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Farm Labor Trends and Management in Washington State

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The Washington State farm labor market is a pivotal point in the western migrant stream. Farm employers argue that the seasonal labor market has tightened as a result of changes in immigration policy and economic conditions, even as they increase acreage of labor-intensive crops and the demand for labor. Yet, one could argue that a sufficient labor supply is available if workers are offered competitive wages and sufficient hours. To address some of these questions and issues, this study explores whether employer-specific factors (commodity, region, size, and management practices) influence worker turnover and the ability of employers to attract return workers.

Key Words: farm labor, Washington agriculture, worker turnover

Agriculture is thought of as a declining industry in terms of employment nationally, but this is not the case in Washington State where agricultural employment has significantly increased over the past decade (figure 1). This growth is primarily due to increased production of the labor-intensive crops (fruits, vegetables, and nursery crops) demanded by a more health-conscious domestic market, and growing export market. Washington agriculture employed an average of 91,700 workers in 1998, but a small fraction of the workforce is employed year-round. For example, peak seasonal employment for apple growers during 1998 required over 50,000 workers, an almost fourfold increase from the total demand for seasonal agricultural labor for all crops in January (refer to table 1).

Washington State employment officials note increasing concern about worker supply among the producers whose highly perishable crops require large volumes of seasonal labor. Agricultural producer organizations dispute the General Accounting Office's finding that a sufficient farm workforce exists at the national level (Kiesling-Fox, 1998; Lipton and Thornton, 1997). It is not known whether a labor shortage exists, or if economic incentives and other labor management strategies

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Table 1. Employment of Seasonal Hired Workers in Washington State by Crop and Month, 1998

Crop	JAN	FEB	MAR	APR	MAY
Apples	8,242	9,077	11,709	10,285	10,140
Cherries	372	1,133	918	265	448
Pears	789	870	765	545	467
Other Tree Fruit	657	680	469	501	319
Berries/Grapes	1,833	2,048	2,499	1,828	1,970
Hop	36	67	820	1,220	1,965
Nursery/Bulb	822	1,612	2,504	2,671	2,039
Wheat/Grain	95	48	294	422	562
Misc. Vegetables	259	335	581	852	1,572
Other Seasonal	1,086	1,737	2,625	10,577	12,517
TOTALS	14,191	17,607	23,184	29,166	31,999

Source: Washington State Employment Security Department (WSESD), 1999.

could alleviate the tight labor market conditions faced by producers. Nationally, claims of labor shortages are the primary factor cited in legislation for a new guestworker program, but such political action may call for more analysis of recent farm labor market trends. This study examines some of the economic trends, dynamics, and perceptions of the Washington State farm labor market to explore these issues.

The next section of this article provides a brief overview of previous research on Washington agriculture and its unique labor market characteristics, followed by an analysis of current agricultural wages and employment dynamics. Although the primary focus is labor market trends, analysis of a 1995 survey illustrates how employer perceptions of turnover, worker recruitment, and the migration origin of workers may affect the employer's wage and employment decisions. Finally, a discussion of the findings and implications for Washington and other western labor markets is presented.

The Washington State Farm Labor Market

Farm labor is arguably the most complex input in the U.S. agricultural industry. Although labor is seldom mentioned in discussions of sustainable agriculture, producers have rarely been able to maintain employment conditions that sustain local workers on a year-round basis. In general, agricultural operations have lowered their demand for labor through continued mechanization, as evidenced by a continuous decrease in farm labor numbers nationally. Yet, for those enterprises that continue to rely on seasonal labor, the challenge of securing sufficient workers during peak seasons remains. Given the extreme seasonality of demand for labor among apple producers, Washington State is an interesting market to examine.

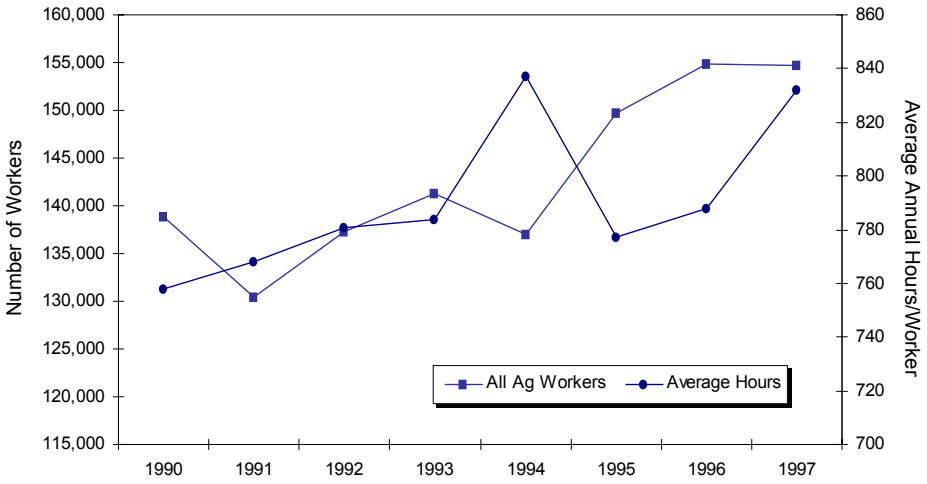
Table 1. Extended

JUN	JUL	AUG	SEP	OCT	NOV	DEC
25,823	26,279	20,357	36,171	53,778	13,742	6,598
14,304	16,998	236	0	0	0	399
1,184	1,451	6,685	6,494	1,469	475	1,396
223	3,193	4,322	3,562	1,374	691	266
3,675	6,717	4,712	1,988	1,462	1,492	2,142
1,303	522	686	2,881	209	184	79
2,477	2,175	2,044	1,703	1,043	1,059	1,255
411	902	1,548	228	42	32	0
2,214	3,653	2,667	3,392	2,655	1,319	604
11,599	7,246	9,314	7,555	6,305	2,708	2,114
63,213	69,136	52,571	63,974	68,337	21,702	14,853

Agriculture is a leading industry in Washington State in terms of both sales and employment. The value of agricultural production in the state totaled $5.6 billion in 1997, making it the 11th largest agricultural state (by sales) in the country. The dominance and growth of the apple and cherry industries in the state have contributed to the persistence of extreme seasonal swings in worker demand (table 1). Unlike national trends, agricultural employment is growing in Washington (figure 1), and the seasonality of labor demand persists. Washington is a primary destination point in the western migrant stream due to its large demand for seasonal farmworkers during the fall months, when Texas and California producers require less labor.

Figure 1 provides aggregate farm employment numbers for Washington State from 1990 through 1997. The clearest trend is that the demand for workers has consistently increased since 1991. However, average hours worked by farm laborers (a substitute for number of workers) has not risen as consistently. Data for 1994 are exceptions in both cases, since rumors of a bad apple crop kept migrants from traveling to Washington, thereby forcing employers to utilize available workers more fully. That season marked the beginning of recent debates on labor shortages, even though employment numbers (and labor demand) have continued to escalate.

The final year illustrated in figure 1 (1997) represents a positive trend to employment officials. The number of workers required in agriculture remained steady from the previous year, but average hours worked increased significantly. This stabilization of the farm workforce may reflect a market-clearing equilibrium where workers are offered sufficient incentives by employers who are willing to pay better wages and provide more total hours to secure adequate labor. Yet, there are employers who declared 1997 unacceptable due to their dependence on a smaller pool of labor, and their inability to get crops harvested as quickly as they would have preferred (Jaksich, 1999).



Source: Washington State Employment Security Department data.

Figure 1. Washington farm labor: Workers employed and average annual hours worked, 1990–1997

Wages and Earnings

Similar to national statistics, earnings for Washington State agricultural workers are low, but hourly and annual earnings vary substantially across agricultural sectors (table 2). While hourly wages are competitive with alternative employment options, the lack of year-round employment keeps annual earnings low. During the month of December 1998, unemployment insurance (UI) claims from crop workers peaked at 7,935 from a low of 1,295 during the previous September, an increase of almost 500%.[1] This seasonal pattern persisted throughout the 1990s, indicating that attempts at "regularizing" the demand for farm labor has not been successful.

Not surprisingly, a high turnover rate exists among farmworkers. Of the 149,650 workers employed in Washington agriculture at some time during 1995, it is estimated that only 45.2% remained in agriculture in 1997. There are many workers who choose to work in both farm and nonagricultural jobs to improve annual earnings. Table 2 reports the average annual earnings of all agricultural workers, as well as those who work only in agriculture (about 70% of the total) and those with both types of employers (31%). Those who worked for both agricultural and nonagricultural employers in 1997 earned no more on an hourly basis than those working in agriculture only. However, when compared to their agriculture-only counterparts, labor statistics for those who worked for both types of employers reveal almost

[1] It is also important to note that 53% of farmworkers in 1997 did not qualify for UI coverage since they did not work 680 hours during the year.

Table 2. Average Annual and Hourly Earnings of Washington State Farm Workers, 1995 and 1997

Description	Annual Earnings ($)	Percent of Ag Employment (%)	Avg. Hourly Wage ($) 1995	1997
Agricultural Production—Crops:				
Wheat	4,024	3.5	9.03	9.75
Irish Potatoes	3,994	4.1	8.67	9.01
Field Crops (except cash grains)	3,652	9.9	7.17	7.72
Vegetables and Melons	2,562	8.1	7.22	7.80
Berry Crops	2,049	5.3	7.12	7.13
Grapes	2,444	3.9	7.29	7.12
Deciduous Tree Fruits	3,822	57.2	7.45	7.88
Ornamental Floriculture/Nursery Products	5,338	8.2	8.70	8.57
Agricultural Production—Livestock:				
Beef Feedlots	6,337	0.7	8.21	10.44
Beef (except feedlots)	4,264	0.8	8.19	9.00
Dairy Farms	9,727	3.5	10.56	10.70
Agricultural Services:	15,127			
Crop Preparation Services	5,192	10.3	8.49	9.02
Farm Management Services	3,017	3.3	7.79	8.42
Worker Classification:				
All agricultural workers	7,237	832 hrs. for 2.57 employers		8.70
Worked for both ag and non-ag employers	10,054	1,142 hrs. for 3.87 employers		8.80
Worked in agriculture only	5,990	695 hrs. for 2 employers		8.62
All Civilian Workers	30,755			

Sources: Wahlers, 1995; Washington State Employment Security Department, 1999.

double the number of hours worked (1,142 versus 695) and double the number of employers (4 versus 2).

This pattern represents a possible solution for supplying seasonal agriculture, but there are also some drawbacks. There is a cost to the workers from switching employers twice as often during the year. This, together with the relative stability of nonagricultural employment, likely explains the poor retention rate of workers in agriculture. There is no clear motive for workers to return to farm operations if hourly earnings are similar, and no long-term farm employment prospects are available. The annual earnings of workers who left farm jobs between 1995 and 1997 averaged $11,899, well above the $7,237 earned by farmworkers and the $10,054 earned by those who worked farm and nonfarm jobs. The complementary seasonality of some nonagricultural work (i.e., food processing directly proceeding harvest) is the primary reason some workers do remain employed in agriculture after securing nonfarm work.

Regional Patterns

The impact of farm labor issues is not uniform across the state of Washington. Almost 80% of the farm employment is located east of the Cascade mountains, with Yakima, Chelan-Douglas, Benton-Franklin, and Grant counties representing almost 60% of agricultural employment (table 3). It is also interesting to note the reliance on agriculture for each county's economy as measured by the share of total employment in agriculture. These numbers are important indicators of potential labor shortages, especially when combined with data on agricultural commodities and production in each area.

The patterns observed in table 3 are not surprising given the varying importance of agriculture throughout the state. The influx of workers during peak seasons does represent a challenge to the economic and social infrastructure of some areas. The lack of nonagricultural employment opportunities in these counties during the off-season dampens prospects for attracting return workers to agriculture from one year to the next. Although discussion of the communitywide social and economic implications is beyond the scope of this study, it is an important consideration in the debate on labor policy and programs.

Migrant and Seasonal Workers

Washington State employment officials estimate that 30–60% of the seasonal agricultural workforce is made up of illegal or undocumented workers. In 1995, about 13% of all Washington seasonal farmworkers were migrants (8.5 % were interstate and 4.4% were intrastate workers). The proportion of migrants is considerably higher during periods of peak activity, with migrants representing nearly one out of every five workers during peak season. This seasonal number is consistent with the share of interstate migrants (20%) reported by growers in this study (refer to table 4).

According to 1997 UI records, the average Washington farmworker is Hispanic (82%), male (76%), and under 40 years of age (64%). Approximately 13% of the agricultural workforce is migrant labor (with a higher share in peak seasons), and there is over 25% turnover annually out of agriculture (WSESD, 1999). Farmworker earnings remain low, even though hourly earnings are similar to peer workers in non-agricultural industries, because of the extreme seasonality of agriculture.

Worker Migration and Turnover

In an attempt to utilize special worker programs (such as the H2-A program), some Washington agricultural employers have previously stated that labor shortages exist, and now many argue that a guestworker program should be reinstituted. However, the economics of labor demand, supply, and market dynamics have not been fully integrated into the debate of labor shortages and worker programs. It is essential to understand the full set of factors affecting the farm labor market and the employers who make choices within the market.

Table 3. Total Employment, Agricultural Employment, and Share of Agricultural Employment, Washington State and Selected Areas, 1996

Area	Total Employment	Agricultural Employment	Ag Share of Total Employment (%)
State Total:	2,699,300	84,350	3.1
Western Washington	2,115,730	16,690	0.8
Eastern Washington	583,610	67,660	11.6
State Agricultural Areas:			
Columbia Basin	38,260	9,580	25.0
< Adams County	7,520	2,340	31.1
< Grant County	30,740	7,230	23.5
North Central	82,090	18,370	22.4
< Chelan and Douglas Counties	47,750	11,380	23.8
< Kittitas County	13,710	1,110	8.1
< Okanogan County	20,630	5,880	28.5
South Central	108,190	20,990	19.4
< Klickitat County	7,690	890	11.6
< Yakima County	100,500	20,100	20.0
South Eastern	108,100	12,900	11.9
< Benton and Franklin Counties	84,000	10,200	12.1
< Walla Walla County	24,100	2,700	11.2
Eastern	246,970	5,820	2.4
< Lincoln County	4,530	1,060	23.4
< Spokane County	189,900	1,420	0.7
< Whitman County	18,320	1,580	8.6
< Other Eastern Counties	34,220	1,760	5.1

Source: Washington State Employment Security Department, 1999.

Notes: Total employment and agricultural employment have been adjusted to eliminate the effect of dual job holding. Detail may not add to total because of rounding.

The economic implications of a continued dependence on seasonal and migrant farm labor are not trivial (Emerson, 1989). Bailey (1993) suggests the labor market of a region with a high proportion of individuals with extensive migration history will operate less efficiently than the labor market of a region with fewer in-migrants. Anderson (1993) found support for the idea that adjustment costs, such as large recruitment costs, should play a role in reducing the employment response of firms to seasonal fluctuations in demand. Yet, turnover and reliance on migrants actually increased in Washington throughout the 1990s.

In the past, ample supplies of replacement workers kept such adjustment/recruitment costs low. Taylor and Thilmany (1993) argue that any labor shortage should be met by an employer response attempting to marginally decrease worker turnover. In the case of seasonal employment, employers may offer a longer duration of employment, higher wages (to offset costs of finding new employment), or other

incentives to attract return workers (such as a bonus to workers who return or who refer other workers).

Cooper (1994) tested the hypothesis that market wages and wage variability are a primary source of information included in the migration decisions of agents. Those employers with higher and/or less variable wages fare better in their challenge to secure the return of previous workers, as well as a sufficient number of new recruits. Similarly, seasonal migrant workers may be more concerned about the duration of work available than the level of wages offered. In short, it is likely that several economic factors—including wage levels and variability, likelihood of employment, and employment duration—all affect migrant behavior. The latter part of this analysis examines whether employers are implementing management practices designed to lower turnover in an effort to avoid labor shortages in peak seasons.

Analysis of Farm Labor Dynamics

The objectives of this analysis focus on several questions posed by Washington State Employment Department officials in a 1995 survey of farm employers. First, it is not clear from labor market trends that employers have altered production enterprises or practices due to concern about labor shortages. A graph and various tables are used here to describe the recent history of the farm labor market, including workforce numbers, wages and earnings, and regional labor demand. Trend analysis of employment data provides base evidence to test claims of a shortage at the state level.

The second section of the analysis examines whether individual employers implemented measures, such as an increase in wages or other employment incentives, to secure workers. The objectives of the farm employer survey and its analysis focus on the differential experiences of farm employers to determine and analyze such labor management strategies. The survey group was divided into two samples for analysis, those who raised wages between 1994 and 1995 and those who attracted a higher share of return workers. An increase in wages offered would be expected in the case of a perceived labor shortage, so those employers who chose to raise wages were of specific interest to officials. Employers who attracted a relatively high share of return workers were also of interest because they seem to hedge against the risk of a labor shortage by using managerial strategies to attract a higher share of workers to return from year to year.

Farm Labor Data and the Employer Survey

A major source of farm labor data in this study is employer tax records. Nearly all farm employment in Washington State since 1990 has been covered by the Employer Security Act. To augment these data with a more detailed account of labor activities by crop, the Washington State Employment Department conducts a monthly In-Season Farm Labor Survey with voluntary responses from about 600 employers.

Although aggregate farm labor estimates exist, there is little information on the migratory nature of the workforce, job duration for individual workers, primary state of migrant residence, or the reliance of individual employers on workers of varying characteristics. Again, to supplement available data, this study also includes data collected from an appendix to the 1995 August Farm Labor Survey. Additional questions on employers' perceptions of the share of workers returning in recent years, origin and share of interstate migrants hired, and employers' decision to raise wages were added to the standard questionnaire.

The response rate to the additional employer questions represented about 50% of the survey sample (243 respondents). To ensure sufficient representation from all sectors, especially those of greatest interest to a study of seasonal workers, the sample was compared to the general characteristics of the Washington farm labor market. The employers surveyed represent 10% of the employment for the state (total and seasonal), and are representative of the crop and regional mix of the state.

Analysis of the Employer Survey

Variable definitions and descriptive statistics from the survey are presented in table 4. Note that almost 50% of the sample chose to raise wages in 1994 or 1995 (*RAISE* share). *TOT* and *SEAS* represent the average total and seasonal workforce hired by the responding employers, and *WAGE* shows the average hourly wage paid (with the average paid for various commodities broken out). The regional and commodity dummy variables show the share of respondents falling under each category. The *HARV*, *TRANS*, *PACK*, and *GEN* variables reflect what share of workers made up the total workforce on average. *INTER* represents the share of interstate migrant workers (20%), and the state-specific variables (*CA*, *MX*, *OR*, and *TX*) show the breakdown of the primary place of residence for most of these migrants (only responses of those employers who use such migrants were considered, so the shares sum to one).

Several variables were included to proxy for various production, hiring, and management strategies that may be used by employers to alleviate labor shortage concerns. *VARTOT* and *VARWAGE* are constructed variables identifying the weight placed on total employment and wage variability for an employer, relative to the average of those same numbers. Following Cooper (1994), higher numbers should negatively affect employers' recruitment and retention efforts. *LENGTH*, *NOCROP*, and *NOACT* show the diversity of the operation and reveal how well employers may be able to regularize their demand for labor. *PSEA* indicates how large a difference there is between employment in the peak season and the average employment year-round to measure the degree of seasonality for an employer. Finally, *BEST*, *REF*, and *REC* reflect employment and hiring practices that may affect workers' perceptions of employment opportunities with a specific operation.

Although the means for each of the respective variables are interesting in themselves, the previous discussion implies there are several interrelated factors among labor markets and employer choices. Thus, econometric models were used for

Table 4. Variable Definitions and Descriptive Statistics Based on 1995 Survey of Washington State Farm Labor Employers

Variable	Definition	Mean	Variance
TOT	Mean total employment	69.7850	94.0450
SEAS	Mean seasonal employment	54.9790	69.2190
WAGE	Mean hourly wage	$5.67	2.0090
	< Tree fruits	$6.90	
	< Vegetables	$6.69	
	< Nursery	$7.49	
	< Grains	$8.02	
SC	South Central area	0.3100	0.4630
NC	North Central area	0.2020	0.4030
CB	Columbia Basin area	0.1360	0.3440
SE	Southeastern area	0.1740	0.3800
VEG	Vegetable producer	0.1490	0.3680
NURS	Nursery producer	0.0620	0.2420
FRUIT	Tree fruit producer	0.4920	0.5010
WHEAT	Wheat producer	0.0580	0.2340
VARTOT	Total labor variability ($= F_{labor} / :_{labor}$)	0.4329	2,443.1000
VARWAGE	Wage variability ($= F_{wage} / :_{wage}$)	0.8144	262.1800
LENGTH	Length of employment (months)	2.5860	2.2840
NOCROP	Number of crops produced	3.2930	1.9900
NOACT	Number of crop activities	7.6650	5.0410
BEST	Best workers retained for longer periods?	0.6610	0.4740
REF	Share of workers referred by other workers	56.3300	44.0820
REC	Share of workers recruited by employer	17.3800	32.3570
HARV	Producer employs primarily harvest labor	0.5870	0.4930
TRANS	Producer employs transportation workers	0.0330	0.1790
PACK	Producer employs packing labor	0.1030	0.3050
GEN	Producer employs general farmworkers	0.0700	0.2560
INTER	Share of interstate migrant workers	20.3260	30.4180
CA	Most interstate workers from California?	0.3640	0.4820
MX	Most interstate workers from Mexico?	0.0660	0.2490
OR	Most interstate workers from Oregon?	0.0700	0.2560
TX	Most interstate workers from Texas?	0.1280	0.3350
RAISE	Wage raise in 1994 and/or 1995?	0.4710	0.5000
PSEA	Peak in seasonal employment (high/mean)	16.4990	22.0030
CON	Constant	1.0000	

empirical analysis of the survey. The models examine the likelihood of securing at least 50% return workers from year to year,[2] and the likelihood of an employer

[2] Optimally, the analysis could be performed on a continuous left-hand variable equal to the share of return workers. However, by convenience or design, most employers reported the return worker share in 10% increments. Thus, econometric estimation that assumed a continuous dependent variable would be biased. The 50% level is not arbitrary, but a clear dividing point for the sample.

offering wage increases in 1994 or 1995. In each case, a two-stage probit model was developed and estimated with the dependent, dichotomous variable defined by an employer's self-reported labor management experiences. The inclusion of migrant worker variables will test whether reliance on such workers leads to upward-wage pressure or turnover.

The first model focused on an employer's decision to raise wages during 1994 and 1995. An increase in wages, rather than the absolute wage level, was analyzed because the primary objective of the study was to determine whether employers had made any labor management decisions that would suggest a perceived shortage of workers or other labor market change. This study assumes increased wages may be a strategy employers use to signal increased factor demand or to counter labor supply changes and assist in recruitment (or attract return workers).

A model exploring the differences in interyear seasonal worker turnover was also estimated. The dependent variable was equal to zero if the employer reported less than 50% of his/her seasonal workers returned each year. Worker turnover among firms is a function of a variety of factors, including wages, total employment, regional and commodity-specific labor market conditions, and duration of employment (Taylor and Thilmany, 1993). The second model tests what employer-specific factors influence the share of return workers in a firm's labor supply.

Estimation results from the econometric models are presented in tables 5 and 6. Estimated coefficients are reported and those variables with significant results are identified. A measure of elasticity, the "effect at means," was calculated for each variable to assist in interpretation. The effect-at-means statistic shows the relative effect of a variable on the probability of an employer being included in one of the dependent variable groups. This statistic was calculated by estimating the difference in the probability of inclusion in the dependent variable category due to a small change in each variable (or 0 versus 1 for dummy variables), while holding all other variables constant at their means (Taylor and Thilmany, 1993).

Findings and Discussion

Several different factors were significant explanatory variables in the employer's decision to offer wage raises during 1994 and/or 1995 (table 5). Among commodities, nursery (*NURS*) and vegetable (*VEG*) producers were more likely to raise wages. Among types of workers, employers of packers (*PACK*) and general laborers (*GEN*) were more likely to raise wages, while transportation (*TRANS*) employers were less likely to do so. There were no significant regional results. Finally, those firms that hired California (*CA*) migrant workers were more likely to give raises, with the opposite true for firms hiring Mexican (*MX*) workers. These findings are likely related to the differential skills and other job opportunities for those respective groups of workers. For example, migrants traveling from California are likely to have a higher reservation wage than those sourced from Mexico given their alternative employment opportunities (or the value of their time), even though their closer proximity and travel costs would suggest they should be easier to attract.

Table 5. Estimation Results for Employer's Choice to Raise Wages in 1994 and/or 1995

Variable	Coefficient	Effect at Means (% change in probability)	Variable	Coefficient	Effect at Means (% change in probability)
TOT	!0.0142**	!0.40	*NOACT*	0.1105**	0.41
SEAS	0.0136	0.36	*BEST*	0.1023	0.44
WAGE	1.3678**	7.57	*REF*	!0.0013	!0.03
SC	0.3689	1.94	*REC*	!0.0007	!0.01
NC	!0.5827	!1.89	*HARV*	0.1558	0.04
CB	0.2364	1.27	*TRANS*	!1.1632*	!0.02
SE	!0.2266	!0.87	*PACK*	0.9384**	0.04
VEG	0.7165*	5.51	*GEN*	1.1750**	0.04
NURS	1.0630**	12.12	*INTER*	0.0016	0.01
FRUIT	0.1656	0.74	*CA*	0.7271**	0.12
WHEAT	!0.7235	!1.74	*MX*	!0.7191*	!0.02
VARTOT	!0.3121	!0.06	*OR*	!0.5454	!0.02
VARWAGE	!0.1523	!0.05	*TX*	!0.1984	0.01
LENGTH	!0.0428	!0.05	*PSEA*	!0.1085**	!0.66
NOCROP	!0.2518**	!0.34	*CON*	!7.7630**	

Correct Predictions = 71.7%
Log-Likelihood Function = !132.43

Note: Single and double asterisks (*) denote significance at the 10% and 5% levels, respectively.

Those producers with a larger workforce were less likely to raise wages (possibly due to a relatively larger effect on cost structure). Raises were more likely to be offered by those employers with relatively high current wages. Although predicted levels were used in the two-stage modeling, an upward bias for employers who increased wages is expected since the reporting period is after the raises were given. Those employers with more diverse cropping operations were less likely to give a raise; conversely, those firms with the highest number of distinct crop activities (i.e., harvest, thinning) were more likely to give a raise. The former may indicate that diverse firms can manage the degree of seasonality, thereby alleviating concerns about attracting sufficient labor during specific periods, while the latter may indicate that hiring for specific tasks requires offering higher wages for specific skills.

Employers who reported low retention and return rates among seasonal workers exhibit several interesting characteristics (table 6). Among the commodities, fruit (*FRUIT*), vegetable (*VEG*), and nursery (*NURS*) employers realized a higher share of return workers. Among the regions, no significant relationships were found. Larger employers were more likely to attract return workers. This may be related to their visibility as an employer, or based on worker perceptions that employment will

Table 6. Estimation Results for Employers Who Report 50% or More Return Workers (year to year)

Variable	Coefficient	Effect at Means (% change in probability)	Variable	Coefficient	Effect at Means (% change in probability)
TOT	0.0102*	0.30	*NOACT*	!0.0986**	!0.37
SEAS	!0.0092	!0.24	*BEST*	!0.3137	!1.28
WAGE	0.5346*	0.99	*HARV*	0.2974	0.08
SC	!0.2450	!1.21	*TRANS*	0.8014	0.01
NC	!0.3780	!2.16	*PACK*	!0.0027	!0.00
CB	!0.0484	!0.22	*GEN*	0.2347	0.01
SE	0.0835	0.35	*INTER*	0.0002	0.00
VEG	0.7230*	2.02	*CA*	0.2791	0.04
NURS	1.1298*	2.07	*MX*	!1.1901**	!0.04
FRUIT	0.8670**	4.22	*OR*	!0.2578	!0.01
WHEAT	!0.3342	!2.04	*TX*	!0.6159*	!0.04
VARTOT	!0.5650**	!0.11	*RAISE*	!0.2602	!1.19
VARWAGE	0.9046	0.30	*PSEA*	0.0369	0.26
LENGTH	0.0569	0.06	*CON*	!2.8261**	
NOCROP	0.2831**	0.38			

Correct Predictions = 79.3%
Log-Likelihood Function = !112.80

Note: Single and double asterisks (*) denote significance at the 10% and 5% levels, respectively.

more likely be available from larger employers during peak periods. Higher wages had the expected effect—increasing the probability of a worker returning each year.

The stability of a firm's employment record played a significant role in its ability to attract return workers (Anderson, 1993). Increased variability of employment increased interyear turnover. Similar to the previous model's findings, enterprise diversity measures had differing results. A more diverse crop mix increased the likelihood of a firm attracting a large share of return workers (possibly based on more stable labor demand throughout the season), and vice versa for the number of crop activities (due to seasonal specificity of tasks). Finally, a relatively high use of Mexican and Texan workers increased turnover, most likely due to the distance they are required to travel.

Conclusions

Employers have historically argued that labor shortages exist, in an attempt to utilize special worker programs (such as the H2-A program), and now many believe a guest-worker program should be reinstituted. Yet, this empirical analysis sends some clear

signals to Washington State employment officials that there is potential for these employers to otherwise alleviate labor shortages through improved labor recruitment and management strategies. Despite some significant differences among crops and regions, employer managerial decisions also are found to have significant effects on worker retention. Employment and wage levels play a role, as well as producer strategies to diversify production (and labor demand year-round). Clearly, the variability of employment demand is an important determinant in an employer's ability to secure sufficient labor supplies.

Washington agriculture appears to be dependent on a self-replenishing workforce from within and outside the state. Depending on future immigration policy initiatives, employment officials view reliance on seasonal and/or migrant workers as a potential downfall for many producers (Jaksich, 1999). The evolving nature of this migrant stream has likely economic and social implications for agriculture and rural development goals. Further investigation into the economic, political, and social implications of potential guestworker programs is also necessary before such legislation is considered in the future. Recent trends suggest employers can offer more regular work to those in the farm labor market (see 1997 data in figure 1), and avoid any further increase in demand for numbers of workers. This is likely the best option for agricultural employers, but it will require progressive managerial strategies from employers and information and job-matching efforts from employment officials.

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