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Regulation and Farm Labor Market Structure

Zhengfei Guan,^{1,2} Sheng Li,² and Feng Wu²

¹ Food and Resource Economics Department, University of Florida

² Gulf Coast Research and Education Center, University of Florida

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Immigration and labor policy may cause changes in the labor market structure over time. In the last few years, evidence suggests increasingly more farmers are hiring through labor intermediaries instead of hiring workers directly in the labor market. In 2011-2012, 10 percent of farm workers were hired through farm labor contractors (FLCs). That number increased to 15 percent in 2013-2014. This percentage is even higher in the labor-intensive specialty crop industry. The majority of fruit and nut farmers hire workers through FLCs. It is estimated that workers employed by FLCs were twice as likely as those employed directly by growers to work in fruit and nut crops (71% compared to 36%) (NAWS 2016).

Studies in the literature have investigated different aspects of labor contractors. For example, Taylor and Thilmany (1993) found that after the 1986 Immigration Reform and Control Act (IRCA) was enforced, FLCs appeared to be fragmenting into smaller operations. Vandeman, Sadoulet, and de Janvry (1991) studied the impact of seasonality and the relative advantages of labor contractors in recruitment and supervision of workers on the choice of contract. Despite the literature on labor hiring and contracting practice, little attention has been paid to the impact of regulation on labor market structure. Some questions remain unanswered: How does regulation induce emergence of farm labor contractors and labor contracting? How do farm and crop characteristics affect the way farmers hire workers? Under what conditions will hiring through contractors lose its advantage to direct hiring?

These questions are particularly relevant in the case of the guest worker regulations. The agricultural guest worker program admits nonimmigrant foreign workers under the H-2A visa category to perform temporary or seasonal agricultural work or services in the United States (DOL 2016). The program was instituted to address labor shortages in U.S. agriculture, which have been a challenge for the industry for decades. The use of H-2A workers has been increasing

rapidly in recent years in U.S. agriculture, especially the labor intensive fruit and vegetable industry (Levine 2005; Hertz and Zahniser 2013; Guan et al. 2015; Roka et al. 2017). According to the United States Department of Labor statistics, the U.S. farmers hired 76,814 foreign guest workers under the H-2A program and that number increased roughly threefold in a period of 10 years to 200,049 over 2007–2017. However, this program has been subject to various criticisms from different interest groups. There have been various proposals to reform the H-2A program. Given the increasing importance of the H-2A workers in U.S. agriculture, the H-2A program requirements and future reforms of the program could have significant impact on farm labor market structure and the agricultural industry.

This study aims to develop a theoretical model to analyze the impact of regulation on farm labor market structure and the implication of reforms of the guest worker program. Specifically, the model is developed to analyze 1) the optimal labor decisions between two hiring practices: directly hiring and hiring through labor contractors under the H-2A program; 2) how program designs and the changes will trigger the emergence of farm labor contractors and hence changes in labor market structure.

The rest of the article is organized as follows. The next section presents the background of the H-2A guest worker program and the major rules of the program, followed by a section of a theoretical labor decision model incorporating these rules. The following section analyzes how regulation impacts labor market structure by affecting farmers' choice between direct hiring and hiring through labor contractors. The final section summarizes major conclusions of the study.

The H-2A Guest Worker Program

The Immigration and Nationality Act (INA) of 1952 authorized a guest worker program under a nonimmigrant visa category, known as H-2, that admits foreign workers to the United States to

perform temporary, agricultural or nonagricultural work. In 1986, the Immigration Reform and Control Act (IRCA) amended the INA and divided the H-2 program into H-2A for agricultural workers and H-2B for nonagricultural workers. The programs are jointly administered by the Employment and Training Administration (ETA) of the United States Department of Labor (US-DOL) and the United States Citizenship and Immigration Services (USCIS) of the Department of Homeland Security (DHS). For agricultural employers, the H-2A program could help them address labor shortages but many employers believe that the current H-2A program is “cumbersome and expensive.” The major rules of the H-2A program include:

1) *The Three-Quarter Rule*. Employers have to guarantee 75% of the total hours offered in the labor contract signed between employers and the guest workers. For many farmers, their crop yield patterns or yield uncertainties may not guarantee the three-quarter requirement in certain periods of the season, in which case employers may not be able to guarantee 75% of the total offered hours over the season, thus ending up paying for any lost hours below the 75% target.

2) *The One-Employer Rule*. Guest workers could only work for the employer that offered the contract. They are not allowed to work for any other employers. If the farmer cannot provide enough hours of work, he could not send workers to other employers to avoid missing the 75% target. But farm labor contractors could hire guest workers and are allowed to send them to different clients (employers), in which case the contractor is considered the employer.

3) *The Adverse Effect Wage Rates (AEWR)*. Employers are required to pay an AEWR wage rates. The AEWR rates are higher than the state or federal minimum wage rates applicable in the work locations. The AEWR rule is designed to protect the domestic labor market, preventing it from being negatively impacted by foreign guest workers. The AEWR rates are

usually more than 30% higher than the statutory minimum wage rates (Zahniser et al. 2011; O'Brien 2014).

4) *Free Housing and Transportation.* Employers are required to provide free housing and transportation for guest workers. Transportation covers round trips from workers home country to the farm, as well as daily travels to the worksites. Employers are also responsible for other transportation deemed necessary for workers in their daily life, such as shopping and attending church services.

To hire guest workers, employers are also required to follow certain application procedures and pay fees. It could take two months or more to bring the workers in the field. There are other rules employers have to comply with. It is clear that many of the rules mean extra costs for employers. However, once the employers hired the guest workers, they usually have a stable and secure labor force that is available throughout the season. Compared to hiring domestic, “at-will” workers without contracts, the use of guest workers significantly reduces labor supply risks. Moreover, the guest workers are often more motivated and more productive than domestic workers. The increased labor costs, reduced risk, and increased productivity will all have implications for farmers’ labor decisions.

Instead of direct hiring, farmers could also choose to hire guest workers through labor contractors. Hiring through farm labor contractors seems to provide a feasible and flexible solution for employers. The guest workers can work for more than one employer in a season by shared contacts. This allows employers (agents or joint farmers) to bring in a larger number of workers on the same contract and share certain fixed costs (e.g., application costs). Workers can work different schedules or crops for different farmers. When hiring through labor contractors, farmers essentially pay the wages guest workers receive plus any extra costs labor contractors

decide to charge them, which may cover all the overhead costs (e.g., free housing and transportation, and any additional costs incurred to contractors) plus a profit margin for labor contractors. For farmers these costs combined divided by hours worked could be considered effective wage rates when hiring through contractors. Farmers seemingly pay a higher wage rate but they may face less binding constraints or less uncertainties, which may translate to gains. Overall, employers may be better off hiring through contractors. The tradeoff will determine the farmer's decision whether to switch from one practice to another.

The Labor Decision Model

We consider a labor decision model of hiring foreign guest workers directly or through FLC for a standard, hypothetical farm in terms of scale and operation. The farmer is assumed to make optimal labor decisions to maximize profit. He needs to decide the optimal number of workers (N) to hire prior to the start of the season and the number of work hours (h_t) during the season.

The model is specified as

$$(1) \max_{N, h_t} \{E \sum_{t=1}^T (p_t - w_t) \theta N h_t\} - c(N),$$

where p_t and w_t are the crop price and wage rate at period t ; θ represents the harvest efficiency of workers. N is the number of workers. $c(N)$ is the recruitment cost, including fixed costs (c_0) (e.g., application fees) and variable costs ($c_1 N$) allocated to individual workers (e.g., visa fees, in-bound and out-bound transportation costs, and housing).

The maximization problem is subject to constraints. First, the harvest amount ($\theta N h_t$) in each of period t should not exceed the actual yield, that is

$$(2) \quad \theta N h_t \leq A Y_t,$$

where Y_t is the yield at period t , determined by the average yield g_t and yield shocks (e_t); A is the crop acreage.

Second, working hours of H-2A workers cannot exceed the maximum available hours \bar{H} , namely,

$$(3) \quad H_t < \bar{H}.$$

Third, H-2A employers are required to comply with regulations of the H-2A program, particularly, the three-quarter guarantee:

$$(4) \quad \sum_{t=1}^T H_t \geq TkH_0$$

where H_0 is work hours offered by farmers and $k = 0.75$.

If the farmer chooses to hire H-2A workers himself, he will optimize his labor decision in Eq. (1) under constraints (1) – (4). If he hires H-2A workers through FLC, his optimization problem becomes

$$(5) \quad \max_{H_t} \{E \sum_{t=1}^T (p_t - w_{lct}) \theta h_t - c(h_t)\}$$

$$s. t.: h_t \leq \frac{Ay_t}{N\theta}$$

where h_t is the total work hours of all H-2A workers (NH_t) and w_{lct} is the effective wage rate the farmer pays. To simplify the model, we standardize θ and A and set them to be one (Du et al. 2015). The season is assumed to have two periods: T_1 and T_2 . We assume that the yield (Y_1) at T_1 are lower and the crop will be fully harvested,¹ while the yield (Y_2) at T_2 are higher. We allow for the possibility that some of the crops at T_2 may have to be abandoned. Yield shocks are assumed to follow a symmetric uniform distribution within the interval $[-b, b]$ as in the studies of Jerrum (1986), Pease (1992), and Ben-Ari and Makowski (2014).

¹ In the earlier harvest season, the yield is usually lower. Crops will be fully harvested. In this case, the second restriction of $H_1 < \bar{H}$ is not imposed and $H_1 = \frac{Ay_1}{N\theta_1}$

Direct Hiring

The labor demand rule in the case of direct hiring is

$$(i) H_1 + H_2 = \frac{Y_1}{N} + \frac{Y_2}{N}, \text{ if } e_y < \bar{H}N - g_2$$

$$(ii) H_1 + H_2 = \frac{Y_1}{N} + \bar{H}, \text{ if } e_y > \bar{H}N - g_2$$

The expected demand of labor hours for each worker in the two periods is

$$(6) E(H_1 + H_2) = \int_{-b}^{\bar{H}N - g_2} \left(\frac{Y_1}{N} + \frac{Y_2}{N} \right) f(e_y) de_y + \int_{\bar{H}N - g_2}^b \left(\frac{Y_1}{N} + \bar{H} \right) f(e_y) de_y$$

The wage paid to workers depends on whether the work hours meet the three-quarter rule. When $e_y = kH_0N - 0.5(g_1 + g_2)$, the rule is met. So

$$(i) C = w[H_1N + H_2N], \text{ if } e_y > \bar{e}$$

$$(ii) C = w[2kH_0N], \quad \text{if } e_y < \bar{e}$$

where $\bar{e} = kH_0N - 0.5(g_1 + g_2)$. The expected labor cost is

$$(7) E(C) = \left[\int_{\bar{e}}^{\bar{H}N - g_2} (g_1 + g_2 + 2e_y) f(e_y) de_y + \int_{-b}^{\bar{e}} (2kH_0N) f(e_y) de_y + \int_{\bar{H}N - g_2}^b N \left(\frac{Y_1}{N} + \bar{H} \right) f(e_y) de_y \right],$$

Therefore, the optimal labor demand is solved by

$$(8) \max_N \{ pNE(H_1 + H_2) - c_1N - c_0 - E(C) \}.$$

The optimal number of workers and the maximum profit can be derived as

$$(9) N^* = \frac{(p-w)(\bar{H}(g_2+b)) + wkH_0(g_1+g_2-2b) - 2bc_1}{(p-w)\bar{H}^2 + 2w(kH_0)^2}$$

$$(10) \Pi = p \left[\frac{2bg_1 + \frac{(\bar{H}N^*)^2 - g_2^2 - b^2}{2}}{2b} \right] - w \left[\frac{\frac{(g_1+g_2)^2}{4} + bg_1 + \frac{(\bar{H}N^*)^2 - g_2^2 - b^2}{2} - kH_0N^*(kH_0N^*)}{2b} \right] - c_0$$

Hiring through FLCs

In the case of hiring through contractors, the decision is to determine the optimal number of hours $h_t(NH_t)$ in each period. Let λ_t be the Lagrange multipliers for the yield constraints, the maximization problem can be rewritten as

$$(11) \quad \max_{h_{it}} \left\{ E \int_{-b}^b (p - w_l)(h_1 + h_2) f(e_y) de_y - C(h_1 + h_2) - c_{l0} + \sum_{t=1}^2 \lambda_t (Y_t - h_t) \right\}$$

The optimal labor demand can be solved as

$$(12) \quad h_t^* = g_t$$

and the optimal profit can be written as

$$(13) \quad \Pi_{lc} = (p - w_{lc})(g_1 + g_2) - C(g_1 + g_2) - c_{lc0}$$

where C is the total variable cost associated with the work hours and c_{lc0} is fixed costs.

Proposition 1. *The three-quarter guarantee discourages farmers from hiring more workers and thus reduces farmers' profit. To mitigate its negative effect, farmers have motivation to offer fewer hours in the contract.*

Proof:

$$(14) \quad \frac{dN^*}{dk} = -\frac{wH_0(2b+(2k-1)(g_1+g_2))}{(p-w)\bar{H}^2+2w(kH_0)^2} \leq 0$$

$$(15) \quad \frac{d\Pi^*}{dk} = -W \left[\frac{(2kH_0N^*)+H_0N(4kH_0N^*-g_1-g_2+2b)}{2b} \right] < 0$$

$$(16) \quad \frac{dH_0}{dk} = \frac{-4(N^*+k\frac{dN}{dk})(g_1+g_2-2b)}{(4kN^*)^2} < 0$$

Proposition 2. *As farmers increase the maximum available hours \bar{H} , the optimal number of employees N^* in the case of direct hiring will be reduced, and the profit will be increased.*

Proof:

$$(17) \quad \frac{dN}{d\bar{H}} = \frac{(p-w)(g(x)_2 - 2\bar{H}N)}{(p-w)\bar{H}^2 + 2w(kH_0)^2} < 0$$

$$(18) \quad \frac{d\Pi^*}{d\bar{H}} = \frac{N(p-w)(g(x)_2 + b - \bar{H}N)}{2b} > 0$$

Proposition 2 implies that the H-2A program design might potentially induce farmers requiring workers to work long hours. Farmers would extend the hours as much as possible. In general, workers can work eight hours a day and six days a week. In the peak season, workers could be required to work seven days a week or on holidays. Compared with domestic workers, H-2A workers often have less power to negotiate.

Proposition 3. *In the case of direct hiring, farmers tend to hire more workers if the average expected maximum profit margin ($\frac{\bar{H}(p-w)}{2}$) could cover the sum of the variable cost (c_1) and the cost to comply with the three-quarter guarantee (wkH_0).*

Intuitively, to deal with yield uncertainties, farmers would hire as many workers as possible if there is no cost burden. However, farmers must consider the constraints of the three-quarter guarantee and recruitment costs. Farmers will trade off the increased marginal cost under the constraints with the potential benefit from hiring more workers to cope with the yield risk.

The effect of the yield risk on the number of workers can be derived as

$$(19) \quad \frac{dN}{d\sigma} = \frac{2b}{(p-w)\bar{H}^2 + 2w(kH_0)^2} \left(\frac{\bar{H}(p-w)}{2} - wkH_0 - c_1 \right)$$

Equation (19) indicates how the yield risk affects labor demand.

Direct Hiring or Hiring through FLCs?

Comparing profit of direct hiring with that through FLC could determine which is preferred. The difference between equations (10) and (13) is

$$(20) \quad Diff = p \left[\frac{2bg_1 + \frac{(\bar{H}N)^2 - g_2^2 - b^2}{2}}{2b} \right] - w \left[\frac{\frac{(g_1 + g_2)^2}{4} + bg_1 + \frac{(\bar{H}N)^2 - g_2^2 - b^2}{2} - kH_0N(kH_0N)}{2b} \right] - c_0 - [(p - w_{lc})(g_1 + g_2) - C(h_1 + h_2) - c_{lc0}]$$

To simplify equation (20), we assume that the wage paid to guest workers through FLC includes two parts: a) $w(g_1 + g_2)$; b) a premium payment for FLCs, which is $\zeta w(g_1 + g_2)$, where ζ is the premium rate. In addition, the variable cost in the case of hiring through FLC is assumed to be a function of work hours and can be written as $\xi w(g_1 + g_2)$, where ξ is the share of the variable cost. Then equation (20) can be re-written as,

$$(20.a) \quad (p - w) \left[\frac{\frac{(\bar{H}N)^2 - (g_2 + b)^2}{2}}{2b} \right] - w \left[\frac{\frac{(g_1 + g_2)^2}{4} (1 - 4k^2) - b(g_1 + g_2)}{2b} \right] + (\zeta + \xi)w(g_1 + g_2) + (c_{lc0} - c_0)$$

The threshold of ζ can be solved by setting (20.a) equal to zero:

$$(21) \quad \zeta = w \left[\frac{(g_1 + g_2)(1 - k^2) - b}{8b} \right] + (p - w) \left[\frac{(g_2 + b)^2 - (\bar{H}N)^2}{4b(g_1 + g_2)} \right] + \frac{(c_0 - c_{lc0})}{g_1 + g_2} - \xi$$

The first term in equation (21) is the cost caused by the three-quarter guarantee. The second term is the expected value of abandoned crops in the second period when farmers hire directly. The threshold will become larger with more possible crop abandonments, which means farmers will accept a higher wage rate for hiring through FLCs. The third term is the difference of fixed costs in two strategies weighted by total yields. Theoretically, the fixed cost in hiring through FLCs will be lower than that of direct hiring due to the economy of scale. For example, the petition fee is fixed regardless of the number of workers hired; professional contractors can improve the efficiency of the application process and labor management. The last term is the marginal variable cost when hiring through FLCs, associated with the number of workers and working hours (N, H). Generally, given the same number of recruiting personnel, the marginal

variable cost has no difference in two strategies. In practice, FLCs are expected to have a lower marginal variable cost due to the economies of scale.

Concluding Remarks

This study developed a theoretical model to investigate farmers' labor decisions and compare two hiring strategies – hiring H-2A workers directly or through FLCs. The threshold is identified in a simplified labor decision model. The analysis showed that the maximum available hours and the three-quarter guarantee rule with the one-employer rule could change the thresholds and farmers' hiring decisions. Compared with direct hiring, hiring through FLCs has comparative advantages of flexibility, lower costs, and more efficient labor use. The findings from this study generate insights into the implications of H-2A program requirements, which could be used to guide future program reforms. They could also help predict the trend of the farm labor market structure under different policy scenarios.

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