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ARTICLE

H-2A workers' preferences for job attributes: Evidence from an experiment

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Abstract

Diminishing labor availability is a pressing issue for US farmers. We surveyed H-2A farmworkers and conducted a discrete choice experiment to estimate their willingness to accept different job benefits. Respondents identified the opportunity to return home as the most valuable perk. The second highest valued job attribute was training in both English and machinery operation, followed by the employer offering housing amenities. The least valued benefit was the opportunity to earn overtime pay. This study provides new insights about the type of program modifications that might be valued more by workers in the context of proposals to modify labor rules.

KEYWORDS

farmworkers, H-2A visa program, nonpecuniary benefits, random utility models

JEL CLASSIFICATION

J43, Q12, Q18

1 | INTRODUCTION

Farmers in the United States have been experiencing a reduction in the availability of agricultural workers for many years. Policies such as the H-2A visa program have been created to facilitate access to foreign agricultural workers, and recent proposals have been made to update and modify the program. The H-2A program allows employers who anticipate temporary or seasonal domestic worker shortfalls to bring nonimmigrant guest workers to the United States to fill agricultural jobs (U.S. Department of Labor, 2023). The number of H-2A visas issued has grown considerably in the

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last decade (Gutierrez-Li, 2021). While previous work has investigated some of the aggregate factors that impact the farm labor supply (like immigration trends and mechanization; Gutierrez-Li, 2021), little is known about the role that pecuniary and nonpecuniary benefits play in H-2A workers' decision to accept a job.

This paper investigates the determinants of H-2A workers' decisions to seek agricultural work by considering monetary and nonpecuniary benefits. One of the main contributions of our study is that we collected primary microdata from in-person interviews with H-2A farm workers in the apple industry in Washington state. Washington state is in the top five states for employing H-2A workers. The state also produces a diverse array of labor-intensive specialty crops, of which the apple industry is the most economically important with the largest workforce (Washington State Department of Agriculture, 2023, Washington State Employment Security Department, 2023). While this study presents the views of a sample of H-2A workers in a specific industry, the results are revealing and add to the ongoing discussion about the H-2A program and the literature on agricultural labor markets.

We implement a survey and a discrete-choice experiment to elicit H-2A workers' willingness to accept (WTA) various field-job characteristics. The results suggest that, for our sample of H-2A workers, the highest WTA was for a job offer with the option to take a short vacation when work intensity is relatively low. The second highest WTA was for training in both English and machinery operations, followed by training in English only, housing amenities, and training in machinery operations only. The lowest WTAs were related to the ability to work as many hours as possible during the week without considering overtime pay, followed by working as many hours as possible with the possibility of earning overtime pay. This last result is consistent with the perception that overtime pay rules would force employers to seek alternatives to avoid paying overtime.

Our results shed light on the value that H-2A workers assign to various potential job perks. This topic is of interest to policymakers, as seen by discussions in the US Congress around proposals such as the Farm Workforce Modernization Bill (FWMB) which could change the rules and regulations applicable to hiring farm workers and reform the H-2A visa program (Gutierrez-Li, 2022). Furthermore, the results could help farmers better understand the job characteristics that farm workers prefer and, thereby, provide more competitive job offers.

2 | THE H-2A VISA PROGRAM

The H-2A program allows US employers to hire foreign agricultural workers legally. Due to the decline in the domestic agricultural labor supply, the program has experienced continued growth in recent decades. In fiscal year 2005, there were about 48,000 certified H-2A jobs in the United States, which expanded to 372,000 by fiscal year 2022. In fiscal year 2022, about 50% of all H-2A certified jobs were concentrated in five states—Florida, California, Georgia, Washington, and North Carolina—where specialty crops are predominant (Rural Migration News, 2022). The share of H-2A-certified jobs in these five states has increased from 34% in 2007 to 50% in 2022, mainly due to the significant increase in California and Washington (Rural Migration News, 2022). H-2A-certified positions grew 467% in Washington alone, from 5068 in 2011 to 28,727 in 2021 (Washington State Employment Security Department, 2023). Likewise, H-2A workers' minimum wages have been rising. In 2023, the average Adverse Effect Wage Rate (AEWR) in the country was $16.14/h ($17.97/h in Washington state) (Gutierrez-Li, 2023). For apple production in Washington state, the focus of this study, labor represents, on average, 54% of field operating expenses (Gallardo, 2020).

Our study assesses H-2A workers' valuation of different job perks considering that, under H-2A program rules, employers must provide workers with a contract that stipulates all terms and conditions of the work, including beginning and end dates of the contract period, job location, meals, rest days, work hours per day and days per week, crops to be worked with and tasks to be

performed, applicable wage rates for each type of crop or job, provision of tools for the job, compensation insurance, and any deduction not otherwise required by law. Employers must also pay for the application, visa processing fees, transportation to and from the country of origin, daily transportation to the work site, and housing (U.S. Department of Labor, 2010).

The wage gap between the United States and the country of origin of the H-2A workers is one reason why Mexican citizens keep applying to this program (Devadoss & Luckstead, 2018). For instance, in 2023, the minimum wage in Mexico was 25.93 Mexican pesos/h (Mexico Secretary of Work and Social Security, 2023), which is equivalent to about $1.42[1] US dollars/h or about one-twelfth of the AEWR in Washington state. Furthermore, according to Biblioteca de Publicaciones Oficiales del Gobierno de la Republica de Mexico,[2] the average wage for agricultural workers in Mexico is 2700 pesos per month (158.3 USD/month), but this number can vary greatly by state. The highest average wage rate for agricultural workers was in Baja California Sur, at around 536 USD/month. In Washington state, baseline farm wages in the specialty crop industry now begin at the AEWR, which increased sharply by 60% from $12/h in 2012 to $19.25/h in 2024, compared to a 19% increase in the producer price index[3] for farm products (U.S. Department of Labor, 2024). Information from the Department of Labor, Employment and Training Administration Performance Data for 2023 reveals that the average wage for apple harvesters in Washington state, on a piece rate basis, was $28.5/bin. An H-2A worker typically works about 40.5 h/week. The average duration of a contract encompasses 200 days, translating to approximately 28.6 weeks or 1147 h of work.[4] Given the challenges that the H-2A program presents to some agricultural employers (e.g., the program excludes dairy farmers because their operations are not seasonal), changes to its rules have been proposed in federal legislation, such as the FWMB. Key provisions include offering a pathway to legalization for currently unauthorized farmworkers and streamlining the H-2A program by adding electronic job ads, permitting 3-year H-2A visas, allowing H-2A workers to fill year-round jobs (which would be limited to 20,000 visas), and the use of E-Verify for new hires.

3 | RELATED LITERATURE AND CONTRIBUTIONS OF OUR STUDY

Our paper contributes to several strands of literature. Most notably, we provide a unique perspective (using primary data) relative to studies that utilize secondary information to analyze the H-2A program. These studies highlight the importance of the H-2A program to mitigate limited workforce availability in US agriculture, especially labor-intensive specialty crops (Castillo et al., 2021, Luckstead & Devadoss, 2019, Zahniser et al., 2018).

Few studies have examined the effects of the H-2A program on the outcomes of non-H-2A agricultural workers. Brady et al. (2016) modeled the impact of an expanded H-2A program on Washington state tree-fruit labor costs and found that a 1% increase in H-2A workers decreased the real wage rate of domestic and existing H-2A workers by 0.54%. This finding coincides with the literature suggesting that the farm labor supply has a low elasticity (Zahniser et al., 2018). However, Richards (2018) observed that growing competition for labor from lower-wage countries with a strong labor-intensive agricultural industry makes the demand for farm labor highly elastic.

This study also contributes to recent work examining factors affecting the engagement of local workers in agricultural tasks. During periods of high unemployment, only a few native-born workers are attracted to labor-intensive agriculture (Luckstead et al., 2022a). Other researchers have documented how economic growth in Mexico has encouraged agricultural workers to transition to

[1]The exchange rate source is the International Monetary Fund (2023).
[2]https://www.economia.gob.mx/
[3]https://www.economia.gob.mx/
[4]https://www.dol.gov/agencies/eta/foreign-labor/performance

service sectors, leading to higher agricultural wages in Mexico and reducing the incentives to migrate north, as expected incomes in the United States relative to earnings in Mexico decline (Kennan & Walker, 2011, Lessem, 2017).

Research on WTA job offers in nonagricultural sectors has examined the impact of job attributes (Abraham et al., 2013), quality of communication (Cable & Graham, 2000), quality of communication of traditional benefits (e.g., disability insurance, health insurance, retirement funding, and life insurance), nontraditional benefits (Jennings et al., 2003), and community homogeneity on the acceptance of job offers and location decisions (Noe & Barber, 1993). In the case of the food sector, Luckstead et al. (2022b) considered the impact of job attributes on the US low-skilled workers' WTA meatpacking jobs during the COVID-19 pandemic. Our paper is different in that we focus on the preferences of foreign guest workers, a group that has received less attention in the literature compared to domestic agricultural workers.

Lastly, this study is directly related to the contingent employment literature. An extensive literature has analyzed topics associated with the loyalty of temporary workers to their employer, job satisfaction, the choice of fixed-term employment, safety issues, work-family conflicts, and the impact of worker attitudes on performance (Connelly & Gallagher, 2004, De Cuyper et al., 2008). Extending the contingent employment literature to the agricultural sector, Luckstead et al. (2022a) examined the impact of job attributes and COVID-19 on US domestic workers' WTA fixed-term agricultural field jobs. The proportion of H-2A workers is likely to rise within labor-intensive agricultural activities, and our study contributes to this literature by developing a discrete choice experiment (DCE) to examine workers' WTA job attributes in fixed-term agricultural field jobs.

4 | DATA AND SURVEY DESIGN

This study focuses on H-2A workers involved in apple harvesting in Washington state. First, Washington is one of the five states, along with California, Florida, Georgia, and North Carolina, that collectively account for about 50% of all H-2A-certified jobs nationwide. The share of Washington state H-2A workers has increased and is expected to continue growing (Rural Migration News, 2022). Second, Washington State produces a diverse array of labor-intensive specialty crops, of which the apple industry is the most economically important and absorbs most workers (Washington State Department of Agriculture, 2023, Washington State Employment Security Department, 2023).

We conducted in-person paper surveys on October 3, 7, and 10, 2022, to a sample of H-2A-certified workers in Washington state. With the help of Washington State University (WSU) Extension faculty, we reached out to more than 10 apple-producing operations in Eastern Washington. Only three of these operations authorized us to survey their H-2A workforce. Ideally, we would have procured a larger and more representative sample of H-2A workers. However, labor is a contentious issue, and accessing workers proved challenging. Among the three companies, we obtained 154 responses. While some companies were too busy or had other legitimate reasons for not allowing us to interview their workers, others may have not allowed us to survey their workers because of poor rapport with them, leading to possible sample selection bias. As such, the results generated from these data need to be interpreted within the context of these limitations.

Because most H-2A workers in these companies originate from Mexico, and Spanish is their first language, we translated the survey to Spanish. The survey was approved by WSU Institutional Review Board #19463. Before implementing the survey, researchers coordinated with the field supervisors of each company on a date, time, and place where the survey would be conducted. In all three instances, the survey took place at each company's H-2A housing site. We offered an incentive of $10 in cash to each survey respondent. Survey participants in each company were divided into groups of approximately 30 individuals. We read each survey question and explained the content to the respondents. Then, we requested that participants respond to each question. Once a worker

completed their survey, researchers checked it for completeness and handed participants the $10 cash incentive.

The goal of the DCE was to elicit the WTA different H-2A job attributes (i.e., to determine the monetary value of the nonpecuniary aspects of an H-2A job offer). To mitigate possible hypothetical bias, a "cheap talk[5]" script was included in the survey and when explaining the questions to participants (Champ et al., 2009). An efficient design of the choice tasks with empirical priors was generated in *Ngene*. Based on the number of wage levels, *Ngene* uses a partial orthogonal method to determine how many choice tasks each participant must answer. To avoid choice-task fatigue, we chose four wage levels, which led to a final design that consisted of 12 choice tasks, with a D-error of 0.2618. As such, each H-2A worker responded to 12 hypothetical scenarios, which are discussed next.

Each choice task involved two job offers and an opt-out option. Each job offer presented a random combination of four nonpecuniary benefits and four wage levels. The survey explained each amenity, and a researcher verbally explained each of these benefits when presenting the survey to respondents. Table 1 includes each wage and nonwage benefit along with its levels. These levels were carefully selected based on previous research (Luckstead et al., 2022a), personal interviews with WSU Extension faculty working on labor issues, Washington agricultural principal operators who work with H-2A-certified workers, H-2A requirements, and information on the Washington State Employment Security website (Washington State Employment Security Department, 2023). The nonpecuniary benefits included housing amenities, training opportunities, and taking short vacations. We also added receiving overtime pay.

Washington is one of the first states to implement overtime pay for agricultural workers. Under the law (Washington State Department of Labor and Industries, 2023), agricultural overtime pay was phased in with overtime workers earning 1.5 times the regular pay rate starting at 55 h work in a week beginning on January 1, 2022, which declined to 48 h a week starting on January 1, 2023, and to 40 h a week starting on January 1, 2024. Hence, this study is also the first study to elicit workers' views on earning overtime pay.

The wage rates used in this study ($18.66, $23.46, $28.62, $33.06) were derived from data released by the Foreign Labor Certification Office of the U.S. Department of Labor (2022). Within the survey, we clarified that the apples slated for harvesting were of the Gala variety. In Washington state, wage earnings typically differ by apple variety and orchard setting, including trellis system type and planting density. The apple variety dictates how many apples are ready to be picked per tree at a given point in the season. We chose the Gala variety because it accounts for the largest share (21%) of total shipments by volume in Washington state (Gallardo, 2023). Furthermore, worker earnings are positively impacted by the number of apples on the tree because, in most instances, the harvest pay is on a piecemeal basis with units being dollars per bin. Worker earnings are also affected by the type of horticultural planting (e.g., a two-dimensional fruit wall with six wires), which influences the number of apples and the ease of reaching them. As such, most workers have priori expectations of their pay based on the apple variety and orchard setting. In Washington state, a bin is the unit used to measure the number of apples harvested by harvesters. While the precise size and material of the bin vary across different apple operations, in our survey, we considered a bin made of wood with a capacity of 925 lbs.

Respondents were also asked job-related questions such as the duration of their current employment, how their wage payment was calculated, the pay rate for harvesting Gala apples, the benefits offered by their current employer, their current job role, whether training to acquire new

[5]The cheap talk statement was verbally explained to respondents in Spanish. The translation in English is "Studies have demonstrated that responding to surveys, such as you would respond in your real life, is difficult for many people. It is likely that you respond in one way in this survey and when you are faced with a similar decision in your real life, you would behave differently. When responding to the survey, you could think "Yes I would choose this job offer." But when you face a similar situation in real life, you would choose differently. We ask that you please avoid this situation and answer the questions as you would do in a real-life situation."

TABLE 1 Nonpecuniary benefits and levels.

Nonpecuniary benefit	Benefit explanation	Benefit levels
Housing amenities	The employer provides additional amenities in the form of free Wi-Fi, an outdoor common area, a small refrigerator to improve housing comfort, and proximity to towns.	1. Yes: The company offers amenities 2. No: The company does not offer any amenities
Training opportunities	The employer will provide tractor operator training for machinery operation or English language classes during nonworking hours.	1. No 2. Training in machine operation (i.e., Tractor) 3. Free English classes 4. Machine operator training (i.e., Tractor) and free English classes
Opportunity to take short vacations	You will have the opportunity to return home to visit your family for a limited amount of time during the year, but at a time when work intensity has decreased. The travel will be at your own expense.	1. No: The company does not offer an opportunity to take short vacations 2. Yes: The company does offer an opportunity to take short vacations
Opportunity to get paid for overtime	Washington state legislators have implemented overtime pay laws for agriculture.	1. You can work as many hours as you and your employer agree to—there is no consideration of the number of hours worked during the week 2. You can only work a maximum of 40 h per week—there is no opportunity to work overtime 3. For all hours over 40 in a week, you will earn overtime pay of $2 per bin
Wage	The two job offers also vary in the amount of pay for harvesting a box of apples. Consider that we assume a block of Gala apples, first-round color pick, uniform color, and vertical trellis with six wires. The payment is by contract and uses ladders	1. $33.06 per bin 2. $28.62 per bin 3. $23.46 per bin 4. $18.66 per bin

skills would influence their choice of employer, if a retention bonus would affect their choice of employer, the length of their commute to work, and their prior experience in agriculture. Socio-demographic data were also collected by asking questions related to age, the highest level of education completed, the number of adults in the household, the number of children under the age of 18 living in the household, gender, ethnicity, residency status, and the number of people that shared the H-2A housing unit. Other questions included the number of hours paid out of the total hours stipulated in the contract, whether workers are concerned about getting their H-2A visa renewed, the level of difficulty in obtaining an H-2A visa, the level of confidence in that their H-2A visa would be renewed, and whether they felt that wages in their home country were increasing faster, slower, or the same compared to the United States.

Regarding sample characteristics, 56% of respondents completed high school and 24% completed technical or vocational school (Table 2). Considering that 99% of the H-2A workers in our sample come from Mexico, we compared some demographics to the Mexican Census. In 2020, the average number of schooling years in Mexico was 9.7, implying no secondary education (Mexico National Institute of Statistics and Geography, 2020). In our survey, 51% of the respondents' households had fewer than four individuals, 27% had no children, and 46% had at least one child. Ninety-seven percent of respondents were male. Eighty-two percent identified as Hispanic or

TABLE 2 Frequency distribution of survey responses.

Variable	Number of respondents	Percent of respondents $N = 154$
Panel A. Demographic characteristics		
Education		
None	1	1
Primary school	19	12
High school	86	56
Career school (technical or vocational school)	37	24
Undergraduate university degree (bachelor's degree)	8	5
Graduate university degree (master's or doctoral degree)	0	0
Did not respond	2	2
Number of adults in the household		
1	20	13
2	33	21
3	26	17
4	21	14
5	13	8
More than 5	37	24
Mixed responses	3	3
Did not respond	1	1
Number of children in the household		
0	41	27
1	21	14
2	50	32
3	17	11
4	15	10
5	2	1
More than 5	2	1
Mixed responses	2	2
Did not respond	4	3
Gender		
Male	150	97
Female	1	1
Did not respond	3	2

(Continues)

TABLE 2 (Continued)

Variable	Number of respondents	Percent of respondents $N = 154$
Primary residence		
Mexico	152	99
Other	2	1
Ethnic background		
White	13	8
Hispanic or Latino	124	81
Mixed race	11	7
Prefer not to say/did not respond	3	4
		Mean (standard deviation)
Age		31 (7.078)
Panel B. Job-related questions		
Length of time employed ($N = 154$)		
Less than 3 months	5	3
3–5 months	16	10
6–8 months	28	18
9–11 months	26	17
12 months	0	0
2 seasons (between 12 and 24 months)	9	6
3 seasons or more (more than 24 months)	64	42
Mixed responses/did not respond	6	4
How pay is calculated ($N = 154$)		
Piece wage	42	27
Hourly rate	14	9
Combination of piece and hourly rate	91	59
Other responses/no response	7	5
Benefits for current job ($N = 542$)		
Guaranteed contract hours	101	19
Vacation time	37	18
Housing amenities	54	15
Retention bonus	96	11
English language classes	57	10
Employer treats me better	82	8
Tractor operator training	38	7
Employment for a longer period	27	7
Orchard has more apples and they all color uniformly	46	5
None of the above/no response	4	1

TABLE 2 (Continued)

Variable	Number of respondents	Percent of respondents $N = 154$
Task in current job ($N = 280$)		
Apple harvest	134	48
Pruning and training trees	91	33
Other	24	9
Tractor driver	16	6
Forklift driver	8	3
Truck driver	3	1
Checker	4	1
If training is a factor in choosing an employer ($N = 154$)		
Yes	118	77
No	33	21
Other	3	2
If a retention bonus would be a factor in choosing an employer ($N = 154$)		
Yes	125	81
No	26	17
Other	3	2
Length of commute to work ($N = 154$)		
Live on site	70	45
Less than 20 min	40	26
21–40 min	26	17
41–60 min	7	5
61 min or more	7	5
Mixed responses	4	2
Have worked in an agricultural field job ($N = 154$)		
Yes	147	95
No	4	3
Did not respond	3	2
How many people share the bedroom ($N = 154$)		
No one, just me	0	0
2–6 people	144	94
7 or more people	8	5
Did not respond	2	1

(Continues)

TABLE 2 (Continued)

Variable	Number of respondents	Percent of respondents $N = 154$
How many hours from what your contract says, do you end up working, on average ($N = 154$)		
Half	2	1
Three-quarters	19	12
All	89	58
More than specified in the contract	14	9
I don't know, I don't count the hours I end up working	29	19
Mixed responses	1	1
Concerned about not obtaining an H-2A visa ($N = 154$)		
Yes	112	73
No	38	25
Other responses	4	2
How difficult is it to obtain an H-2A visa ($N = 154$)		
Extremely difficulty	13	8
Difficult	53	34
Neutral	53	34
Easy	31	20
Extremely easy	4	3
How confident to secure an H-2A visa next year ($N = 154$)		
Extremely confident	10	6
Confident	68	44
Neutral	23	15
Not confident	44	29
Extremely confident	4	3
Mixed responses	3	3
Did not respond	2	1
Wages in my home country are increasing ($N = 154$)		
Faster than in the United States	12	8
Similar to the United States	10	6
Slower than in the United States	129	84
Did not respond	3	2

Note: Sociodemographic characteristics and job-related questions.

Latino, 9% identified as White, and 7% indicated Mixed race. The average age of survey respondents was 31, which was close to the average age of 29 years in Mexico (Mexico National Institute of Statistics and Geography, 2020).

For the job-related and H-2A questions, 42% of individuals stated that they worked for the same company for three seasons (or more than 24 months) (Table 2). This suggests that respondents were experienced with the H-2A program, as only 13% have worked for less than 6 months. Sixty percent of people indicated they are paid both piecemeal and by hourly wage rates. While participants did not emphasize a particular overall "best benefit" from the current job, 20% of respondents indicated that the most important benefit is the assurance of guaranteed contract hours, 18% said it was vacation time, and 15% house amenities. These findings suggest that payment and the opportunity to take a short vacation to return to Mexico and spend time with their families are important for H-2A workers.

Of the tasks that respondents usually performed, 48% indicated harvesting apples, which is understandable as the survey was conducted during harvest season (September–October). Thirty percent indicated that they also perform pruning and tree training, which often happens during the winter months (January–February). We did not ask about the length of the work contract. However, the answers above suggest that 30% likely have contracts for 32 weeks a year to prune and train trees and harvest apples, while 48% have contracts closer to 12 weeks for only harvesting.

When asked about important factors when choosing an employer, 70% of respondents indicated that training, while 81% revealed that retention bonuses were key factors in their decision. During personal interviews with principal operators of apple-producing companies, we learned that a retention bonus is not typically offered in Washington state. Forty-five percent of respondents indicated they live near the orchard where they usually work, while 55% indicated that they commute. The company provides transportation for those workers who must commute to the orchards. This is typical in Washington because large tree fruit operations usually have orchards located in different places within the state.

Ninety-five percent of respondents indicated that they had previously worked in agricultural field jobs. On housing arrangements, 94% of respondents shared their bedroom with 2–6 individuals. Importantly, 58% of individuals indicated they work the exact number of hours stipulated in their contract. Additionally, 73% disclosed some concern that their H-2A visas might not be renewed, while 42% indicated that it was either difficult or extremely difficult to obtain an H-2A visa. Nonetheless, 44% revealed that they were confident in securing an H-2A visa for the following year.

Eighty-four percent perceived that wages in Mexico increase slower than in the United States. This indicates that the wage-gap incentive to work in the United States remains strong, and Mexican citizens will continue to be interested in applying for an H-2A visa. The workers surveyed provided positive comments about the H-2A program, all indicating a desire to have their contracts and visas renewed during the subsequent production season. One concern consistently raised was the separation from their families for long periods. This perception differs from that reported by Zoodsma et al. (2022), who interviewed a group of H-2A workers in New York state. Their respondents criticized the H-2A program mainly because of the impediments toward moving from farm to farm, communication difficulties with supervisors due to language barriers, perceived instability of employment, and violations of housing or work contracts. These differences reveal that H-2A workers perceive the program differently across states.

5 | EMPIRICAL APPROACH

To understand H-2A worker preferences for nonpecuniary job benefits, we employ an attribute-based DCE following the consumer theory by Lancaster (1966) and the random utility theory by McFadden (1974). This method allows us to examine H-2A workers' WTA different job attributes

by measuring the compensation workers would be willing to accept to forgo the attributes from a job offer. When using wage (willingness to receive compensation) WTA is more appropriate than willingness to pay because the latter is often associated with an income effect (i.e., an individual's ability to pay). In our study, the WTA, being less influenced by income, provides a better measure of the values assigned to attributes associated with a job offer.

Given our proposed experiment, a job offer consists of both wage and nonpecuniary benefits from which a rational farmworker derives utility. A farmworker is more likely to accept an offer if the utility obtained from the job attributes is the highest among all possible alternative options. Specifically, the utility U obtained by farm worker n by selecting field job i from a limited set of j alternative choices for situation t is:

$$U_{nit} = \alpha' X_{nit} + \varepsilon_{nit},$$

where α' is a vector of parameters, X_{nit} is a vector of field-job attributes, and ε_{nit} is a white noise error term. We utilize a random parameters logit (RPL) model as our preferred choice because, as Train (2009) discussed, the independence from irrelevant alternatives property is not always appropriate, and preference heterogeneity can occur.[6] With our proposed survey design, the job-attribute vector X_{nit} contains a wage rate (W_{it}) that represents one of four values, a binary variable for housing amenities (H_{it}), four options for training opportunities—none, training in machine operation, training in English, and training in both machine operations and English—(T_{it}), a binary variable for vacation time (V_{it}), and three options for overtime pay—unlimited hours, a maximum of 40 h with no overtime, and 40 h per week with $2 per bin overtime pay—($O_{it}$). Given the RPL specification, we define utility as:

$$U_{nit} = A_n + \alpha_W W_{it} + \alpha_{H,n} H_{it} + \alpha_{T,n} T_{it} + \alpha_{V,n} V_{it} + \alpha_{O,n} O_{it} + \varepsilon_{nit},$$

where U_{nit} indicates which job offer the respondent selected for each of the choice tasks and A_n is the alternative-specific constant representing the respondents' current job bundle. To directly estimate marginal WTA instead of marginal utility, the utility function is reparametrized as shown below:

$$\begin{aligned} U_{nit} &= A_n + \alpha_W W_{it} + \alpha_{H,n} H_{it} + \alpha_{T,n} T_{it} + \alpha_{V,n} V_{it} + \alpha_{O,n} O_{it} + \varepsilon_{nit}, \\ &= \alpha_W W_{it} + Z_{it}\beta + \varepsilon_{nit}, \\ &= \alpha_W W_{it} + Z_{it}\left(\alpha_W \frac{\beta}{\alpha_w}\right) + \varepsilon_{nit}, \\ &= \alpha_W \quad (W_{it} + Z_{it}\gamma) + \varepsilon_{nit}, \end{aligned}$$

where Z_{it} represents a vector of all the nonpecuniary benefits, β is the parameter vector of non-pecuniary benefits, and γ is the WTA parameter vector. Therefore, γ contains our parameters of interest and indicates the average wages that workers would be willing to forgo to obtain the specified attribute. We estimate all WTA space RPL models using the multinomial logit model with random parameters "GMNL" package in R with 500 Halton draws for the simulation considering the panel structure of the data (Sarrias & Daziano, 2017). The RPL model accounts for unobserved

[6]The independence from irrelevant alternatives property implies that if the relative likelihood of a worker's preference is, for example, for vacation time over overtime pay, then if training opportunities become available, the relative preference for vacation time over overtime pay remains.

preference heterogeneity by assuming a continuous heterogeneity distribution. Our study assumes that parameters vary randomly over individuals following the normal distribution.[7] With preference heterogeneity, the WTA parameter γ is normally distributed and the algorithm estimates both mean and standard deviations for each attribute, and we report the standard errors for both the mean and standard deviation.

To further understand respondents' preferences for nonpecuniary benefits, we computed the compensating surplus (CS), which represents the welfare change for respondents when going from the base option to the hypothetical job offer. The base option is defined as a job offer providing no housing amenities, no training opportunities, no opportunity to take short a vacation, and limiting the number of hours worked to 40 h/week (i.e., no overtime). Following Britwum and Yiannaka (2019) and Espinosa-Goded et al. (2010), the CS is defined as:

$$\mathrm{CS} = -\left(\frac{1}{\beta_{\mathrm{price}}}\right)(V_1 - V_2),$$

where V_1 is the conditional indirect utility of the base option and V_2 is the utility associated with the hypothetical job offer based on the benefit levels reported in Table 1. Additional details on the estimation of the CS are included in the online appendix.

6 | RESULTS

In the first part of this section, we present the findings from the DCE experiment by considering the WTA job attributes and the CS. We then examine the WTA based on a subsample analysis.

6.1 | WTA

This section discusses the H-2A workers' WTA job attributes that were included in the survey. The WTA for a job with none of the attributes (i.e., their reservation wage[8]) is statistically significant at \$10.213 per bin, which is well below the rate farmers pay (about \$25 per bin) for Gala apples and indicates that workers are satisfied with their current job conditions (Table 3). If the average worker picks seven bins per day, assuming an 8-h workday, the hourly reservation wage rate is \$8.94/h (= 7 × 10.213/8). Thus, this reservation wage is well below the AEWR of \$17.97/h in 2023. We believe that this reservation wage is rational as it lies between the Mexican minimum wage of \$1.42/h and the AEWR. Thus, at least for Washington state apple harvesters, it seems that the minimum wage imposed by the AEWR is well above the level needed to attract H-2A workers specifically from Mexico (note that the values could be different for workers coming from other countries like South Africa or Central America with different wage levels, which we do not have in the sample).

Regarding nonpecuniary benefits, the largest estimated WTA (\$10.583 per 925-lb bin) was for the opportunity to take short vacations when work intensity is low and the worker covers the travel cost. Thus, H-2A workers find it important to have the opportunity to return home and visit family. To provide context, if the AEWR was 17.97/h and workers are willing to give up \$10.583 per bin for a trip home, the H-2A workers would earn \$14.42 per bin—which is above the reservation wage of \$10.213 per bin and well above their potential earnings in Mexico. While currently not allowed

[7]While we rely on a normal distribution to model heterogeneity of individuals, this assumption does help to mitigate the concern of endogeneity bias due to unobserved factors.
[8]The reservation wage is the lowest wage that the workers would consider accepting for an H-2A contract.

TABLE 3 Coefficient estimates of WTA.

Variable	Coefficient estimate	Standard error
Mean		
Prefer current job bundle—neither alternative presented (alternative specific constant)	10.213***[a]	2.236
The company offers an opportunity to take a short vacation[b]	10.583***[a]	0.742
Machine operator training (i.e., Tractor) and free English classes[c]	10.184***	1.180
Free English classes[c]	9.278***	1.708
Training in machine operation (i.e., Tractor)[c]	7.655***	0.986
The company offers housing amenities[d]	7.999***	0.710
Work as many hours as a worker and employer agree[e]	6.210***	0.895
For all hours over 40/week, earn overtime pay of $2 per bin[e]	1.946**	0.886
Scale heterogeneity	−0.970***	0.289
Standard deviation		
The company offers an opportunity to take short vacations	6.910***	0.892
Machine operator training (i.e., Tractor) and free English classes	1.611	1.245
Free English classes	1.268	2.759
The company offers housing amenities	10.614***	1.196
Training in machine operation (i.e., Tractor)	0.377	1.508
Work as many hours as the worker and employer agree	1.138	1.408
For all hours over 40/week, earn overtime pay of $2 per bin	2.709***	0.782
Tau	−1.897***	0.208
Number of observations	1848	
Log likelihood	−1367	
Akaike information criterion	2768	
Bayesian information criterion	2862	

Note: Nonpecuniary H-2A job benefits.

[a]*, **, *** indicates statistical significance at the 10%, 5%, and 1% levels.

[b]Relative to "No opportunity to take a short vacation."

[c]Relative to "No training opportunity."

[d]Relative to "No offer of housing amenities."

[e]Relative to "Work a max. of 40 h/week—there is no overtime opportunity."

under the H-2A program, this result signals the importance to respondents of being close to their families and coincides with expressed concerns about being away from relatives for a long period.

The second largest estimated WTA ($10.184 per 925-lb bin) was for training in both machine operation and English, followed by training in English only ($9.278 per 925-lb bin) and machinery training only ($7.655 per 925-lb bin). As with short vacation opportunities, the net earnings from these attributes are well above the reservation wage. Furthermore, these results indicate that H-2A workers value enhancing their human capital and understand the importance of communication and gaining new skills for their future earnings (although our data is for one period within a

single year). The estimated WTA for housing amenities such as wireless internet connection, a common outdoor area, a small refrigerator to improve house comfort, and proximity to towns is \$7.999 per 925-lb bin. While these job characteristics are not part of the H-2A program, this information is important for farmers to attract and retain workers.

In 2021, Washington state implemented a new policy of phasing in overtime pay for farm workers. In the new policy, by 2024, farm workers can only work 40 h a week before overtime pay begins (Geranios, 2021). We examine H-2A workers' preferences for this policy change. The WTA for working as many hours as agreed with no consideration to overtime pay was \$6.210 per 925-lb bin and the WTA for working as many hours as agreed with consideration to overtime pay for work over 40 h/week was \$1.946 per 925-lb bin. The two latter were estimated to have "work a maximum of 40 h/week only" as the base for comparison. This finding is revealing and implies that H-2A workers prefer the status quo—working as many hours as they and their employer agree without overtime pay—to being limited to only 40 h/week of work. That is, even if overtime pay is in the picture, they assign a higher WTA to the status quo than to the opportunity to earn overtime. These reductions would not affect all workers equally. However, on average, agricultural workers could see changes in their weekly income ranging from a \$30 increase to a \$60 decrease.

The coefficient estimates for scale heterogeneity reflecting individual preferences for wage and other factors, as measured by τ, were statistically significant (Table 3). This suggests the presence of heterogeneity across respondents' choices. The standard deviation of coefficient estimates for overtime pay for all hours over 40 per week, the offering of house amenities, and the option of an opportunity to take short vacations were also statistically significant. This result further indicates heterogeneity across respondents' preferences.

Considering the heterogeneity of different apple-producing farms, we apply interaction terms of binary variables of farm characteristics in the RPL model (Table 4). The results demonstrate that the farm characteristics do not influence workers' WTA the free English classes and earning overtime payments. Note that the first farm surveyed is the reference point. The results indicate that while workers working on the second farm have a higher premium for short vacations than workers working on the first farm surveyed, this result is statistically insignificant. The same result has been found for the WTA for training in machine operation for workers surveyed in the third farm. The results also suggest that workers on the second and third farms have significantly higher WTA housing amenities and training in both machine operation and English classes together compared to the first farm.

6.2 | CS

We computed the compensating surplus for the job offers with the nonpecuniary benefits, as shown in the online appendix. The estimated CS was \$39.455 for a job offer that includes housing amenities, training (English and machinery, English only, and machinery only), the opportunity to take short vacations, and working all the hours agreed with either overtime pay or no overtime pay (the latter compared to the base scenario limiting the number of hours worked to 40 h/week). We considered two other scenarios[9] for CS in the online appendix. In all, H-2A workers stated they were better off with a job offer that included housing amenities, training (machinery operation, English, or both) the opportunity to take short vacations, and the option to work as many hours as agreed even if without overtime pay.

[9]The other two scenarios are (i) consider as the base working all hours with no overtime payments and limiting the number of hours worked to 40 h/week, and (ii) consider as the base working all hours with overtime payments and limiting the number of hours worked to 40 h/week. These are explained in detail in the online appendix.

TABLE 4 Coefficient estimates of WTA: With farm characteristics.

Variable	Coefficient estimate	Standard error
Mean		
Prefer current job bundle—neither alternative presented (alternative specific constant)	12.154***[a]	4.231
The company offers an opportunity to take a short vacation[b]	7.659***[a]	1.088
Machine operator training (i.e., Tractor) and free English classes[c]	5.370***	1.387
Free English classes[c]	4.239	2.965
The company offers housing amenities[d]	2.817**	1.289
Training in machine operation (i.e., Tractor)[c]	4.070***	1.228
Work as many hours as the worker and employer agree[e]	0.892	1.640
For all hours over 40/week, earn overtime pay of $2 per bin[e]	1.944	1.698
Interaction with farm characteristics		
Farm2 × prefer current job bundle	1.127	4.827
Farm3 × prefer current job bundle	−52.507***	17.932
Farm2 × vacation	4.426***	1.417
Farm3 × vacation	1.083	2.162
Farm2 × machine operator training and free English classes	4.529**	2.047
Farm3 × machine operator training and free English classes	6.569**	3.330
Farm2 × free english classes	4.661	3.641
Farm3 × free English classes	5.373	5.241
Farm2 × housing amenities	3.381**	1.569
Farm3 × housing amenities	11.868***	2.222
Farm2 × training in machine operation	5.060***	1.779
Farm3 × training in machine operation	3.147	2.990
Farm2 × work as many hours as a worker and employer agree	7.493***	2.053
Farm3 × work as many hours as a worker and employer agree	8.043***	2.887
Farm2 × for all hours over 40/week, earn overtime pay of $2 per bin	1.004	2.041
Farm3 × for all hours over 40/week, earn overtime pay of $2 per bin	1.575	2.579
Scale heterogeneity	−0.739**	0.289
Standard deviation		
The company offers an opportunity to take short vacations	7.678***	0.909
Machine operator training (i.e., Tractor) and free English classes	0.135	1.840
Free English classes	0.701	1.974
The company offers housing amenities	8.0676***	0.873
Training in machine operation (i.e., Tractor)	0.771	1.018

TABLE 4 (Continued)

Variable	Coefficient estimate	Standard error
Work as many hours as a worker and employer agree	3.786***	1.085
For all hours over 40/week, earn overtime pay of $2 per bin	3.882***	1.011
Tau	2.063***	0.235
Number of observations	1848	
Log likelihood	−1349	
Akaike information criterion	2764	
Bayesian information criterion	2946	

Abbreviation: WTA, willingness to accept.

[a]*, **, *** indicates statistical significance at the 10%, 5%, and 1% levels.

[b]Relative to "No opportunity to take a short vacation."

[c]Relative to "No training opportunity."

[d]Relative to "No offer of housing amenities."

[e]Relative to "Work a max. of 40 hours/week—there is no overtime opportunity."

6.3 | Subsample analyses

We examined if there was heterogeneity in our WTA results across the length of employment with the same company and years of education using subsample analyses (see Table 5).

Seventy-five respondents were employed for less than 1 year, and 73 were employed for more than 1 year (implying returning workers). The respondents who were employed for more than 1 year showed a larger WTA—for all nonpecuniary benefits included in the study—than those employed for less than 1 year. Those employed for less than 1 year had the highest WTA for housing amenities offered by the employer, followed by the opportunity to take short vacations. For those employed for more than 1 year, the highest WTA was for training, both in machine operation and English classes, followed by training in English classes only and the opportunity to take short vacations.

Regarding the number of years of education, 45 respondents indicated they attained an education beyond high school, and 106 respondents indicated they completed high school or less. Respondents who attained education beyond high school stated the highest WTA for housing amenities offered by the employer and then for the opportunity to work as many hours as the worker and employer agree upon. Those who attained high school or less stated the highest WTA for training in machine operation and English classes, followed by the opportunity to take short vacations. The results imply that respondents with schooling higher than a high school education were less interested in training opportunities, likely because they had already obtained other skills through more years of education.

7 | CONCLUSIONS

This is the first study to interview H-2A workers to conduct an attribute-based DCE to estimate their WTA nonpecuniary job benefits. Overall, the results indicate that the most valued nonpecuniary benefit by H-2A workers is the opportunity to return home to visit family for a limited time when work intensity is low. The second highest valued benefit is training in both English and machinery operation, followed by training in English only, the employer offering housing amenities,

TABLE 5 Subsample analyses: Coefficient estimates of WTA: Nonpecuniary H-2A job benefits.

Variable	WTA estimation by length of employment				WTA estimation by worker years of education			
	Employed <= 1 year, $N = 75$		Employed > 1 year, $N = 73$		Years of education > high school, $N = 45$		Years of education ≤ high school, $N = 106$	
Mean	Coefficient estimate	Standard error	Coefficient estimate	Standard error	Coefficient estimate	Standard error	Coefficient estimate	Standard error
The company offers an opportunity to take a short vacation[a]	8.958***[b]	1.097	10.816***	1.207	6.365***	1.177	11.045***	0.939
Machine operator training (i.e., Tractor) and free English classes[c]	8.665***	1.768	11.021***	1.999	1.509	1.359	11.294***	1.369
Free English classes[c]	5.834*	2.486	10.839***	2.836	0.719	1.742	9.599***	1.950
The company offers housing amenities[d]	9.482***	1.105	9.958***	1.479	13.600***	1.861	7.332***	0.718
Training in machine operation (i.e., Tractor)[c]	6.438***	1.536	8.447***	1.522	2.181	1.400	8.262***	1.255
Work as many hours as the worker and employer agree[e]	5.429***	1.432	10.657***	1.648	7.928***	1.818	6.859***	0.986
For all hours over 40/week, earn overtime pay of $2 per bin[e]	0.705	1.418	3.657**	1.321	2.665	1.495	2.839*	1.113
Prefer current job bundle—neither alternative presented	9.103*	4.214	10.270***	3.068	25.308***	1.786	8.430*	3.810
Scale heterogeneity	−1.696***	0.275	−0.494***	0.056	−0.931*	0.445	−0.967**	0.338
Standard deviation								
The company offers an opportunity to take short vacations	7.091***	1.535	7.183***	1.323	9.978***	1.649	8.396***	1.184
Machine operator training (i.e., Tractor) and free English classes	0.697	4.396	0.856	2.752	1.373	2.058	2.204	2.293

TABLE 5 (Continued)

Variable	WTA estimation by length of employment				WTA estimation by worker years of education			
	Employed <= 1 year, $N = 75$		Employed > 1 year, $N = 73$		Years of education > high school, $N = 45$		Years of education ≤ high school, $N = 106$	
Mean	Coefficient estimate	Standard error	Coefficient estimate	Standard error	Coefficient estimate	Standard error	Coefficient estimate	Standard error
Free English classes	0.511	9.034	0.918	3.893	0.794	3.316	0.219	2.547
The company offers housing amenities	10.187***	1.772	9.273***	1.416	15.676***	2.973	8.193***	1.050
Training in machine operation (i.e. Tractor)	1.016	3.955	0.733	1.377	4.216*	1.916	1.082	1.649
Work a maximum of 40 h/week—there is no overtime opportunity	2.929	2.531	7.441***	1.523	7.202***	1.316	3.162*	1.363
For all hours over 40/week, earn overtime pay of $2 per bin	1.334	3.408	3.073*	1.310	1.900	1.382	4.850***	1.234
Tau	1.291***	0.232	2.388***	0.053	1.645***	0.333	−1.834***	0.244
Number of observations	900		876		540		1272	
Log likelihood	−653.410		−659.61		−413.840		−926.500	
Akaike information criterion	1340.820		1353.228		861.683		1887.001	
Bayesian information criterion	1422.460		1434.409		934.640		1974.523	

Abbreviation: WTA, workers' willingness to accept.

[a]Relative to "No opportunity to take a short vacation."

[b]*, **, *** indicates statistical significance at the 10%, 5%, and 1% levels.

[c]Relative to "No training opportunity."

[d]Relative to "No offer of housing amenities."

[e]Relative to "Work a max. of 40 hours/week—there is no overtime opportunity."

and training for machinery operation only. The least valued benefit was the opportunity to earn overtime pay.

Workers surveyed were heterogeneous in their valuations. Those employed for more than 1 year (implying returning workers) exhibited the highest valuation for training and short vacations, whereas those employed for less than 1 year stated the highest WTA was for housing amenities and short vacations. Workers who completed high school or less revealed that the highest WTA was for training and short vacations, while those whose education extends beyond high school indicated that the highest WTA was for housing amenities and the opportunity to work as many hours as agreed upon.

This paper provides revealing insights in the context of proposed modifications to the H-2A program. Results from this study suggest that H-2A guest workers in Washington state would like the opportunity to return to Mexico to visit their families. Therefore, changes to the program rules should allow workers to return home under their H-2A visa or guarantee a path for permanent residency that would allow workers to bring their families and travel to the United States more easily.[10] Another implication is the need to find and regulate the optimal length of a contract. We find a lower value (compared to the other benefits presented) assigned to mandatory overtime pay, as implemented in Washington state in 2021. Workers may perceive that overtime pay could result in farmers limiting the number of hours they can work, thus reducing their expected income. The opportunity to receive training is also highly valued by workers, suggesting that H-2A workers would prefer rotating jobs within a working crew to expand the opportunity to learn new skills such as operating machinery. Also important are training in English and housing amenities.

An important caveat when interpreting our results is that we faced significant challenges in finding companies authorizing us to survey their workers. While our results are informative, they are likely not generalizable as we also did not have access to other variables that could have better allowed us to control for some endogeneity concerns, that is, additional unobservable factors influencing farm workers' choices. We alleviate this concern by using RPL models which account for unobserved heterogeneity across workers. Future research should test the robustness of our findings with larger sample sizes that include other states, crops, and explanatory variables.

DATA AVAILABILITY STATEMENT

Authors elect to not share data.

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