Farmworkers and Nonfarm Work: Evidence From the NAWS

Zachariah J. Rutledge and J. Edward Taylor NAWS at 30 Conference April 4th, 2019





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Overview: Workers are Leaving the Farm

- Recent evidence points to changes in the farm labor supply
- Are workers leaving the farm for other sectors of the economy?
- If so, what is driving this?
- And how will this affect the farm labor supply in the future?

Hertz and Zahniser: Rising Farmworker Wages

| 2010 and 2011, Using 6-Digit NATCS Industry Codes | | | | | |
|---|---|----|-------------|--|--|
| County | Crop / Activity | /w | Wage Growth | | |
| Kern, CA | All other miscellaneous crop farming | | 44% | | |
| Muskegon, MI | Apple orchards | | 48% | | |
| Gibson, IN | Corn farming | | 42% | | |
| Glenn, CA | Farm labor contractors and crew leaders | | 47% | | |
| Okeechobee, FL | Farm labor contractors and crew leaders | | 52% | | |
| Kings, CA | Fruit and tree nut combination farming | | 66% | | |
| Missaukee, MI | Nursery and tree production | | 48% | | |
| Sacramento, CA | Other noncitrus fruit farming | | 57% | | |
| Oceana, MI | Other vegetable and melon farming | | 44% | | |
| Bonneville, ID | Potato farming | | 45% | | |
| Lonoke, AR | Rice farming | | 44% | | |
| Riverside, CA | Soil preparation, planting, and cultivating | | 53% | | |
| St. Joseph, MI | Soil preparation, planting, and cultivating | | 47% | | |
| Becker, MN | Turkey production | | 43% | | |
| Jackson, OK | Wheat farming | | 84% | | |

Table 2. Selected Counties with Rising Wages and Falling Employment in Agriculture between 2010 and 2011, Using 6-Digit NAICS Industry Codes

Source: Authors' analysis of QCEW data.

Notes: Coverage limited to publicly disclosed county/crop cells at the NAICS 6-digit level. Other criteria are the same as in table 1.

Source: Hertz, T. and Zahniser, S. (2012). Is There a Farm Labor Shortage? *American Journal of Agricultural Economics*, 95(2):476–481.

Charlton and Taylor: Mexico's Farm Labor Supply Is Shrinking

Predicted Probability of Working in Agriculture by Region



Source: Charlton, D. and Taylor, J.E., 2016. A Declining Farm Workforce: Analysis of Panel Data from Rural Mexico. *American Journal of Agricultural Economics*, *98*(4), pp.1158-1180.

Fan et al.: Farmworkers Less Willing to Migrate



Source: Fan, M., Gabbard, S., Pena, A. A., and Perloff, J. M. (2015). Why Do Fewer Agricultural Workers Migrate Now? *American Journal of Agricultural Economics*, 97(3):665–679.

Methodology – 3 Types of Analysis

1) Trend Analysis for Nonfarm Work (Simple Regression Framework)

- Identify when the previous negative trend was broken by an upward trend
- Quantify the recent upward trend
- 2) Linear Probability Model
 - Identify factors that are linked to increases/decreases in nonfarm work
 - Quantify the effects of those factors

3) Forecast Share of Workers Engaging in Nonfarm Work in the Future

- Multi-step process using panel regression models aggregated at county level
- Forecast 5, 10, 15, 20 years into the future

Trends in Nonfarm Work (1989-2016)



Trends in Nonfarm Work (2000 - 2016)



Trends in Nonfarm Work (2000 - 2016)



Trends in Nonfarm Work (2000 - 2016) Share of Farmworkers Doing Non-Farm Work During the Past Year (All California Farmworkers) 2 .15 5.-05 0 2005 2010 2015 2000 Year Share Doing Non-Farm Work Linear Trend

Source: NAWS

Trend Analysis

- Estimate separately for each value t^{j} in 1990 2016
- $NF_{irt} = \alpha_0 + \alpha_1^j t + \alpha_2^j AFTERt^j + \alpha_3^j AFTERt^j \times t + \Theta \mathbf{X}_{irt} + \Phi_r + \varepsilon_{irt}$
- NF_{irt} = Dummy for nonfarm work; \mathbf{X}_{irt} = Vector of demographics
- Test null hypothesis: $H_0: \alpha_1^j \ge 0 \text{ or } \alpha_1^j + \alpha_3^j \le 0$ Against the alternative: $H_a: \alpha_1^j \le 0 \text{ and } \alpha_1^j + \alpha_3^j \ge 0$
- Find when there is a break in the trend
- Quantify recent upward trend

Linear Probability Model

• Estimate the following model:

 $NF_{irt} = \gamma_0 + \Gamma X_{irt} + \Phi_r + \Phi_t + \Phi_{rt} + v_{irt}$

- X_{irt} = Age, gender, marital status, legal status, schooling, dummy for FLC worker, dummy for migrant worker, no. of kids in H.H., no. of people in nonfarm network, years of nonfarm experience, dummy for good English ability, dummy for farm employer giving monetary bonus
- Φs = fixed effects

Forecasting – Steps 1-3

• Estimate the following panel model separately for each x^k :

$$x_{ct}^k = \omega_0^k + \omega_1^k x_{ct-1}^k + \omega_2^k x_{ct-2}^k + \omega_3^k t + \phi_c + \delta_{ct}$$

• x_{ct}^k are the weighted county means of variables X_{irt}

• Calculate long-run trends for each
$$x^k$$
: $\Omega^k = \frac{\omega_3^k}{(1 - \omega_1^k - \omega_2^k)}$

• Forecast changes in demographics in T years: $\Omega^k \times T$

• Estimate the following panel model:

 $SNF_{ct} = \pi_0 + \Pi X_{ct} + \phi_c + \varepsilon_{ct}$

- *SNF_{ct}* = Share of farmworkers who engaged in nonfarm work
- Gather each π^k in Π (the coefficient on each x^k in X_{ct})
- Predict the change in SNF_{ct} by using: $\sum_{k=1}^{K} \Omega^k \times T \times \pi^k$

Trend Results

Negative trend 1989-1998: -.9 pp/yr

Upward trend starts in 1999: .9 pp/yr

Upward trend increasing over time

Upward trend 2006-2016: 1.6 pp/yr

| | (1) | (2) | | |
|--|----------------------------|----------------------------|--|--|
| | Time Trend Time Trend | | | |
| t [/] | $(t^{j} + 1)$ through 2016 | $(t^{j} + 1)$ through 2016 | | |
| 1998 | .009*** | .007*** | | |
| | (0.002) | (0.002) | | |
| 1999 | .010*** | .008*** | | |
| | (0.002) | (0.002) | | |
| 2000 | 011*** | .008*** | | |
| | (0.002) | (0.002) | | |
| 2001 | .011*** | .009*** | | |
| | (0.002) | (0.002) | | |
| 2002 | .012*** | .010*** | | |
| | (0.003) | (0.003) | | |
| 2003 | .014*** | .011*** | | |
| | (0.003) | (0.004) | | |
| 2004 | .016*** | .012*** | | |
| | (0.004) | (0.005) | | |
| 2005 | .016*** | .012*** | | |
| | (0.004) | (0.004) | | |
| | Without Controls | With Controls | | |
| Observations | 50,653 | 40,290 | | |
| e: Standard errors are clustered at the NAWS survey region lev | | | | |

Lin-Prob Model

个 Off-farm work Education Migrant Nonfarm network Nonfarm work experience Good English skills

\downarrow Off-farm work

Age Female Undocumented FLC workers Farm employer bonuses

| | (1) | (2) | (3) | (4) |
|------------------------------------|---------------------|-------------|-------------|------------|
| 1 | Yint | Yint | Yirt | Yirt |
| Age | -0.002/4 (0.000714) | -0.00334 | -0.00341 | -0.00324 |
| | (0.000714) | (0.000/01) | (0.000/45) | (0.000752) |
| Female | -0.0404** | -0.0413** | -0.0404** | -0.0406** |
| | (0.0156) | (0.0160) | (0.0145) | (0.0142) |
| Married | -0.00337 | 0.000317 | 0.000611 | -0.000662 |
| Mattica | (0.00552) | (0.00620) | (0.00564) | (0.00524) |
| | () | (/ | (| () |
| Undocumented | -0.0156 | -0.0308** | -0.0316*** | -0.0280** |
| | (0.0100) | (0.0109) | (0.00968) | (0.00914) |
| School | 0.00437** | 0.00281*** | 0.00252*** | 0.00290** |
| | (0.000707) | (0.000549) | (0.000543) | (0.000546) |
| | 0.000- | 0.000- | 0.0010 | 0.000- |
| Works for an FLC | -0.0385*** | -0.0395 | -0.0213*** | -0.0227*** |
| | (0.00578) | (0.00823) | (0.00564) | (0.00672) |
| Migrant | 0.0950*** | 0.0970*** | 0.0826*** | 0.0851*** |
| 0 | (0.0178) | (0.0157) | (0.0163) | (0.0169) |
| Na af Vida in Hausahald | 0.00140 | 0.000010 | 0.000204 | 0.000220 |
| No. of Kids in Household | (0.00149 | -0.000910 | -0.000294 | -0.000339 |
| | (0.00122) | (0.00111) | (0.00103) | (0.000967) |
| No. of People in Nonfarm Network | 0.0237*** | 0.0220*** | 0.0207*** | 0.0209*** |
| | (0.00306) | (0.00318) | (0.00301) | (0.00294) |
| Vears of nonfarm Experience | 0.0160*** | 0.0156*** | 0.0151- | 0.0147*** |
| rears of noniarin experience | (0.000822) | (0.000220) | (0.000697) | (0.000663) |
| | (0.0000-) | (0.0000110) | (0.0000000) | (unonnum) |
| Speaks Good English | 0.0347*** | 0.0397*** | 0.0184** | 0.0217*** |
| | (0.00672) | (0.00435) | (0.00728) | (0.00674) |
| Farm Employer Gives Monetary Bonus | -0.0332** | -0.0374** | -0.0427*** | -0.0405*** |
| | (0.0127) | (0.0108) | (0.0110) | (0.0115) |
| Year Fixed Effects | - | X | X | X |
| Region Fixed Effects | - | - | Х | Х |
| Region-by-Year Fixed Effects | - | - | - | X |
| N | 32,146 | 32,146 | 32,146 | 32,146 |

Forecasts for Share of Farmworkers Doing Nonfarm Work

(Based on Predicted Changes in Demographics)

US – Small increase (.23 to .25 in 20 yrs) Florida – Small increase (.25 to .28 in 20 yrs) California – Doubles (.12 to .23 in 20 yrs) Pacific Coast Region (.21 to .36 in 20 yrs)

Summary: Large increases in nonfarm work in west offset by decreases in other regions

Table 3: Forecasts for the Share of Farmworkers Who Will Engage in Nonfarm Work

| | | Predicted Share of Farmworkers | | | | |
|---|------|--------------------------------|------|------|------|--|
| | | Doing Nonfarm Work | | | | |
| Year | 2016 | 2021 | 2026 | 2031 | 2036 | |
| U.S. | .232 | .236 | .239 | .243 | .246 | |
| Florida | .253 | .260 | .267 | .274 | .281 | |
| California | .123 | .150 | .177 | .204 | .228 | |
| Pacific Coast | .206 | .245 | .284 | .323 | .362 | |
| Note: Baseline figures for 2016 are taken from the NAWS | | | | | | |

Overview of Findings

- Recent upward trend in nonfarm work
 - Starts around turn of millennium
- Demographic factors are partially driving this
 - Education
 - Nonfarm networks
 - Nonfarm work experience
 - Language skills
- Forecasts suggest sharp increases in California and Pacific Coast
 - Twice as many in CA; 36% in Pacific Coast within 20 years

Conclusions

- Upward trend in nonfarm work supports evidence of shifting farm labor supply
- Farmers will need to prepare for more competition from nonfarm sector
- Some factors could mitigate this
 - Paying bonuses
 - Create working conditions for worker to stay employed at older age
 - Hire workers through FLCs
 - Hire more female workers

Recommendations for DOL

- Keep multi-stage sampling in FVH regions (e.g. California/Florida)
- Increase sample size to obtain more accurate county-level statistics
- Provide weights to identify changes in extensive margin
- Collect new variables that identify use of technology

Thank You

