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Effects of Immigrant Legalization on U.S. Agriculture: New Evidence for IRCA

Abstract

This study examines the effects of the seasonal agriculture worker (SAW) provision of IRCA, the largest immigration legalization reform in the United States, on the agricultural labor market. We calculate county-level exposure measures from administrative data on 1.26 SAW applicants and combined it with recently digitized data from the Census of Agriculture. Employing the difference-in-differences method, we estimate that, in counties with approved SAW applicants, the reform leads to substantial increases in labor costs that last at least a decade. The increase in total labor costs is due to the increase in wage rates without a noticeable decrease in the equilibrium farm employment, suggesting that farm labor demand is inelastic in areas with SAW applicants. Future legalization reform should include measures to mitigate the threat of farm labor shortage.

I. Introduction

There are about 283 thousand undocumented immigrants working on U.S. farms, representing 45% of the agricultural workforce (Rosenbloom, 2022). As the domestic farm labor supply dwindles (Charlton et al., 2021), the policy objectives of reducing unauthorized immigration and maintaining food security continue to clash. One potential solution to this dilemma is the legalization of undocumented immigrants. The most significant example of such legalization reform is the Immigration Reform and Control Act of 1986 (IRCA), which granted legal status to 2.7 million undocumented immigrants, including 1.1 million agricultural workers. After IRCA, other broad legalization initiatives were proposed (Martin, 2013), and the political and economic demands for legalization remained. The aim of this paper is to gauge the heterogeneous impacts of migrant workers' legalization through IRCA on the farm labor market.

IRCA, signed into law in 1986, came as a surprise after years of political impasse. It took a “three-pronged” approach, including legalizing undocumented immigrants, sanctioning employers who knowingly hire unauthorized migrant workers, and tightening immigration enforcement at the border (Chishti & Kamasaki, 2014). While the latter two prongs did little to stem the growth of undocumented immigrants, the large-scale legalization (with a general legalization program and a Special Agricultural Worker (SAW) Program) had profound impacts on immigrants and the farm labor market. Most studies find that legal status gives immigrants a wage premium (Sampaio et al., 2013) and encourages them to accumulate human capital (Mendez et al., 2016). However, previous analyses on legalization and agriculture mostly relied on small survey samples of legalized immigrant farm workers (e.g., Sampaio et al., (2013); Pena,

(2010), and Kandilov & Kandilov, (2010)), which limits the research focus to the immigrants themselves.

Economic theory and intuition suggest that large-scale legalization efforts like IRCA should have far-reaching effects on the agricultural market. With new legal status, immigrant workers are likely to have more mobility. Places that previously had high concentrations of IRCA applicants may see immigrant workers leave for better agricultural and non-agricultural job opportunities. The decline in immigrant workers should lead to an increase in the overall wage rate for farm workers. The law of demand suggests that labor demand should decrease. However, the effect on overall labor cost is ambiguous, depending on the elasticity of farm labor demand. If the demand for farm labor is inelastic, overall labor costs should increase. The increase in labor cost is expected to decrease farm income, shift crop mix to less labor-intensive crops, increase product price, and encourage labor substitution with machinery and other inputs. These broader impacts of IRCA have not been rigorously examined in previous work.

To address this gap in the literature, we leverage the Legalization Public Use Microdata (LPUM), which is the individual-level administrative data for the universe of individual-level IRCA applicants. For agricultural workers who filed applications under IRCA's Special Agricultural Worker program (SAW), the dataset contains information on the county where they intended to work, the type of crop they worked on before their application, and their application and residency permit approval dates. This information allows us to construct county-level measures of exposure to IRCA legalization, defined as the ratio between the number of approved SAW applicants and total farm employment. We couple the LPUM dataset with Census of Agriculture (COA) data from 1982, 1987, 1992, and 1997. The COA data contains county-level data on hired labor expenditures and labor demand. We employ the difference-in-differences method to estimate the causal impacts of the IRCA reform on agricultural labor markets.

Our preliminary analysis using the traditional two-way-fixed-effect model shows that exposure to the legalization of agricultural workers increases the labor costs both in absolute terms and as a share of total production cost. Furthermore, more exposure to IRCA causes a decrease in the number of farms that report hired labor, and the labor cost per farm increases. The increase in labor costs, both at the aggregate and per-farm level, suggests that the demand for farm labor is indeed inelastic. We further show that the wage rate of farm labor increases as a result of the reform, while the impact on the number of farm workers is not statistically significant. Our finding of a higher wage rate after the reform is consistent with previous results on manufacturing workers (Cobb-Clark et al., 1995).

This paper contributes to the literature in two aspects. First, both immigration reform and agricultural labor shortage are pressing policy issues, and the results of this study can generate policy discussions. Second, this study presents an example of how an exogenous shock on labor supply can propagate through the agricultural market. The results can potentially be generalized to other agricultural labor market shocks.

II. Method

2.1 Data

SAW applicants and county-level exposure to SAW

The data on SAW applications is from the “1992 Legalization Summary Public Use Tape” data. The data contains records on two categories of applicants under IRCA, including those who resided in the United States since January 1982 (section 245A applicants or form I-687 applicants) and those who worked on “perishable crops” for at least 90 days in 1986 (Special Agricultural Workers, Section 210A applicants, or form I-700 applicants.) In this study, we focus on the 1.28 million SAW applicants. The application for temporary residency (phase I application) under the SAW program started on May 5th, 1987, and ended on May 4th, 1988. When the data ended in August 1992, 1.25 million SAW applicants (98.6%) received decisions, with 1.08 million approvals (84.3%) and 0.18 million denials (14.3%.) In this study, we use the number of approved applicants (by 1992) in the main analysis and use the total number of applicants as a robustness check. To protect confidentiality, county of residence is not available for applicants from counties with less than ten thousand residents and counties with less than 25 applicants.

We aggregate the number of total and approved SAW applicants at the county level. In 95 counties, the total number of SAW applicants exceeds the total number of farm employment in 1986 (obtained from the Bureau of Economic Analysis.) One possible explanation is that some undocumented workers are not included in the farm employment estimate. Therefore, we calculate the exposure to the SAW program by dividing the number of SAW applicants by the sum of applicants and total farm employment in 1986. Other exposure definitions are used in robustness checks.

Farm Outcomes

Farm outcomes are gathered from the Census of Agriculture (COA.) Most of the historical COA data that we use (i.e., 1982, 1987, 1992, and 1997) are from the Inter-university Consortium for Political and Social Research (ICPSR). Data on the number of workers from 1982 COA are not included in the ICPSR database, and they are manually entered using the double-entry method. We focus on several labor market outcomes. First, construct two variables: the log of total hired agricultural labor cost at the county level and the percent of labor cost in total production cost. Hired labor cost is defined as “the total amount paid for farm or ranch labor including regular workers, part-time workers, and members of the operator's family if they received payments for labor. It includes social security taxes, State taxes, unemployment tax, and payment for sick leave or vacation pay.”

Second, we construct two variables to measure labor cost at the extensive and intensive margins. The variable that represents the extensive margin is the number of farms that report hired labor expenses. The intensive margin is captured by the labor cost per farm for farms that did report labor expenses. Third, we consider the number of farm workers and inferred annual wage rate, which is calculated as total labor expense divided by the number of workers. The data

on the number of workers is not available in the 1987 COA. Therefore, the analyses for the number of workers and wage rate only include 1982, 1992, and 1997 data.

Other Variables

We include county characteristics that are likely to be the covariates of farm labor variables as control variables in DID analyses. These variables include the share of the population in rural areas, the share of the Hispanic population, the share of residents that are not U.S. citizens, the share of agricultural employment, the share of the population with income below the poverty line, and the share of the population without a high school degree.

2.2 Econometric Model

We estimate the following DID model using two-way-fixed effects:

$$Y_{it} = \beta_0 + \beta_1 SAW_i \times Year_t + \beta_2 X_i \times Year_t + Year_t + \delta_i + u_{it}$$

In the above regression, the dependent variable for the county i , year t , can be one of the farm labor outcomes described in subsection 2.1. The key independent variables are the measures of exposure to SAW. Two alternative measures are used: the first is a binary variable indicating whether a county has approved SAW applicants by 1992; the second exposure measure is the share of approved SAW applicants in total farm employment in 1986. The vector of binary indicators for different census years after the reform (1987, 1992, and 1997) are $Year_t$.¹ The year 1982 is used as the baseline. The coefficients for the interaction between SAW exposure and year dummies, β_1 , are the DID estimators of the effects of SAW in different census years. For the analysis of the number of farm workers and wage rates, the year 1987 is not included due to the lack of data. Control variables are constructed from the interaction terms between initial county characteristics (section subsection 2.1) with year dummies. This specification avoids the problem of control variables capturing the effect of the treatment, and we also present results without any control variables. Year and county fixed effects are represented by $Year_t$ and δ_i . Finally, u_{it} is the idiosyncratic error term.

3. Results

3.1 Summary Statistics and Descriptive Analysis

The map in Figure 1 shows that SAW applicants are concentrated in California, with 52% of the total applicants. The next five states, Texas, Florida, New York, Arizona, and Illinois, account for 30% of the total applicants. This is a conservative estimate since we assume that SAW workers, previously undocumented, are not included in the number of workers. If some of them

¹ The application for SAW started in the middle of the 1987 census year. Therefore, 1987 farm outcomes are affected by the reform.

are counted in the number of hired labor, then the share should be higher. There are 340 counties that have approved SAW applicants. About 80% of the SAW applicants report that they work in the production of fruits and vegetables. About 89% of the applicants are Hispanic, with 81% coming from Mexico.

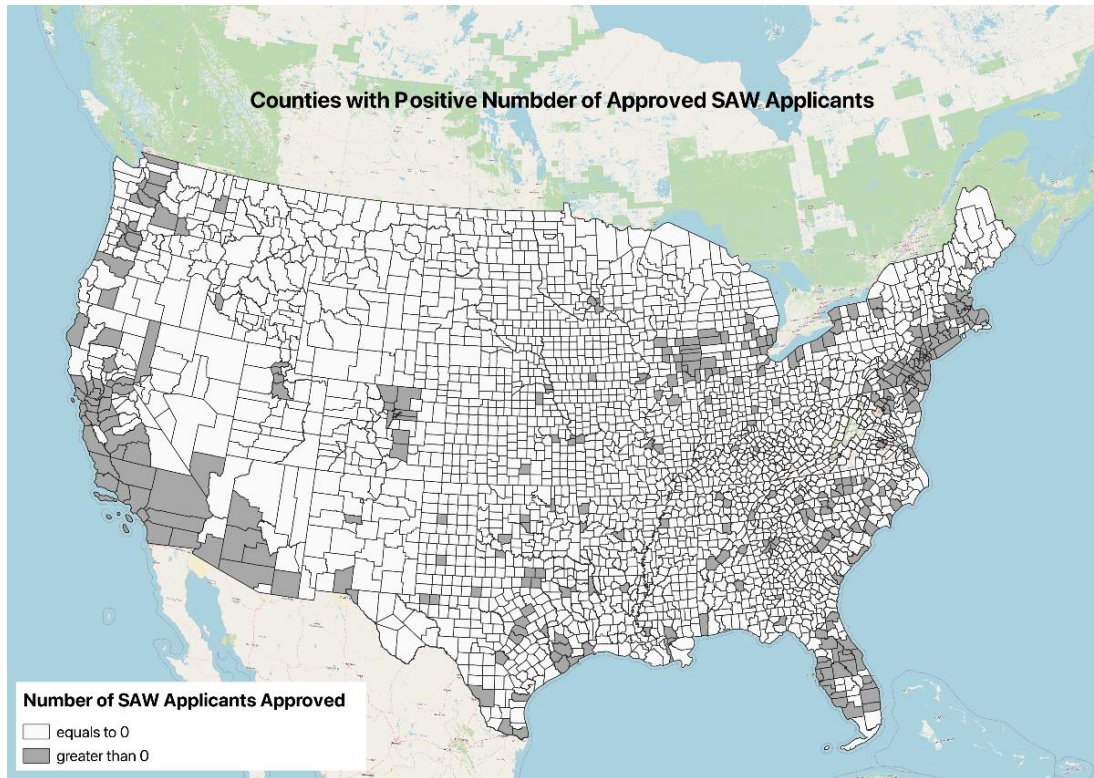


Figure 1. Counties with approved SAW applicants.

The summary statistics of all variables used in the analysis are presented in Table 1. The summary is for the pooled sample across census years. While only a limited number of counties have approved SAW applicants, the concentration of SAW applicants reaches 30% of farm employment in those counties. A comparison of farm labor outcomes shows that counties with SAW applicants engage in labor-intensive agricultural production: these counties have higher labor costs, higher labor cost share in total cost, more farms hiring workers, more workers, and higher farm wage rates. This is expected since SAW workers mostly work in labor-intensive fruit and vegetable production. The high wage rates in counties with SAW applicants suggest that if SAW applicants were to leave their original county of residence, it is unlikely for them to work in agriculture elsewhere. It is more likely that they will exit the agricultural sector altogether. Therefore, the farm sectors in counties without SAW applicants are unlikely to be affected by the reform.

Also, SAW applicants concentrate in relatively more urban areas with higher farm wage rates, lower agriculture employment share, lower poverty rates, and higher education levels. Unsurprisingly, the counties with SAW applicants have substantially higher shares of the Hispanic population and non-U.S. citizens.

Table 1. Summary Statistics

variable	mean	sd	min	max	mean	sd	min	max
	SAW Approved>0				SAW Approved=0			
SAW approved share	0.30	0.28	0.01	1.00	-	-	-	-
Total labor cost (\$1,000)	15266.03	34115.86	26.00	348053.00	2462.35	3570.65	1.00	101535.00
Percent labor cost	17.38	11.02	1.16	89.85	7.57	5.50	0.39	57.07
Farms with hired labor	340.89	439.40	1.00	4620.00	221.68	173.22	1.00	1983.00
Labor cost per farm	41.05	53.81	1.19	486.59	12.75	16.21	0.17	377.98
Total farm workers	4054.58	11169.54	11.00	186578.00	984.29	1388.63	0.00	33023.00
Wage	4.20	2.60	0.25	20.42	2.80	1.94	0.00	18.64
Rural share 1980	0.21	0.18	0.00	0.88	0.70	0.25	0.00	1.00
Hispanic share 1980	0.07	0.12	0.00	0.92	0.03	0.10	0.00	0.97
Non-citizen share 1980	0.03	0.03	0.00	0.18	0.01	0.01	0.00	0.26
Ag employment share								
1980	0.02	0.03	0.00	0.22	0.11	0.10	0.00	0.70
Poverty rate 1979	0.08	0.04	0.02	0.29	0.13	0.06	0.00	0.45
Below high school share								
1980	0.21	0.07	0.06	0.47	0.29	0.10	0.03	0.66

Note: The table presents the summary statistics of the pooled sample of U.S. counties from four years of the Census of Agriculture (COA): 1982, 1987, 1992, and 1997. The “total farm workers” and “wage” variables are not available in the 1987 COA year. The left panel is for counties with approved SAW applicants, while the right panel is for counties with no approved SAW applicants. See text for variable definitions and sources.

3.2 Difference-in-differences estimation results

Total labor cost and labor cost share in total production cost

The results on total labor cost and the change in the percentage of labor cost in total farm production cost are presented in Table 2. Columns (1) and (2) show that counties with SAW applicants experience 5.5%~14.7% increases in total farm labor cost starting from 1987. The effects are smaller in 1987, which is only partially exposed to the policy since applications started in May of that year. Columns (3) and (4) of Table 2 use continuous the SAW exposure measure. Results show that a 10% increase in the share of approved SAW applicants in total farm employment leads to a 1.45% ~2.10% increase in labor cost. Given that the average share of SAW applicants is about 30%, results with the continuous measures (coefficients multiplied by 0.3) are reasonably close to those with the binary exposure measure. The total labor cost is the product between the quantity and price of labor. With some SAW applicants exiting the local agricultural sector, the equilibrium wage rate will go up, and the equilibrium farm employment will go down. The increase in total labor costs indicates that the demand for farm labor is inelastic and that the wage increase dominates the quantity decrease.

With the increase in the level of labor cost, there is a corresponding increase in the share of labor costs in total production cost. Results in Table 2, column (5) ~ (8), confirm this process. In 1992 and 1997, labor costs increase by 0.742 ~ 2.534 percentage points. To put these numbers into perspective, the average labor cost share is 17.38% in counties with SAW applicants in the four COA years. When the continuous measure of SAW exposure is used, the effect is only

statistically significant for the year 1992. It is possible that farmers use other inputs to substitute labor. If that is the case, it is expected that the increase in labor share will not be as prominent as the increase in total labor costs.

Table 2. SAW approval and labor cost

VARIABLES	Log(Total labor cost)				Percent labor cost			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
SAW x Y1987	0.102*** (0.0269)	0.0547* (0.0327)	0.296*** (0.0652)	0.195** (0.0798)	-0.0264 (0.231)	-0.333 (0.280)	-0.0114 (0.560)	-0.267 (0.683)
SAW x Y1992	0.156*** (0.0270)	0.101*** (0.0329)	0.323*** (0.0662)	0.145* (0.0812)	2.524*** (0.232)	1.665*** (0.281)	5.567*** (0.568)	3.762*** (0.695)
SAW x Y1997	0.147*** (0.0269)	0.123*** (0.0327)	0.310*** (0.0651)	0.210*** (0.0798)	1.021*** (0.230)	0.742*** (0.280)	0.273 (0.559)	-0.563 (0.682)
SAW measured	Binary	Binary	Share	Share	Binary	Binary	Share	Share
County F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables		Yes		Yes		Yes		Yes
N	11,883	11,877	11,883	11,877	11,883	11,877	11,883	11,877
R-squared	0.208	0.222	0.207	0.221	0.113	0.134	0.111	0.133

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The reference year is 1982.

Extensive versus intensive margins

With SAW applicants exiting local agricultural production, some farms may have to shut down or exclusively rely on the unaided labor of farm owners and their family members. Results in Table 3, columns (1) ~ (4), confirm this process. Counties with SAW applicants experience up to 11.9% decrease in the number of farms reporting hired labor costs (Table 3, Columns (1) and (2)). Using continuous SAW exposure measures produces qualitatively similar results (Table 3, Columns (3) and (4)). Further analysis is needed to ascertain whether the farms stop production or only stop hiring. While some farms stop hiring, others continue to hire and shoulder the high labor cost. Table 3, columns (5) and (6) show that in counties with SAW applicants, labor cost per farm is 9.5% ~ 24.4% higher after IRCA. These results are confirmed by specifications using the continuous SAW exposure measure (Table 3, Columns (3) and (4)). The magnitudes of positive effects on the intensive margin (increase in cost per farm) dominate the negative effects on the extensive margin (decrease in the number of farms), which leads to an increase in total labor costs (Table 4).

Control variables		Yes		Yes		Yes		Yes
N	11,883	11,877	11,883	11,877	11,883	11,877	11,883	11,877
R-squared	0.208	0.222	0.207	0.221	0.113	0.134	0.111	0.133

Notes: Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. The reference year is 1982.

4. Conclusion

Almost four decades have passed since IRCA became law, and U.S. agriculture is becoming ever more reliant on undocumented workers. However, the effects of provision for agricultural workers under IRCA have not been subjected to examination with high-quality data and rigorous empirical analysis. This study fills this gap by applying the difference-in-differences method to administrative data on 1.26 million SAW applicants and recently digitized county-level Census of Agriculture data. We examine the effects of legalization on farm labor outcomes.

Our results show that legalization increases labor costs, manifested in higher wage rates, higher total labor costs, and higher percentages of labor cost in total production cost. These results suggest that SAW applicants indeed leave the local agricultural sector once legalized. The increased total labor costs imply that the demand for labor is inelastic. These findings are bolstered by the analysis of total employment and wage rates: the large increase in wage rates and null effects on the number of workers again suggest inelastic labor demand. There is suggestive evidence that the IRCA reform put considerable stress on the local farm sector: exposure to IRCA reduces the number of farms reporting hired labor expenses and higher labor costs per farm for those still hiring.

We do not have data to confirm what happened to SAW applicants. Since they are already working in areas with much higher farm wage rates than the rest of the country, they are unlikely to pick up agricultural work elsewhere in the United States. Therefore, either the farmers paid higher wage rates to keep these workers, or they left agriculture and joined other industries. If the latter is true, inelastic labor supply suggests that there must be replacement workers, who could be new migrants. These findings suggest that legalization is likely to cause short-term stress on the local farm sector if the immigrant workers were to obtain full mobility within the United States.

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