 is Model 4 with demand-side information to identify bargaining power as in Flinn (2006). All models estimated with real wages and minimum wages, defined as 2020 dollars. A single asterisk (*) indicates significance at a 10% level, ** at 5%, and *** at 1%.

Table 6. Counterfactual Simulations: Effect of Healthcare Coverage

	Sim 1: Wages			Sim 2: Worker Income			Sim 3: Surplus			Sim 4: Net Profit		
	Estimate	Std. Dev.	% Change	Estimate	Std. Dev.	% Change	Estimate	Std. Dev.	% Change	Estimate	Std. Dev.	% Change
Base - 20%	10.80	4.91	-2.48%	21,562	12,810	-2.37%	2.94	0.04	-3.08%	6879.18	251.39	7.49%
Base - 10%	10.93	5.07	-1.28%	21,814	13,097	-1.23%	2.99	0.02	-1.55%	7154.10	127.38	3.80%
Base	11.08	5.25	0.00%	22,085	13,414	0.00%	3.04	0.03	0.00%	7436.48	112.39	0.00%
Base + 10%	11.23	5.44	1.38%	22,377	13,762	1.32%	3.08	0.02	1.56%	7726.45	130.80	-3.90%
Base + 20%	11.39	5.65	2.87%	22,691	14,146	2.74%	3.13	0.04	3.14%	8024.10	265.06	-7.90%

Note: Base case for Wages and Income is observed healthcare coverage, simulations consider reducing coverage (-20%) and increasing healthcare coverage (+20%) in increments of 10%. Wage is the average hourly wage over all workers, Income is the total annual income, averaged over all workers, Surplus is the average hourly surplus from employment, and Net Profit is the net surplus to firms, on average, adjusted for the probability that a worker will either enter the laborforce (employment) or leave the workforce (become unemployed). Firm surplus is net of employee share, and critical match value that induces employees to accept offer. For firm calculations, Base case is observed healthcare and Base +/-10% represents changes to the average share of covered employees.

Table B. Structural Model Estimates with Health Defined as D22 or D23

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.	Estimate	Std. Err.
τ	0.1230***	0.0021	0.1236***	0.0021	0.1235***	0.0021	0.1033***	0.0033	0.1034***	0.0033
$\tau - Healthcare$							0.0277***	0.0038	0.0279***	0.0038
δ	0.1848***	0.0042	0.1850***	0.0042	0.1491***	0.0056	0.1379***	0.0067	0.1379***	0.0067
$\delta - Healthcare$					0.0439***	0.0057	0.0586***	0.0079	0.0586***	0.0079
μ	2.0144***	0.0068	1.9757***	0.0115	1.9957***	0.0109	1.9330***	0.0196	1.9332***	0.0196
$\mu - Healthcare$			0.0501***	0.0110	0.0262***	0.0105	0.1072***	0.0207	0.1078***	0.0207
σ	0.2175***	0.0100	0.2162***	0.0099	0.2154***	0.0099	0.2234***	0.0099	0.2242***	0.0099
ϕ^*	3.1834***	0.0054	3.1834***	0.0054	3.1834***	0.0054	3.1835***	0.0055	3.1785***	0.0054
λ	0.2297***	0.0011	0.2297***	0.0011	0.2297***	0.0011	0.2295***	0.0011	0.2284***	0.0011
IMR	0.0268***	0.0036	0.0268***	0.0037	0.0268***	0.0037	0.0267***	0.0041	0.0267***	0.0041
Year Fixed Effects?	Yes		Yes		Yes		Yes		Yes	
Crop Fixed Effects?	Yes		Yes		Yes		Yes		Yes	
Task Fixed Effects?	Yes		Yes		Yes		Yes		Yes	
Demographics?	Yes		Yes		Yes		Yes		Yes	
Demand Side Data?	No		No		No		No		Yes	
N	24,151		24,151		24,151		24,151		24,151	
LLF	-72,542.08		-72,522.74		-72,502.52		-72,475.73		-72,569.51	
AIC/N	6.012		6.011		6.009		6.007		6.015	

Note: Demographic Attributes include age, age squared, gender, education, foreign status, years in farm work, immigration status, and whether the worker has healthcare coverage. Model 2 allows match-productivity to depend on healthcare coverage status. Model 3 allows the rate of job destruction (δ) to depend on healthcare, while Model 4 allows the rate of job creation (tau) to vary with healthcare status. Model 5 is Model 4 with demand-side information to identify bargaining power as in Flinn (2006). All models estimated with real wages and minimum wages, defined as 2020 dollars. Healthcare defined as question D22 or D23. A single asterisk (*) indicates significance at a 10% level, ** at 5%, and *** at 1%.