IMPLICATIONS OF PROPOSED IMMIGRATION REFORM FOR THE U.S. FARM LABOR MARKET

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Abstract

Specialty crop agriculture may be affected by immigration reform given that most farm workers are foreign-born and unauthorized for U.S. employment. Controlling for selection on legal status and job type according to skill level, this research examines the wage effects for workers with different characteristics in the U.S. and South.

Keywords: immigration reform, legal status, skill, specialty crop agriculture, wages
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Introduction

Immigration continues to be an issue engendering heated political debate. In signing P.L. 109-367, the Secure Fence Act of 2006, the President remarked that "*It is an important step toward immigration reform. ... We have more to do*." (White House, 2006) Two earlier proposals in the 109th Congress – one introduced in the U.S. House of Representatives and the other in the U.S. Senate – provoked much debate across America, and serve to frame U.S. immigration issues. The 109th Congress failed to reach a compromise between these two sets of views on immigration.

Legislative proposal H.R. 4437 (the *Border Protection, Antiterrorism, and Illegal Immigration Control Act of 2005*) was passed by the House of Representatives in December 2005. It is arguably one of the more restrictive proposals introduced for consideration in Congress in that it contains no provisions for legalization of unauthorized workers or for a guest worker program. It is pro-enforcement, advocating criminal penalties for unauthorized immigrants and hefty fines for the U.S. employers who hire them. Further, it makes no modifications to existing laws on legal immigration, and is quite strict on I-9 document reform and worksite/interior/border enforcement. In contrast, S. 2611 (the *Comprehensive Immigration Reform Act of 2006*) passed by the U.S. Senate in May 2006 proposes earned legalization for unauthorized immigrants and

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modifications to existing laws on legal immigration. It is not as severe as H.R. 4437 but it favors I-9 document reform and stricter enforcement (for example, tougher penalties for U.S. employers who hire unauthorized immigrants). S.2611 also contains specific provisions for agriculture under AgJOBS (*Agricultural Job Opportunity, Benefits and Security Act of 2005* (S. 359/H.R. 884; S.2611 Subtitle B). AgJOBS is intended to streamline the H-2A program to improve wages, working conditions and minimum benefits (housing and transportation) for farm workers and to establish a pilot program for earned legalization of unauthorized workers who meet certain requirements.

Given that the majority of the crop farm workforce is foreign-born (78%) and more than 50% is unauthorized for U.S. employment (NAWS, 2004), the U.S. farm labor market and the specialty crop sector may be directly affected by immigration reform, specifically labor availability and wages. Based on the assumption that farm workers self-select into specific legal status groups, previous work on this issue examined the impact of legal status on the farm wage and the types of jobs (skilled or unskilled) for which workers are hired. First, Taylor (1992) explained wages separately for primary (skilled) and secondary (unskilled) jobs in agriculture, arguing that there was self-selectivity into the two types of work. Legal status of the worker entered the earnings equations as an exogenous influence, argued to affect earnings differently for the two job types. Isé and Perloff (1995) explained farm wages based on a model with self-selectivity into four legal status categories and specified separate earnings equations for each status. Job type (as distinguished by skill level) was not considered in their analysis. Iwai et al. (2006) also examined farm workers' self-selectivity into different legal statuses. Similar to Isé and Perloff (1995), they simulated how the wages of unauthorized

workers would change with adjustment to legal status, but did not consider self-selection into skilled or unskilled employment.

This study goes a step further to examine farm workers' joint self-selection into U.S. employment as authorized or unauthorized and for skilled or unskilled jobs. Focusing on job type as a potential source of selection bias in conjunction with legal status is motivated in part by an interesting conclusion by Taylor (1992) that there may be wage differentials for workers of different legal status in the same jobs, such that the expected earnings for unauthorized workers in skilled positions could be less than those for their authorized cohorts. The major distinction from previous work is that these two employment status indicators are modeled jointly to reflect the potential joint choices by workers. We use data for 1989-2004 from the National Agricultural Workers Survey (NAWS) and restrict our sample to the foreign-born population since U.S. citizens do not select into legal status for US employment.

Research Methodology

The double selection model proposed by Tunali (1986) is used to model the two potential sources of selectivity. A bivariate probit model is used to explain the joint decisions/selections on employment status in the first stage. We constructed selectivity parameters from the estimated coefficients and included them as explanatory variables in wage regressions in the second stage. We assume that the i^{th} individual's (unobserved) decisions on legal status and job type are specified as shown:

$$y_{1i}^{*} = x_{1i}'\beta_1 + u_{1i} \qquad \textit{Legal status decision} \qquad (1)$$

$$y_{2i}^{*} = x_{2i}'\beta_2 + u_{2i} \qquad \textit{Job (skill) type decision} \qquad (2)$$

The log wage regression equation is specified as:

$$\ln W_{3i} = x_{3i}'\beta_3 + \sigma_3 u_{3i} \tag{3}$$

The explanatory variables and unknown coefficients are represented by x and β, respectively, and the joint normal error terms (u_{1i}, u_{2i}, u_{3i}) have zero mean and covariance matrix $\Sigma = \begin{bmatrix} 1 & \rho & \rho_{13} \\ \rho & 1 & \rho_{23} \\ \rho_{13} & \rho_{23} & 1 \end{bmatrix}$. Since y_{1i}^* and y_{2i}^* are unobserved, we use the observed outcomes of the dichotomous variables D_1 (indicating whether the farm worker is authorized or unauthorized for U.S. employment) and D_2 (indicating whether he is employed for a skilled or unskilled job) only:

$$D_1 = \begin{cases} 1 & if \quad y_1^* > 0 \\ 0 & if \quad y_1^* \le 0 \end{cases} \qquad D_2 = \begin{cases} 1 & if \quad y_2^* > 0 \\ 0 & if \quad y_2^* \le 0 \end{cases} \tag{4}$$

Four subgroups $G_j \ (j = 1,...,4)$ are generated, the elements of which are combinations of D_1 and D_2, i.e. $G_1 = (0,0), G_2 = (0,1), G_3 = (1,0)\ and\ G_4 = (1,1)$. Subgroup G_1 denotes foreign-born farm workers who are *unauthorized* & *unskilled*, and G_2, G_3 and G_4 are foreign-born farm workers who are *unauthorized* & *skilled, authorized* & *unskilled,* and *authorized* & *skilled*, respectively[2]. If the four subgroups are distinct and completely classified, the probability S_j that an individual is assigned to the j^{th} subgroup is:

$$\begin{aligned} S_1 &= Pr(D_1 = 0, D_2 = 0) = Pr(y_{1i}^* \le 0, y_{2i}^* \le 0) \\ &= Pr(u_{1i} \le -C_1, u_{2i} \le -C_2) \\ &= \Phi_2(-C_1, -C_2; \rho) \end{aligned} \tag{5}$$

$$\begin{aligned} S_2 &= Pr(D_1 = 0, D_2 = 1) = Pr(y_{1i}^* \le 0, y_{2i}^* > 0) \\ &= Pr(u_{1i} \le -C_1, u_{2i} > -C_2) \\ &= \Phi_2(-C_1, C_2; -\rho) \end{aligned} \tag{6}$$

[2] Per the NAWS dataset, pre-harvest, harvest and post-harvest jobs are classified as unskilled positions, whereas semi-skilled and supervisory jobs are classified as skilled.

$$
\begin{aligned}
S_3 &= Pr(D_1=1, D_2=0) = Pr(y_{1i}^{*} > 0, y_{2i}^{*} \le 0) \\
&= Pr(u_{1i} > -C_1, u_{2i} \le -C_2) \\
&= \Phi_2(C_1, -C_2; -\rho)
\end{aligned} \tag{7}
$$

$$
\begin{aligned}
S_4 &= Pr(D_1=1, D_2=1) = Pr(y_{1i}^{*} > 0, y_{2i}^{*} > 0) \\
&= Pr(u_{1i} > -C_1, u_{2i} > -C_2) \\
&= \Phi_2(C_1, C_2; \rho)
\end{aligned} \tag{8}
$$

In equations 5 through 8, $C_1 = x'_{1i}\beta_1$ and $C_2 = x'_{2i}\beta_2$, Φ_2 is the standard bivariate normal distribution function and ρ is the correlation coefficient between u_1 and u_2. For each subgroup with complete observations, $E(W_{3i} \mid x_{3i}, \theta) = x_{3i}'\beta_i + \sigma_3 E(u_{3i} \mid x_{3i}, \theta)$ where θ denotes the joint outcome of the double selection process. Selectivity bias arises if $E = (u_{3i} \mid x_{31}, \theta) \neq 0$ (Tunali, 1986; Vella, 1998). The inverse Mills ratios (selectivity variables) corresponding to each subgroup are calculated as shown below. Symbols $\phi(.)$ and $\Phi(.)$ represent the standard univariate normal density and distribution functions, respectively[3].

(i) *For* $i \in G_1$ *(i.e.* $D_1=D_2=0$*)*: $E(u_{3i} \mid u_{1i} \le -C_1, u_{2i} \le -C_2) = \rho_{13}\lambda_{11} + \rho_{23}\lambda_{12}$

$$
\begin{aligned}
&\lambda_{11} = -\left[\frac{\phi(C_1)\Phi(-C_2^{*})}{(S_1)}\right],\ \lambda_{12} = -\left[\frac{\phi(C_2)\Phi(-C_1^{*})}{(S_1)}\right] \\
&where\ C_1^{*} = \frac{C_1 - \rho C_2}{\sqrt{1-\rho^2}};\ C_2^{*} = \frac{C_2 - \rho C_1}{\sqrt{1-\rho^2}}
\end{aligned} \tag{10.1}
$$

(ii) *For* $i \in G_2$ *(i.e.* $D_1=0$*;* $D_2=1$*)*: $E(u_{3i} \mid u_{1i} \le -C_1, u_{2i} > -C_2) = \rho_{13}\lambda_{21} + \rho_{23}\lambda_{22}$

$$
\lambda_{21} = -\left[\frac{\phi(C_1)\Phi(C_2^{*})}{(S_2)}\right],\ \lambda_{22} = \left[\frac{\phi(C_2)\Phi(-C_1^{*})}{(S_2)}\right] \tag{10.2}
$$

[3] See Tunali (1986) for the complete set of derivations.

(iii) *For* $i \in G_3$ *(i.e.* D_1*=1;* D_2*=0):* $E(u_{3i} \mid u_{1i} > -C_1, u_{2i} \le -C_2) = \rho_{13}\lambda_{31} + \rho_{23}\lambda_{32}$

$$\lambda_{31} = \left[\frac{\phi(C_1)\Phi\left(-C_2^*\right)}{(S_3)}\right], \lambda_{32} = -\left[\frac{\phi(C_2)\Phi\left(C_1^*\right)}{(S_3)}\right] \tag{10.3}$$

(iv) *For* $i \in G_4$ *(i.e.* D_1*=1;* D_2*=1):* $E(u_{3i} \mid u_{1i} > -C_1, u_{2i} > -C_2) = \rho_{13}\lambda_{41} + \rho_{23}\lambda_{42}$

$$\lambda_{41} = \left[\frac{\phi(C_1)\Phi\left(C_2^*\right)}{(S_4)}\right], \lambda_{42} = \left[\frac{\phi(C_2)\Phi\left(C_1^*\right)}{(S_4)}\right] \tag{10.4}$$

The selectivity variables are used as covariates in the log wage equations for each subgroup of the foreign-born farm workers, for example, for subgroup G_1 we have

$$\begin{aligned} \ln W &= x'\beta + \sigma_3\rho_{13}\lambda_{11} + \sigma_3\rho_{23}\lambda_{12} + \sigma_3\nu \\ &= x'\beta + \beta_1\lambda_{11} + \beta_2\lambda_{12} + \sigma_3\nu \end{aligned} \tag{11}$$

where $\beta_1 = \sigma_3\rho_{13}$, $\beta_2 = \sigma_3\rho_{23}$, and $\nu = u_{3i} - \rho_{13}\lambda_{11} - \rho_{23}\lambda_{12}$.

Results & Discussion

Table 1 defines the explanatory variables that were used in the bivariate probit and wage equation models. Tables 2(a) and 2(b) report the summary statistics for each foreign-born worker subgroup (*authorized & skilled, authorized & unskilled, unauthorized & skilled, unauthorized & unskilled)* for the U.S. and South[4], respectively. *Unauthorized & unskilled* workers comprise 44%, *authorized & unskilled* workers comprise 32%, *authorized & skilled* workers comprise 13%, and *unauthorized & skilled* workers comprise 11% of our U.S. sample (n=29364).[5] In our sample of the South

[4] The South is defined as Florida, Delta-Southeast (AR, LA, MS, AL, GA, SC) and Appalachia (NC, VA, KY, TN, WV).

[5] Throughout the paper, both summary statistics and parameter estimates are based on unweighted sample data. In the absence of a compelling argument to weight the data for parameter estimation (Deaton 1997), the parameter estimates reported later in the paper use unweighted data. Correspondingly, unweighted summary statistics are presented to characterize the sample data used for model estimation. Consequently, other reports (Carroll et al. 2005; Walters et al. 2006) focusing solely on representative summaries of the data which properly incorporate the weights in generating the summary statistics may differ from summary

(n=6238), the *unauthorized & unskilled* subgroup comprises the majority (64%) followed by the *authorized & unskilled* (24%) subgroup. The *unauthorized & skilled* and *authorized & skilled* subgroups each account for less than 10% of the entire sample, at 8% and 4%, respectively.

The summary statistics for the subgroups reveal that foreign-born workers who select into farm employment at the national level (US) and in the South are more likely to be male and Mexican. They speak little or no English and have some foreign farm work experience. In both samples, workers in the *unauthorized & unskilled* and *unauthorized & skilled* subgroups are generally younger than their counterparts in the other subgroups: for example, workers' mean age on average in either of these subgroups is 28 years (U.S. sample) and 27 years (South). Workers represented in the *authorized & skilled* and *authorized & unskilled* subgroups tend to be in their mid- to late 30s.

Approximately 15-20% of the workers in the US and the South reported receiving free housing from their employer. The exception was for unauthorized workers in the South where 28% of the unskilled workers and 54% of the skilled workers reported free housing from their employer. The proportions of workers reporting having attended adult education classes since arriving in the US were understandably higher in both the US and the South for authorized workers than for unauthorized workers. Among authorized workers, 28-34% reported adult education in the US while only 10-14% of unauthorized workers reported the same. Although the percentages do not differ greatly between the US and the South, the percentages for adult education were slightly higher for authorized workers in the South relative to the US, and slightly lower for unauthorized workers in the South relative to the US.

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characteristics reported here. The weighted data are more appropriate as a representative summary of the data.

Most of the workers are employed with growers. Not surprisingly, authorized workers tended to have been employed longer with their current employer; in the U.S., they had been employed for over five years whereas they had been employed for only two years on average if they were unauthorized. Similarly, workers in the South had been with their current employer for four years on average, whereas unauthorized workers had been employed for two years on average. Regardless of skill level, workers who are authorized report longer work periods on average, and have more experience in U.S. farm work than their unauthorized cohorts. Although an analysis of duration of farm work in the US is beyond the scope of this paper, the substantial differences between authorized and unauthorized workers in years of US farm work are undoubtedly dependent on variations between the two groups in the number of years since arriving in the US. By contrast, farm work completed in the last year is quite similar for both groups, varying only between 33 and 39 weeks, but again with slightly higher averages for authorized workers.

Bivariate Probit Model Selections

Foreign-born workers' choices on employment as authorized or unauthorized workers and for skilled or unskilled jobs were estimated with bivariate probit models of the U.S. and South. Table 3 reports the estimated coefficients and asymptotic standard errors. The rho (ρ) coefficients are positive and statistically significant at 10% (level of significance) in both models. These results suggest that in the farm labor markets of the U.S. and the South, workers' choices on employment as authorized or unauthorized workers and in skilled or unskilled jobs are interrelated. Thus, foreign-born farm workers who are likely to self-select into U.S. employment as unauthorized workers are also likely to be employed in unskilled jobs.

The coefficients of the two equations of the U.S. model are statistically significant at the 10% significance level or better and have the expected signs. All else being the same, the characteristics that increase the probability that a foreign-born farm worker is unauthorized for U.S. employment are: (being) male, single, Mexican, having few years of formal education, US farm experience and limited English speaking ability. The probability that a worker is unauthorized for U.S. employment increases if he is hired in Florida as opposed to California. However, if he was interviewed before 1993 and has attended adult education courses since arriving in the U.S., there is a higher probability that he is authorized for U.S. employment, holding all other factors constant. The probability of selection into skilled employment is increased if workers can speak English well, if they are educated, and have U.S. and foreign farm work experience. All else being the same, there is also an increased probability of selection into skilled employment if the worker is employed on a seasonal basis and has worked for several years with his current employer. On the other hand, the probability decreases if the farm worker is employed with a grower, paid a piece rate, and employed in specialty crop agriculture.

With the exception of the variables reflecting Mexican ethnicity, foreign farm work experience, years with current employer and age, the coefficients of the bivariate probit model for the South are statistically significant at the 10% level. The characteristics that increase the probability of being authorized and skilled are similar to those discussed previously for the U.S. model, the only notable (and statistically significant) exceptions being the coefficients for the grower and education variables in the skilled equation. Holding all other factors constant, the probability that a worker selects into skilled employment in the South increases if he is employed with a grower – this is directly opposite to what was determined for the U.S. model. The negatively

significant coefficient for education is interesting, more so because it suggests that the probability of farm workers selecting into skilled employment in the South decreases if they are educated. This is in contrast to the finding on education in the skill equation of the U.S. model.

Table 4 reports the marginal effects of each variable on the probability of a worker's selection into each of the four subgroups identified in the U.S. and South samples. Holding all other characteristics constant, foreign-born workers who are interviewed before 1993 are 9% and 3% more likely to be *authorized & skilled* (US and South, respectively) than if they were interviewed after 1993. In contrast, workers are 9% and 3% less likely to self-select into the *unauthorized & skilled* subgroup if they were interviewed before 1993.[6] The marginal effects are similar for the US and South for the *authorized & unskilled* (*unauthorized & unskilled)* subgroups, in that workers are about 30% more (less) likely to self-select into these employment statuses if they were interviewed before 1993. These effects are expected since roughly 1.3 million farm workers gained legal status under the 1986 Immigration Reform and Control Act (IRCA); this particular variable is therefore capturing this effect. Comparison with the after 2001 dummy variable shows the opposite marginal effects, in that foreign-born farm workers are more likely to select into the unauthorized subgroups (regardless of the job/skill level) than into the authorized subgroups.

Many of the farm workers in specialty crop agriculture are unskilled. This effect comes through in the specialty crop dummy variable in our models of the US (South) in that foreign-born workers are 5% (4%) more likely to be *authorized & unskilled* and 6% (14%) more likely to be *unauthorized & unskilled* if they are employed in specialty crop

[6] Note that for any variable included in one equation but not the other, the marginal effects are the mirror image for the opposite group.

agriculture. We observe the opposite marginal effects if the workers are skilled (regardless of legal status). The marginal effects induced by the location variables (California and Florida) show that workers are more likely to be unauthorized if employed in Florida but more likely to be authorized if employed in California.[7]

Wage Equation Models with Selectivity Bias Corrections

Tables 5 (a) and 5 (b) report the estimated coefficients and asymptotic standard errors for the four wage equation models for the US and South, respectively. Most parameter estimates are statistically significant at 10% or better and have the expected signs. The selectivity variable for legal status, λ_1, accounts for potential selection bias from foreign-born workers' choices on employment as authorized or unauthorized. Selectivity variable λ_2 measures the potential bias arising from workers' selection into skilled or unskilled employment. The estimated coefficients for both selectivity variables are statistically significant across all worker subgroups suggesting the presence of selectivity bias in the system. Thus, if these wage equations were estimated without the appropriate corrections, the coefficients would be biased.

In the four worker subgroups shown for the US in Table 5(a), workers who have attended adult education courses, are employed in California, employed with a grower and paid by piece rate are more likely to have higher earnings. Education and English-speaking ability also have significantly positive effects on farm worker earnings across all worker subgroups. US farm experience has a significant positive nonlinear effect in

[7] Although this result may seem counterintuitive, it is a result of excluding native born citizen workers from the analysis. Most authorized workers on the East Coast are native born so that when native born citizen workers are excluded, virtually all workers are unauthorized, e.g. there tend to be few green card farm workers on the East Coast. By contrast, on the West Coast most authorized workers were foreign born (green card, naturalized citizen, or other form of authorization). Consequently, the exclusion of native born citizens on the East Coast results in a very large change in the proportions of authorized and unauthorized workers from what they would be over all types of workers, including native born citizens.

all subgroups, and so does age except in the *unauthorized & unskilled* subgroup. Free housing has a significant and negative effect on farm worker earnings, consistent with the theory of compensating differentials. Regardless of the subgroup that they select into, seasonal workers are likely to have lower earnings.

Overall, our findings are broadly consistent with those of Isé and Perloff (1995) and Iwai et al. (2006). Taylor (1992) found that education and farm work experience were significant in explaining skilled employment, but were not so in explaining differences in earnings among skilled workers. The effect of employment in Florida is somewhat unclear judging from the results of our model: it is negative and significant in the *unauthorized & unskilled* subgroup (implying that earnings are lower for those workers) but positive and significant in the *authorized & skilled* subgroup (implying that this employment status is more advantageous for workers). Isé and Perloff (1995) and Iwai et al. (2006) found that workers employed in Florida had lower earnings on average -- Isé and Perloff noted that they were paid significantly less than workers employed in California, whereas Iwai et al. were able to confirm this only for unauthorized workers.

In the earnings equations for the South, females, workers for whom free housing is provided, and those who are hired for seasonal work tend to have lower earnings if they belong to any subgroup other than *authorized & skilled.* In contrast to the results based on the total US data, these variables have no statistically significant effect on workers' earnings in the latter subgroup. Age has a significant nonlinear effect in the authorized (skilled or unskilled) subgroups only. Conversely, workers who have attended adult education courses since arriving in the U.S., who are employed by a grower, paid by piece rate, and educated are likely to earn more, as was the case for farm workers throughout the US. In addition, English speaking ability has a statistically significant

effect on Southern workers' earnings only if the workers are authorized for US employment, in contrast to all farm workers regardless of authorization status for the total US data. Farm work experience has a statistically significant effect with the typical earnings profile for all groups in the South except *authorized & skilled* workers for which log earnings increase with experience at a constant rate rather than a decreasing rate; all groups were statistically significant and appropriately shaped for the total US data.

The piece rate dummy variable is dominant in both the US and Southern earnings equations. All else being the same, payment by piece rate increases earnings by more than 20% in unskilled subgroups regardless of authorization, but to a lesser extent in the skilled subgroups (<13%). The magnitude of influence is less in the Southern earnings equations but is comparable across all subgroups, increasing earnings by 18% or more regardless of skill level. The grower dummy variable also yields some interesting differences between the US and Southern subgroups. Based on the total US data, our results suggest employment with a grower would increase workers' earnings by 7% or more if they are authorized for US employment. In the South however, the effect on earnings is larger for skilled than for unskilled workers – for example, *authorized & (un)skilled* and *unauthorized & (un)skilled* workers' earnings increase by 9% (4%) and 6% (5%), respectively.

Our results show that employer-provided free housing has a statistically significant effect on earnings for most of the US and Southern worker subgroups. The US data show rather modest negative effects varying between 2% and 4% of earnings, with unauthorized workers having the larger differential. The situation is reversed in the South: *authorized & unskilled* workers' earnings are approximately 7% less in the

presence of free housing, but unauthorized workers' earnings are about 4% less in the presence of free housing regardless of skill level.

Finally, we report the average predicted earnings for each subgroup in the US and South in Table 6. The predicted earnings are highest for workers who self-select into the *authorized & unskilled* subgroups ($8.13 and $7.77, respectively, for the US and the South). In the US market, workers self-selecting into the *authorized & skilled* subgroup have the second highest average earnings ($7.82), followed by those individuals who choose to be employed as *unauthorized & unskilled* workers ($7.20). In the South, individuals who opt for employment as *authorized & skilled* workers also have higher average earnings ($7.24) than those who self-select into the *unauthorized & unskilled* subgroup ($6.97). Interestingly, the lowest average earnings are for workers who self-select into *skilled* employment as *unauthorized* workers: $6.92 (US); $6.36 (South). This result suggests that self-selection into skilled employment without legal status is disadvantageous to the average foreign-born farm worker; unauthorized workers doing skilled work are significantly penalized for their legal status. These findings are consistent with those reported by Taylor (1992) who concluded that unauthorized status could hamper workers' chances of skilled employment or at least result in lower wages that would in turn discourage them from moving into those jobs.

Conclusions

Two employment status indicators, legal status and the job type (distinguished by skill), were modeled jointly to reflect the potential joint choices by foreign-born farm workers. This is the major distinction between our study and previous examinations of the workers' self-selectivity into legal status in the farm labor market. Further, we

restricted our sample to the foreign-born population since U.S. citizens do not select into legal status for employment in the US.

We found a statistically significant relationship between foreign-born workers' selection into skilled or unskilled employment as authorized or unauthorized; this implies that workers who are likely to select into skilled (unskilled) employment are more likely to be authorized (unauthorized). In our models of the US and South, we determined similar sets of characteristics associated with workers who select into the different statuses (*authorized & skilled, authorized & unskilled, unauthorized & skilled, unauthorized & unskilled)*. In general, unauthorized and unskilled status is associated with workers who have limited English-speaking ability, few years of formal education and US farm experience. We determined that education was less of a factor for skilled employment in the South in contrast to the US overall. Further, Southern farm workers have a higher probability of selecting into skilled employment if they are employed with growers; this is directly opposite to our results based on the total US data.

Our earnings results indicate some interesting differences between the US and the South. First, English-speaking ability appears to matter for earnings in the South only if the workers are authorized; in contrast, the total US data indicate that it positively influences earnings regardless of authorization status. Second, employment with growers in the South tends to increase workers' earnings more so if they are employed in skilled positions; conversely, the US data suggest larger earnings increases if the workers are authorized for US employment. Third, in the South, a housing provision decreases the earnings of *authorized & unskilled* workers more so than unauthorized workers (regardless of skill level); in the US, unauthorized workers would experience slightly larger earnings decreases than their authorized cohorts.

The group of workers in the South of most interest in the context of immigration reform is the unskilled group. A few key findings of most interest in terms of worker earnings are the following. Unauthorized workers earn 22% more when paid by the piece rate, while authorized workers earn 30% more with the piece rate. Being a seasonal worker reduces earnings by 2% for unauthorized workers, but 6% for authorized workers. And finally, English ability has no significant effect for unauthorized workers, but improves earnings for authorized workers by about 4%.

Finally, our results on earnings differences by legal status and job (skill) type concur with those reported by Taylor (1992). Regardless of whether they are employed in the US or South, unauthorized workers holding skilled jobs are penalized for doing so.

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Table 1: Explanatory Variables for Bivariate Probit & Wage Models[a]

Variable	Definition
LnWage	Natural logarithm of the real farm wage in 2004 dollars. Conversions from the nominal wage were made using the consumer price index for all urban consumers
Authorized	=1 if farm worker is authorized for U.S. employment (citizen, permanent resident, or has other work authorization) = 0 if otherwise (i.e. unauthorized)
Skill	=1 if task is semi-skilled or supervisory job =0 if otherwise (pre-harvest, harvest, post harvest jobs)
Piece Rate	= 1 if worker is paid by piece rate = 0 if otherwise (by the hour, hour/piece combination, or salary)
Seasonal Worker	=1 if worker is employed on a seasonal basis = 0 if otherwise (year-round)
Female	=1 if female =0 if male
Mexican	= 1 if worker is of Mexican nationality =0 if otherwise
Education	Highest grade level of education completed by the farm worker, ranging from 0 to 16
Adult Education[b]	=1 if worker had attended any adult education classes or school in the U.S. =0 if otherwise
Before 1993	Dummy variable reflecting the interview years after the 1986 IRCA but before 1993
After 2001	Dummy variable reflecting the interview years following September 2001
California (CA)	Dummy variable reflecting employment in California at the time of the interview
Florida (FL)	Dummy variable reflecting employment in Florida at the time of interview
Housing	=1 if worker (and family, if applicable) receives free housing from current employer =0 if otherwise

Table 1: Explanatory Variables for Bivariate Probit & Wage Models, (continued)

Variable	Definition
English speaking ability	= 1 if 'none at all' = 2 if 'a little' = 3 if 'somewhat' = 4 if 'well'
Married	= 1 if 'married/living together' =0 if otherwise
Years with current employer	Number of years of employment worker has completed with current employer. One year is measured as one or more days per year (NAWS)
Farmwork weeks	Farmwork weeks completed in the last year
Foreign Farm Work Experience	=1 if worker had been employed in agriculture, either full-time or part-time, while living in native (foreign) country =0 if worker had been employed in non-agricultural sector or had never worked while living in native (foreign) country
Grower	= 1 if employed by a grower = 0 if employed by a farm labor contractor
Specialty Crop	= 1 if worker was employed in specialty crop production at the time of the interview =0 if otherwise
Age	Respondent age in years
Age^2	Age squared
Experience	Years of U.S. farm work
Experience^2	Experience squared
λ_1	Selectivity correction term from the legal status (authorized) decision equation
λ_2	Selectivity correction term from the job type (skill) decision equation

[a] Data were sourced from the National Agricultural Workers Survey. Definitions enclosed in quotation marks are as they appear in the NAWS Codebook.

[b] This would include English/ESL, citizenship, literacy, job training and Adult Basic Education classes, GED/high school equivalency classes, college or university classes, and Even Start and Migrant Education classes (NAWS Codebook, 2004).

Table 2(a): Summary Statistics for Explanatory Variables: US Sample

	Authorized & Skilled Subgroup (n=3903)		Authorized & Unskilled Subgroup (n=9434)		Unauthorized & Skilled Subgroup (n=3125)		Unauthorized & Unskilled Subgroup (n=12902)	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Housing	0.15322	0.36024	0.16218	0.36863	0.19264	0.39444	0.21710	0.41229
Adult Education	0.29029	0.45395	0.28344	0.45069	0.14080	0.34787	0.13223	0.33875
Before 1993	0.22700	0.41895	0.29924	0.45795	0.07488	0.26324	0.09247	0.28969
After 2001	0.24648	0.43101	0.26087	0.43913	0.36224	0.48072	0.39304	0.48844
California	0.66308	0.47272	0.45177	0.49769	0.48736	0.49992	0.31662	0.46517
Florida	0.03485	0.18341	0.11925	0.32410	0.03488	0.18351	0.16145	0.36796
Female	0.12042	0.32549	0.22186	0.41552	0.09504	0.29332	0.15439	0.36134
Married	0.80656	0.39505	0.74698	0.43477	0.50912	0.50000	0.49310	0.49997
English	2.00000	0.88614	1.89177	0.89538	1.50912	0.68899	1.48295	0.69390
Mexican	0.90161	0.29787	0.87799	0.32731	0.93248	0.25096	0.89374	0.30819
Education	5.59672	3.29263	5.64755	3.45410	6.13696	3.06551	6.05550	3.17261
Experience	16.26057	8.85396	14.11363	8.97386	5.96288	5.62182	5.01984	5.30795
Experience^2	342.77860	357.31130	279.71610	365.99610	67.15072	160.43600	53.37095	156.38060
Age	39.00692	11.08921	37.77411	11.60935	28.53664	9.51811	28.30422	9.64938
Age^2	1644.47900	930.86990	1561.64600	960.38850	904.90530	683.31520	894.23200	686.38450
Seasonal worker	0.50602	0.50003	0.52258	0.49952	0.52192	0.49960	0.48279	0.49972
Foreign Farmwork Experience	0.71253	0.45264	0.60695	0.48845	0.72960	0.44424	0.68803	0.46331
Years with Current Employer	6.56444	5.90306	5.39029	5.28969	2.79104	2.58669	2.44389	2.33974
Farmwork weeks	38.64935	11.82657	36.37304	13.27431	34.50295	15.05507	33.20103	16.35835
Piece rate	0.10838	0.31090	0.22006	0.41431	0.13504	0.34182	0.21446	0.41047
Grower	0.81655	0.38708	0.79309	0.40511	0.74208	0.43756	0.76190	0.42594
Specialty crop	0.84653	0.36049	0.92315	0.26637	0.81600	0.38755	0.88947	0.31356

Table 2(b): Summary Statistics for Explanatory Variables: South Sample

	Authorized & Skilled Subgroup (n=227)		Authorized & Unskilled Subgroup (n=1524)		Unauthorized & Skilled Subgroup (n=492)		Unauthorized & Unskilled Subgroup (n=3995)	
Variable	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Housing	0.21586	0.41233	0.21785	0.41292	0.54268	0.49868	0.28511	0.45152
Adult Education	0.34361	0.47596	0.29134	0.45453	0.09553	0.29424	0.10738	0.30964
Before 1993	0.40529	0.49203	0.45801	0.49840	0.11382	0.31792	0.14919	0.35632
After 2001	0.21586	0.41233	0.21457	0.41066	0.13821	0.34547	0.32466	0.46830
Female	0.13216	0.33941	0.27034	0.44428	0.10976	0.31290	0.16446	0.37073
Married	0.68722	0.46465	0.66470	0.47225	0.43699	0.49652	0.44856	0.49741
English	2.15859	1.02251	1.89042	0.91054	1.50000	0.66785	1.44631	0.65494
Mexican	0.81938	0.38555	0.77034	0.42075	0.82317	0.38191	0.80075	0.39949
Education	5.62996	3.21289	5.21588	3.48583	5.68089	3.07573	5.61151	3.31153
Experience	12.05286	7.50497	11.37336	8.13843	4.12602	4.79990	4.27384	4.54947
Experience^2	201.34800	231.35190	195.54400	345.47110	40.01626	130.45890	38.95820	144.65990
Age	35.78414	10.83350	35.77887	11.60180	27.13211	8.83872	27.50713	9.16937
Age^2	1397.35200	839.99970	1414.64100	921.37150	814.11590	597.43770	840.69860	629.38020
Seasonal worker	0.41410	0.49365	0.44488	0.49712	0.67276	0.46968	0.50738	0.50001
Foreign Farmwork Experience	0.63436	0.48267	0.58136	0.49350	0.70935	0.45452	0.66984	0.47033
Years with Current Employer	4.12335	4.21047	4.11221	3.96354	1.93902	1.66072	2.09011	1.86953
Farmwork weeks	40.71743	13.43007	39.97666	13.17330	30.70006	16.70126	34.31050	17.26394
Piece rate	0.10132	0.30242	0.34449	0.47536	0.10976	0.31290	0.31840	0.46591
Grower	0.87225	0.33455	0.76640	0.42326	0.81301	0.39030	0.70113	0.45782
Specialty crop	0.68722	0.46465	0.88320	0.32128	0.29675	0.45729	0.77397	0.41831

Table 3: Bivariate Probit Model Estimates for Foreign-Born Workers' Selections[a]

Authorized	Parameter Estimate (US)	Parameter Estimate (South)	Skilled	Parameter Estimate (US)	Parameter Estimate (South)
Constant	-3.4908**	-3.6980**	Constant	-1.12476**	-1.2679**
	(0.10029)	(0.21608)		(0.08221)	(0.22207)
Adult Education	0.18184**	0.28231**	Seasonal Worker	0.11192**	0.14062**
	(0.02405)	(0.05483)		(0.01716)	(0.05136)
Before 1993	1.03700**	1.14035**	Foreign Farmwork Experience	0.11340**	0.04591
	(0.02668)	(0.05172)		(0.01974)	(0.05213)
After 2001	-0.47995**	-0.29124**	Years with Current Employer	0.01360**	-0.01400
	(0.02197)	(0.05543)		(0.00213)	(0.00953)
California	0.31474**		Farmwork Weeks	0.00235**	0.00277*
	(0.02054)	N/A		(0.00061	(0.00153)
Florida	-0.15734**		Piece rate	-0.38749**	-0.60320**
	(0.03253)	N/A		(0.02320)	(0.06472)
Female	0.43924**	0.38664**	Grower	-0.08955**	0.18350**
	(0.02493)	(0.05173)		(0.02032)	(0.05859)
Married	0.20063**	0.12968**	Age	0.02031**	0.01948
	(0.02148)	(0.04714)		(0.00401)	(0.01199)
English	0.31770**	0.34427**	Age^2	-0.00031**	-0.00031*
	(0.01321)	(0.03000)		(0.00005)	(0.00017)
Mexican	-0.13471**	0.01453	English	0.05519**	0.13665
	(0.03128)	(0.05384)		(0.01108)	(0.03149)
Education	0.03023**	0.02790**	Female	-0.25616**	-0.13900*
	(0.00329)	(0.00724)		(0.02554)	(0.06765)
Experience	0.17934**	0.16634**	Experience	0.01786**	0.00932*
	(0.00325)	(0.00683)		(0.00142)	(0.00454)
$Experience^2$	-0.00273**	-0.00233**	Education	0.00627*	-0.01396*
	(0.00008)	(0.00017)		(0.00295)	(0.00769)
Age	0.04627**	0.03764**	Specialty Crop	-0.33139**	-0.87597**
	(0.00521)	(0.01189)		(0.02458)	(0.05210)
Age^2	-0.00037**	-0.00024			
	(0.00007)	(0.00015)			

US sample size = 29364; Log-likelihood = -26995.78; Rho (ρ) = 0.034*

South sample size = 6238; Log-likelihood = -4152.83; Rho (ρ) = 0.0759*

[a] Standard errors are given in parentheses. Asterisks (**, *) indicate statistical significance at 5% and 10% levels of significance, respectively.

Table 4: Marginal Effects of Bivariate Probit Estimates of Selection into Legal Status & Job (Skill) Type (US & South)

Variable	Marginal Effect							
	Authorized & Skilled		Authorized & Unskilled		Unauthorized & Skilled		Unauthorized & Unskilled	
	US	South	US	South	US	South	US	South
Adult Education	0.01650	0.00774	0.05522	0.07454	-0.01650	-0.00774	-0.05522	-0.07454
Before 1993	0.08918	0.03369	0.30312	0.33733	-0.08918	-0.03369	-0.30312	-0.33733
After 2001	-0.04226	-0.00710	-0.14031	-0.06679	0.04226	0.00710	0.14031	0.06679
California	0.02839	*n/a*	0.09483	*n/a*	-0.02839	*n/a*	-0.09483	*n/a*
Florida	-0.01404	*n/a*	-0.04665	*n/a*	0.01404	*n/a*	0.04665	*n/a*
Female	0.00012	0.00473	0.17351	0.11010	-0.07256	-0.02510	-0.10107	-0.08973
Married	0.01801	0.00333	0.06000	0.03155	-0.01801	-0.00333	-0.06000	-0.03155
English	0.03590	0.01344	0.08843	0.07926	-0.01919	0.00783	-0.10514	-0.10053
Mexican	-0.01223	0.00037	-0.04092	0.00353	0.01223	-0.00037	0.04092	-0.00353
Education	0.00355	0.00025	0.00828	0.00727	-0.00165	-0.00242	-0.01018	-0.00509
Experience	0.01853	0.00459	0.05166	0.04020	-0.01312	-0.00313	-0.05707	-0.04166
Experience^2	-0.00025	-0.00006	-0.00082	-0.00057	0.00025	0.00006	0.00082	0.00057
Age	0.00683	0.00162	0.01127	0.00851	-0.00069	0.00141	-0.01742	-0.01155
Age^2	-0.00007	-0.00002	-0.00007	-0.00005	-0.00002	-0.00003	0.00016	0.00010
Seasonal worker	0.01464	0.00473	-0.01464	-0.00473	0.01923	0.01717	-0.01923	-0.01717
Foreign Farmwork Experience	0.01463	0.00153	-0.01463	-0.00153	0.01920	0.00555	-0.01920	-0.00555
Years with Current Employer	0.00178	-0.00047	-0.00178	0.00047	0.00234	-0.00171	-0.00234	0.00171
Farmwork Weeks	0.00031	0.00009	-0.00031	-0.00009	0.00040	0.00034	-0.00040	-0.00034
Piece rate	-0.04617	-0.01754	0.04617	0.01754	-0.06031	-0.06294	0.06031	0.06294
Grower	-0.01192	0.00585	0.01192	-0.00585	-0.01568	0.02111	0.01568	-0.02111
Specialty Crop	-0.04697	-0.03842	0.04697	0.03842	-0.06216	-0.14481	0.06216	0.14481

Table 5(a): Wage Models for Each Worker Subgroup (US)[a]

	Authorized & Skilled	Authorized & Unskilled	Unauthorized & Skilled	Unauthorized & Unskilled
Constant	1.7053** (0.0779)	1.5298** (0.0369)	1.5922** (0.0640)	1.7172** (0.0210)
Housing	-0.0340** (0.0097)	-0.0190* (0.0077)	-0.0408** (0.0092)	-0.0385** (0.0054)
Adult Ed.	0.0541** (0.0077)	0.0373** (0.0064)	0.0181* (0.0099)	0.0260** (0.0065)
California	0.0548** (0.0082)	0.0676** (0.0065)	0.0415** (0.0078)	0.0455** (0.0052)
Florida	0.0364* (0.0187)	-0.0109 (0.0091)	-0.0103 (0.0179)	-0.0472** (0.0061)
Grower	0.0746** (0.0088)	0.0938** (0.0069)	0.0382** (0.0083)	0.0563** (0.0051)
Piece Rate	0.1217** (0.0151)	0.3466** (0.0102)	0.0891** (0.0143)	0.2297** (0.0077)
Seasonal Worker	-0.0551** (0.0070)	-0.0746** (0.0057)	-0.0348** (0.0072)	-0.0396** (0.0045)
Female	0.0102 (0.0131)	0.0108 (0.0089)	-0.0491** (0.0140)	-0.0246** (0.0073)
Education	0.0041** (0.0012)	0.0042** (0.0009)	0.0036** (0.0011)	0.0052** (0.0007)
English	0.0345** (0.0048)	0.0272** (0.0038)	0.0259** (0.0057)	0.0148** (0.0036)
Age	0.0077** (0.0023)	0.0035* (0.0016)	0.0065** (0.0020)	0.0012 (0.0011)
Age^2	-0.0001** (0.00003)	-0.00005** (0.00002)	-0.0001** (0.00003)	-0.00002 (0.00002)
Experience	0.0120** (0.0019)	0.0076** (0.0013)	0.0166** (0.0018)	0.0145** (0.0011)
$Experience^2$	-0.0002** (0.00004)	-0.0002** (0.00003)	-0.0002** (0.00005)	-0.0003** (0.00003)
λ_1	0.0487** (0.0156)	0.0415** (0.0101)	0.0630** (0.0137)	0.0431** (0.0090)
λ_2	-0.1277** (0.0325)	-0.3043** (0.0407)	0.0582* (0.0327)	-0.1213** (0.0367)

Table 5(b): Wage Models for Each Worker Subgroup (South)

	Authorized & Skilled	Authorized & Unskilled	Unauthorized & Skilled	Unauthorized & Unskilled
Constant	0.8074** (0.2396)	1.5601** (0.0853)	1.5853** (0.1146)	1.7483** (0.0384)
Housing	-0.0587 (0.0377)	-0.0675** (0.0175)	-0.0412* (0.0202)	-0.0266* (0.0103)
Adult Ed.	0.0260 (0.0302)	0.0332* (0.0168)	0.0308 (0.0310)	0.0412** (0.0145)
Grower	0.0928* (0.0422)	0.0403* (0.0178)	0.0553* (0.0232)	0.0507** (0.0097)
Piece Rate	0.1793** (0.0519)	0.2993** (0.0203)	0.2136** (0.0337)	0.2174** (0.0114)
Seasonal Worker	-0.0023 (0.0298)	-0.0656** (0.0152)	-0.0439* (0.0244)	-0.0181* (0.0095)
Female	-0.0935* (0.0430)	-0.0525** (0.0173)	-0.0481* (0.0286)	-0.0703** (0.0121)
Education	0.0094* (0.0048)	0.0058* (0.0023)	0.0075* (0.0029)	0.0068** (0.0013)
English	0.0609** (0.0172)	0.0358** (0.0093)	-0.0111 (0.0152)	-0.0054 (0.0075)
Age	0.0220* (0.0092)	0.0099** (0.0037)	0.0050 (0.0053)	-0.0002 (0.0023)
Age^2	-0.0003* (0.0001)	-0.0002** (0.00005)	-0.0001 (0.0001)	-0.00001 (0.00003)
Experience	0.0146* (0.0075)	0.0079** (0.0027)	0.0263** (0.0048)	0.0096** (0.0020)
$Experience^2$	0.00001 (0.0002)	-0.00004 (0.0001)	-0.0005** (0.0001)	-0.0002** (0.00005)
λ_1	0.1299** (0.0484)	0.0482* (0.0221)	0.0779* (0.0438)	-0.0421* (0.0203)
λ_2	0.1671** (0.0523)	-0.0584 (0.0635)	0.0591 (0.0387)	-0.1083** (0.0372)

[a] Asterisks (**, *) indicate statistical significance at 5% and 10% levels of significance, respectively. Standard errors have not been corrected for the two-step estimation.

Table 6: Average Predicted Conditional Wage for Each Legal Status & Job Type Subgroup in the US and South[a]

Legal Status & Job Type Subgroups	U.S. Wage ($)	South Wage ($)
Authorized & skilled *(G11)*	7.82	7.24
Authorized & unskilled *(G10)*	8.13	7.77
Unauthorized & skilled *G(01)*	6.92	6.36
Unauthorized & unskilled *G(00)*	7.20	6.97

[a] Average wages are conditioned on the selectivity variables for legal status and skill type.