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On the political economy of guest worker programs in agriculture[†]

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Abstract

Guest workers have provided a source of agricultural labor supply in many countries. Recent legislative proposals on immigration reform in the United States have renewed discussions about the role of guest worker programs, and highlighted the arguments for and against such programs. Even within the agricultural sector, there has not been strong broad-based support for an expansion in the number of guest workers. A model is developed that considers competing interests between commodity groups (horticulture crops and grain crops) to explain this lack of support, and then a series of simulations are conducted to highlight the possible economic effects of an expanded guest worker program. Results suggest that an increase in the labor supply would lead to much larger welfare gains for horticultural producers and firms in the supporting input markets. Furthermore, under some conditions, simulation outcomes show how an increase in the labor supply may lead to small welfare losses for both producers and input suppliers in grain markets.

Keywords: Guest worker programs, horticulture, immigration reform, political economy, simulation model.

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Introduction

Potential reform in immigration policy has fueled much political debate in the United States (Martin 2013); immigration reform also remains a significant policy question in other developed countries (Reichert and Massey 1982; Wong 1984; Yamanaka 1993; Castles 2006). Such debates have generally focused on three issues: (1) enforcement against illegal migration, (2) development of rules for unauthorized immigrants currently in the host country, and (3) administration of guest worker programs. Guest worker programs allow foreign citizens to temporarily reside and work in the host country; they are typically used to employ laborers in industries such as agriculture, hospitality, and other industrial sectors that have seasonal production patterns. Guest worker programs in the United States have had a long history and have been at the nexus of the recent negotiations surrounding immigration reform (Martin 2002; Kim 2014).

As a result of labor shortages during World War II, the U.S. government began a guest worker program known as the Bracero Program which allowed Mexican laborers to enter the United States and work in agriculture. The Program (also referred to as Public Law 78) continued until 1964, and at its peak it allowed up to 440,000 guest workers to enter the United States per year. In 1953 the U.S. government began the H-2 Visa Program, a guest worker program separate from the Bracero Program that allowed a small number of foreign citizens to be employed in the United States for work that was classified as seasonal. The H-2 Visa Program has not been specific to agriculture[1], but it has been used to bring temporary workers to the United States to work in agriculture and the Program continues to employ approximately 60,000 guest workers in agriculture in recent years. At the same time, it is estimated that half of

the 1.2 million workers employed in U.S. agriculture are unauthorized (U.S. Department of Labor 2005).

The most recent legislation on immigration in the United States was in 1986; the Immigration Reform and Control Act of 1986 granted legal status for certain unauthorized immigrants and increased border surveillance to increase enforcement, but effectively did little to the guest worker program (Martin 1994; Thilmany 1996). Since 1986 there have been several legislative attempts to introduce additional reforms; however, none of these legislative proposals have become law and there remain an estimated 12 million unauthorized immigrants in the United States (Passel, Cohn, and Gonzalez-Barrera 2013). In 2006 the U.S. Senate proposed a comprehensive plan targeting enforcement, legalization of unauthorized immigrants, and an expansion of the guest worker program. The 2006 Senate act included AgJobs, or the Blue Card Program, which proposed allowing up to 1.5 million unauthorized immigrants to obtain immigration status if they engaged in farm work. In 2013, the U.S. Senate again introduced legislation that proposed a broad set of reforms to immigration policy, including an expanded guest worker program. This Senate proposal called for a replacement of the H-2A visa with a W visa; under this program there would remain a cap on the total number of visas, but the total number of guest workers allowed at any one time would rise to approximately 350,000. Later in 2013 the U.S. House proposed a set of so-called piecemeal bills for immigration reform; this included the Agricultural Guestworker Act that proposed to replace the H-2A Program with the H-2C Program. The number of visas under the proposed H-2C program would be determined by the Secretary of Agriculture, and up to 500,000 visas would be issued per year.

There are two main criticisms of guest worker programs. First, labor rights advocates are critical of the conditions faced by guest workers, and of potential opportunities for agricultural

employers to exploit guest workers. Second, critics of immigration reform opine that guest worker programs provide an avenue for immigrants to enter a country legally but then become unauthorized immigrants if they overstay their visa (Basok 2000). There are also benefits associated with guest worker programs. For immigrants, the benefits may include higher wages, and migrant-sending countries may benefit from greater remittances and the return of workers who gained skills abroad (Chiswick 1988). Employers in the migrant-receiving country may benefit from the expanded economic output created by the stable and reliable labor force supplied by immigrant workers. Agricultural economists have highlighted the important role that immigrant workers have contributed in the production of labor-intensive horticultural crops (a category that includes fruit, vegetable, and nursery crops). In general, research in this arena finds that large changes in the supply of foreign-born agricultural workers (through border enforcement or guest workers) would have positive impacts in markets for horticultural crops—some horticultural crops are expected to be impacted more than others—whereas the effects in markets for non-horticultural markets are less clear.

Emerson (2007) notes that technological improvements in agriculture have been biased towards labor-intensive crops between 1970 and 2005; this research also suggests that a closed border approach would shift the crop mix away from horticultural crops whereas an increase in legal migration would have a very limited impact on the crop mix. Zahniser et al. (2012) simulate the implications from two policy scenarios in a general equilibrium model: the first is a modest increase in the number of guest workers, and the second is a substantial decrease in the number of unauthorized workers in the United States. Their results show that an increase in the number of guest workers by 156,000 would lead to a 1.0 to 2.2% increase in the production of horticultural crops, and a 0.1 to 1.5% increase in the production of other (non-horticultural)

crops. When the supply of unauthorized workers is decreased by 5.8 million, their simulation results show that horticultural crop production would fall between 2.0 and 5.4% and non-horticultural crop production would fall between 1.6 and 4.9%. Gunter, Jarrett, and Duffield (1992) find a similar range of results for production of selected horticultural crops with a 10% change in the agricultural labor supply. Calvin and Martin (2010) examine the relationship between immigration reform that leads to fewer guest workers, labor costs, and the production of key horticultural crops. They find evidence that a decrease in the supply of guest workers would further encourage mechanization among producers of raisins, processing oranges, and baby leaf lettuce; it would also increase pressure for consolidation among producers in these industries. They also find that labor-intensive, highly traded, and non-mechanized agricultural sectors (such as asparagus and apples) would lose export market share, whereas crops with little import competition (strawberries and select lettuce crops) would be less affected by an increase in labor costs.

The current Congressional debate on immigration reform continues without a clear consensus on how to proceed with guest worker programs. As part of this larger debate, many stakeholders within the agricultural community would back legislation that would expand the labor supply, and this seems reasonable given that many agricultural industries are relatively labor-intensive. However, and perhaps surprisingly, there is not unanimous support across agriculture industries for an expansion in the number of guest workers. There are efforts to establish a greater coalition of support for immigration reform across agricultural commodity groups and across regions, but a large share of the active members in this group represent stakeholders from horticultural markets.[2] The apparent lack of support from grain and oilseed groups suggests that immigration reform is either a non-issue for them, their policy preferences

are elsewhere, or that there are complex multiple dimensions of policy at play (Grossman and Helpman 2001). The objective of this paper is to consider the effects of an expanded guest worker program for both labor-intensive crops (horticultural crops) and land-intensive crops (grains and oilseeds), and for the input markets that serve these two crop categories. Previous work finds that an increase in the agricultural labor supply would lead to producer welfare gains for both types of crops, but that the labor-intensive crops would receive a disproportionately larger share of the gains (e.g., Zahniser et al. 2012). Little attention has been paid to the welfare effects in the relevant factor markets including land and other capital inputs. The hypothesis here is that, under some conditions, an expansion in the labor supply could lead to small decreases in welfare for input suppliers in the markets for land-intensive crops. I test this hypothesis using a series of simulations that assess the implications of an expanded guest worker program in a two-output, three-input model. If an expansion in the number of guest workers has the capacity to generate negative welfare effects for stakeholders in input markets for land-intensive crops, it will help to explain the lack of consensus support for immigration reform across the agricultural industry.

Competition among pressure groups within agriculture for political influence

Others have drawn attention to the differences in policy preferences among agricultural stakeholders due to regional and commodity-specific interests, and how this makes it difficult for general farm organizations to articulate unambiguous policy preferences (e.g., Barnett and Coble 2011). Guest worker programs are clearly favored by some commodity organizations, and have proven to be a controversial issue for broad-based farm lobbying groups. As evidence of this, I collected information published in 2012 by 41 state-level agricultural lobby groups on their i)

crop mix, and ii) volume of text in the publication that focused on labor issues.[3] These state-level policy publications are used to communicate their members' policy preferences to the parent farm lobby organization at the national level.[4] In Figure 1, I plot the number of times that the word "labor" (or labor-related synonyms) appeared in the text of the policy publication along the left vertical axis (shown by the line), and program crop acres[5] as a share of total crop acres along the right vertical axis (shown by the bars) for the 41 states. The information in Figure 1 suggests that states with higher shares of program crop acres are less likely to mention "labor" in their policy publication, and this reinforces the anecdotal evidence that the concerns about labor supply are not equal across regions.

Below I follow and extend work by Becker (1983) to develop a conceptual framework that describes the competing interests for political support in agriculture, and that explains the lack of consensus across agricultural industries for an expanded guest worker program. Equation (1) shows the per firm redistribution, denoted as R, as a result of lobbying. I use subscript a to represent the agricultural (crops) industry and subscript b to represent non-agricultural industries. The redistribution to agriculture is the net redistribution to horticultural crops (h) and grain crops (g); Z is the income earned per firm as a result of the redistribution where superscript 0 in the initial income level. Becker (1983) defines the redistribution as a tax to one group and a subsidy to another group. Here I generalize the definition of a redistribution to examine the effects of a policy change that has the capacity to impact various groups or industries.

$$\begin{aligned} R_a &= R_h + R_g = Z_h - Z_h^0 + Z_g^0 - Z_g \\ R_b &= Z_b^0 - Z_b \end{aligned} \tag{1}$$

Following Becker (1983), the net redistribution transfer to agriculture is set equal to the redistribution transfer to the non-agricultural industry. In equation (2) n_c represents the number

of firms in industry c, where $c \in [h, g, b]$, and the functions H, G, and B, are the revenue or cost of providing the transfer to the respective industry and include the deadweight costs.

$$n_h H(R_h) + n_g G(R_g) = n_b B(R_b) \tag{2}$$

If it is assumed, for simplicity, that there are no deadweight costs for transfers, so that $H(R_h) = R_h$, $G(R_g) = R_g$, and $B(R_b) = R_b$, then total amount of the redistribution to industry c is described as being determined by an influence function, denoted by I^c in equation (3). The influence function depends on the political pressure exerted by industry c, denoted as ρ_c, and by other variables in x.

$$\begin{aligned} n_h R_h &= I^h(\rho_h, \rho_g, \rho_b; x) \\ n_g R_g &= -I^g(\rho_h, \rho_g, \rho_b; x) \\ n_b R_b &= -I^b(\rho_h, \rho_g, \rho_b; x) \end{aligned} \tag{3}$$

For the case of an expansion in the number of guest workers available, I describe the case where the influence function is positive for the horticulture industry, negative for the grain industry, and negative for the non-agriculture industry. That is, the redistribution due to an expanded guest worker program is hypothesized to have a positive impact for the horticultural industry and a negative impact for the grain industry.

Equation (4) shows that the political pressure exerted by industry c, is a function of n_c and the total lobbying efforts, denoted by m_c, where $m_c = v_c n_c$ and v_c is the lobbying resources per firm. The hypothesis that the influence function is negative for the grains industry rests on the assumption that $v_g < 0$ for some firms. This assumption implies that some stakeholders in the grains industry spend effort lobbying against proposals that support guest worker programs; this might be explicit lobbying actions against such proposals or it could encompass more implicit actions that favor other issues that compete for the attention of policy makers.

$$\rho_c = f_c(n_c, v_c n_c), \text{where } c \in [h, g, b] \tag{4}$$

The framework presented above outlines a conceptual model that can be used to examine competition between interest groups within agriculture, and provides some structure to consider the likely economic effects of an expanded guest worker program across agricultural industries. This conceptual model extends work by Becker (1983) to show that although there may be potential net benefits to the agricultural industry from an expanded guest worker program, it is possible that not all subsectors within agriculture will benefit from such a policy change. In the next section I develop a simple simulation model to assess the implications that an expanded guest worker program might have on markets for horticultural crops and grains crops, and on the factor markets that supply inputs to both crops. The purpose of the simulation exercise is to test the hypothesis that an increase in the number of guest workers may have negative welfare effects for suppliers of inputs to the grains market. In addition, the simulation model provides a useful tool to better understand the conditions under which a negative welfare change is likely to occur.

Simulation model

Following Muth (1964), Alston, Norton, and Pardey (1995) and Sumner, Lee, and Hallstrom (1999) I develop a multimarket simulation model to understand the implications of an expansion in the number of guest workers available to U.S. crop agriculture. The model includes supply and demand functions for two crop markets, horticultural crops (denoted with subscript *h*) and grain crops (denoted with subscript *g*). Crop agriculture is treated as a separable group in the analysis, and in some simulations I allow for imperfect substitutability in consumption between the two crop markets.[6] Three input markets are also included in the model as factors in the production of the two crops; the three inputs include labor (denoted with subscript *l*), land (denoted with subscript *d*), and other capital inputs (denoted with subscript *r*).

The primary motivation here is to study the general economic effects of a policy change—that would lead to a small increase in the labor supply—in the domestic markets for the two aggregate crop categories and the three inputs. Such a policy change is expected to have effects in international markets if there was substantial trade in the crop markets or in the input markets. However, including international trade would add some complexity to a multimarket model with broad crop categories, and it is not clear that the international trade effects can be captured in a meaningful way in the stylized model proposed below. The purpose of the simulation model is to understand if an increase in the number of guest workers has the capacity to negatively affect any domestic stakeholders as a way to explain the lack of support for immigration reform across all domestic agricultural industries. Including trade in crops or inputs is not expected to provide any additional insight on this central question. Therefore, in the model presented next, I assume that there is no trade in crops, and use Q_i to describe both domestic consumption and domestic production of crop *i*, where $i \in [h, g]$. I also assume that there is no trade in input markets following similar assumptions often used by agricultural economists that employ multimarket simulation models.

The basic structure of the simulation model is given in equations (5) through (9). Equation (5) represents market demand for crop *i* and it is shown to be a function of a vector of crop prices, denoted as **p**, and an exogenous variable that affects demand for crop *i*, denoted A_i. Equation (6) represents the derived demand for input *k*, where $k \in [l, d, r]$, in the production of crop *i*, and **w** is a vector of input prices; this assumes that there is a well-defined cost function for each of the two crop categories, denoted as $C_i(\cdot)$ in equation (6). Equation (7) represents the market supply of input *k* which is a function of the price of input *k*, denoted as w_k and an exogenous variable that affects the supply of input *k*, denoted as B_k. Equation (8) is the

equilibrium condition in the input markets. Equation (9) is the market clearing condition in the output markets assuming perfect competition and assuming production is equal to consumption.

$$Q_i = f_i(\mathbf{p}; \mathrm{A}_i) \tag{5}$$

$$x_{ki} = \frac{\partial C_i(\mathbf{w}, Q_i)}{\partial w_k} \tag{6}$$

$$X_k = f_k(w_k; \mathrm{B}_k) \tag{7}$$

$$X_k = \sum_i x_{ki} \tag{8}$$

$$p_i = \frac{\partial C_i(\mathbf{w}, Q_i)}{\partial Q_i} \tag{9}$$

Totally differentiating equations (5) through (9) and converting them to elasticity form yields the simulation model shown below. Because the model is partial equilibrium in nature, aggregate income and prices of commodities outside of crop agriculture remain constant throughout the adjustment process. In equations (10) through (14), equilibrium adjustments in prices and quantities are simulated by exogenously specifying a relative increase in the supply of agricultural labor via the parameter β_k. These simulated changes in prices and quantities are subsequently used to calculate the corresponding changes in producer revenue. In the following equations, for any variable *z*, $\hat{z}$ represents the relative change in *z*, that is, $\hat{z}$ represents *dz*/*z* where *d* refers to a total differential.

$$\hat{Q}_i = \sum_j \eta_{ij}(\hat{p}_j - \alpha_i) \tag{10}$$

$$\hat{x}_{ki} = \sum_n \gamma^i_n \sigma^i_{kn} \hat{w}_n + \hat{Q}_i \tag{11}$$

$$\hat{X}_k = \varepsilon_k(\hat{w}_k + \beta_k) \tag{12}$$

$$\hat{X}_k = \sum_i \lambda_k^i \hat{x}_{ki} \tag{13}$$

$$\hat{p}_i = \sum_k \gamma_k^i \hat{w}_k \tag{14}$$

Equation (10) describes the relationship between changes in prices of crops (where *j* includes all crops) and the demand for crop *i*; here η_{ij} is the demand elasticity of crop *i* with respect to the price of crop *j*. Equation (10) also includes the parameter α_i to allow for a shock representing a relative increase in the demand for crop *i*. Equation (11) outlines the multimarket relationship used to describe changes in the derived demand for input *k* used to produce crop *i*. Here the parameter γ_n^i represents the cost share of input *n* (where *n* includes all inputs) in the production of crop *i* and parameter σ_{kn}^i is the Allen elasticity of substitution between inputs *k* and *n*. Equation (12) shows the relationship between changes in the total supply of input *k* and the supply elasticity for input *k*; equation (12) also includes the parameter β_k as a shock that leads to a relative increase in the supply of input *k*. The supply elasticity for input *k* is denoted as ε_k in equations (12). Equation (13) shows that the change in the total supply of factor *k* is the sum of changes in the derived demands for the input across all crops; each derived demand change is weighted by λ_k^i, the industry share of input *k* used in in the production of crop *i*. Equation (14) shows that the change in the price for crop *i* is equal to the sum of changes in prices for all inputs used to produce crop *i* weighted by the input cost shares.

The linear transformation framework adopted here is convenient as an approximation but none of the results hinge on this simplification. Equations (10) through (14) do not involve any explicit or implicit assumptions about the functional forms used, and it is not necessarily assumed that the elasticities are constant. However, it is assumed that the supply-and-demand functions are approximately linear at the initial point of market equilibrium (Alston, Norton, and Pardey 1995). Because the solutions to the logarithmic transformation depend on the parameters

selected to characterize the elasticities and share parameters, the next section provides information about each parameter used in the model.

Parameterization of the model

The parameters used here are based on empirical estimates from the literature, similar parameters used in other research, and data supplied by industry sources. Overall, the range of parameters used should be interpreted as those in the intermediate run (three to five years) as that seems to be the appropriate time horizon to consider for this type of policy change. It is expected that the quantity effects of an expanded guest worker program might be larger and the price effects smaller if a longer time horizon were considered. That is, with more time to adjust, farms and input suppliers would be more able to shift resources within these industries in response to a change in the supply of seasonal agricultural workers. A summary of the parameters used in the simulation model are presented in Table 1, and each is discussed in detail below.

The own-price elasticity of demand for horticultural crops is set at -1.2, and for grain crops it is set equal to -0.6. These values are slightly more elastic than the estimates for similar crops in Huang and Lin (2000), but this analysis considers a longer time horizon. The values selected here fall within the range estimated in the literature and are summarized in Okrent and Alston (2011). Two values for the cross-price elasticities of demand between the crop categories are considered in the analysis; in the baseline results this parameter is set equal to zero and subsequent simulations examine how modest substitution between the crops affects the results by setting the parameter equal to 0.2. The supply function for the two crops is derived from supply functions in the factor input markets. The supply functions in the factor input markets apply to that market as a whole, but reflect the supply decisions made by individual firms in that market.

The model assumes that these input markets are competitive, that is, the prices of the inputs used are exogenous to individual firms in the crop markets. Overall, it is expected that the elasticity of supply of the inputs—notably for labor and land—is relatively inelastic in response to a policy change that would increase the number of guest workers. The supply elasticity for labor is set equal to 0.2, for land it is set equal to 0.2, and for other inputs it is set equal to 1.0 (Sumner, Lee, Hallstrom 2009). The Allen input substitution elasticities are initially set equal to zero, but the sensitivity of results to this parameter is also explored with additional simulations. Subsequent analysis also considers the economic effects when the input substitution elasticities are set equal to 1.0.

The simulation model also requires information to describe input cost shares and industry use shares. Input cost shares define the relative contribution of each input towards the total cost of producing each crop. For horticultural crops, labor is well documented as the largest cost category and its cost share is assigned as 50%; other inputs are assigned 30% of the total production costs and land is assigned 20% of the total production costs. For grain crops, 60% of the total costs are for land, 30% are for other inputs, and 10% is for labor. Industry use shares define how each input is allocated across the two crops. For labor, 80% of the use share is assigned to horticultural crops and 20% is assigned to grain crops. Land use shares are reversed for the two crops; 10% of the land use share is assigned to horticultural crops and 90% is assigned to grain crops. Lastly, for other inputs, 30% of the use is assigned to horticultural crops and 70% is assigned to grain crops. The share parameters used in the analysis serve as approximate values, but overall are reflective of the cost structure and the industry usage of inputs in these two broad crop categories. Furthermore, some additional sensitivity work shows

that the results reported next are not very sensitive to small changes in the share parameters described in this section.

Results and discussion

The results for four simulations that consider the economic effects of a 10% increase in the supply of agricultural labor are reported. The first set of results is calculated using the baseline set of parameters reported in Table 1, and then three additional sets of results are presented that outline how sensitive the baseline results are to alternative parameter assumptions. Each simulation imposes a policy shock to the system of equations and generates new equilibrium prices and quantities in the markets for the two crops and the three inputs. The primary purpose of the simulation exercise is to shed some new light on the effects of an expanded guest worker program for agricultural producers and owners of the key inputs that supply agricultural producers. Therefore, the simulated changes in prices and quantities are used to calculate approximate changes in total revenue in each market. The percentage change in total revenue for producers in each market is calculated as the sum of the percentage changes in price and quantity. This approximation was a simplification, however, it allowed for a comparison of the change in total revenue across the simulation experiments. Such a policy change is also expected to have impacts on consumers in these markets, but changes in consumer welfare cannot be properly assessed within the framework used here. As a result, changes in consumer surplus are not provided in the results presented next.

The results in Table 2 outline the baseline results for a 10% increase in the total agricultural labor supply. Here the change in the quantity of horticultural crops is 8.4% and the change in the quantity of grain crops is -0.4%; the change in total revenue for horticultural crops

is 1.4% and it is 0.2% for grain crops and these values are generally reflective of what earlier research has shown. Because fixed factor proportions (i.e., the input elasticities are set equal to zero) are assumed in the baseline model, the changes in quantities in input markets are equal to the changes in quantities in the crop markets. Changes in the total revenue to owners of the labor input falls for both crops; it falls by -8.5% for labor used to produce horticultural crops and by -17.3% for labor used to produce grain crops. For owners of the land input and the other input, the change in total revenue is positive, yet it is substantially more positive for the inputs that supply the horticultural crops. The change in total revenue increases by 10.7% for land used to produce horticultural crops and by 1.9% for land used to produce grain crops. A similar result is found for the other input market; the change in total revenue increases by 11.7% for other inputs used to produce horticultural crops and by 2.9% for other inputs used to produce grain crops.

A sensitivity analysis is conducted that examines how the results are impacted by greater substitution across crops and between inputs. In Table 3 I report results for three simulations: the first includes non-zero cross price elasticities of demand for the horticultural crop and the grain crop, the second considers non-zero input substitution elasticities between the three inputs, and the third considers both substitution effects. The results in the first sensitivity analysis show that adding some substitution in demand between crops does not impact the baseline results for horticultural crops in a substantial way, but it does lead to some important differences in the effects in the grain market. Here the change in total revenue for grains is negative as is the change in total revenue for owners of the land input; the change in total revenue for grains is -1.85% and the change in total revenue to the owners of land supplying the grain market is -0.8%. Compared to the baseline results, the total revenue to owners of the other input supplying the grain market falls, but it remains positive. In the second sensitivity analysis the assumption of

fixed factor proportions is relaxed; this also impacts the results, and it has relatively important effects in the grain market. Here the results show that there is a small negative change in the total revenue for grain crops; the change in total revenue for horticultural crops remains close to that reported in the baseline results. In addition, the results in the second sensitivity analysis show that the total revenue is negative for all three input markets supplying the grain market. In reality, it is likely that there is some substitution between inputs in agriculture, and therefore the results from the second sensitivity analysis may be the most reflective of how an increase in labor supply will affect agricultural crop markets and the supporting input markets. In the third sensitivity analysis the change in total revenue for horticultural crops remains positive at 1.0% but is less than what was reported in the baseline results, and that the change in total revenue for grain crops is -3.3%. Again, the results show a negative change in total revenue for producers of all three inputs supplying the grain market.

Industry and policy implications

The U.S. Congress has engaged in a long history of political debate surrounding immigration policy, and agricultural interests have been actively involved in these discussions given their interest in finding a reliable and qualified supply of farm labor. The most recent changes in U.S. immigration policy, in 1986, introduced various reform measures but these did little to the way the guest worker program functioned. Since 1986, several legislative bills on immigration reform have been proposed, and in each case policy makers have spent considerable effort evaluating possible changes in the guest worker program. But the guest worker program that continues to exist employs a relatively small number of immigrants and, as a result, there are a significant number of unauthorized immigrants working in agriculture with a large share working on fruit and vegetable farms. Many stakeholders in U.S. horticultural industries have voiced

strong support for an expansion in the number of guest workers and have documented how labor shortages affect their businesses. However, support for an expanded guest worker program is not omnipresent within the larger immigration reform debate, and it appears that there is not even broad-based support for an expanded guest worker program across all agricultural industries.

Earlier research has largely found that an expansion in agricultural labor supply will benefit horticultural industries. There is less research examining how additional labor might affect non-horticultural industries, and very little research that examines the effects in the upstream markets. This research fills these voids by simulating the likely effects of an expanded guest worker program for producers of horticultural crops and grain crops, and for the factors of production that support these industries. We extend the model introduced in Becker (1983) and apply it in a series of simulation experiments to explore the conditions under which an expanded guest worker program may decrease welfare for grain producers or reduce welfare for the firms that supply inputs to the grain industry.

Three key findings emerge from the simulation results. First, an expansion in the agricultural labor supply does lead to disproportionally larger benefits to producers of horticultural crops and to the firms that supply inputs to the horticultural industry. Second, allowing for substitution between crops or between inputs has the capacity to generate negative economic effects for producers of grain crops and for firms that supply inputs to the grains industry; allowing substitution between crops or between inputs has relatively little impact on the effects in the horticultural markets. Third, of the three input markets included in the analysis, the labor market is most affected by a change in the supply of agricultural labor. Yet, relative to the baseline results, the markets for the land input and the other input are most affected once substitution is allowed between crops or between inputs. Overall, the simulated effects in the horticultural crop market and in the labor market are robust across the various models; the

simulated effects in the grain crop market and in the other input markets are most sensitive to the substitution parameters.

This research presents a careful analysis of how an expansion in the number of guest workers may affect producers of horticultural crops and grain crops, and the suppliers of inputs to the two crops. I employ a simple but novel framework to study these effects and to test the hypothesis that an expansion in the number of guest workers could lead to some negative effects within agricultural markets. The results show some evidence that an increase in the agricultural labor supply could decrease the production of grain crops and decrease the total revenue for producers of grain crops; it could also lead to decreases in the supply of inputs used to produce grain crops. These findings suggest that an expanded guest worker program will not necessarily be universally beneficial to all agricultural producers, and that there may be economic reasons for the reluctance of support for guest worker programs across agricultural industries. The debate on immigration reform in the United States involves many stakeholders beyond agriculture, and there certainly exist larger political economy issues in these negotiations. However, it appears that there may also be valid reasons for competition among pressure groups within agriculture for political support, and that increasing the agricultural labor supply is an issue that does not draw strong support from all agricultural industries. Although the lack of consensus within agriculture on this issue is not the primary impediment on immigration reform in the United States, it may be one of the contributing factors to the absence of any legislative action that would introduce changes to the guest worker program.

Endnotes

[1] The H-2 program was formally divided into two programs in 1986; the H-2A program is specific to agriculture and the H-2B program is used to fill non-farm jobs related to landscaping (for resorts, hotels, and golf courses).

[2] The agricultural organization that is most often associated with advocacy for immigration reform is the Agriculture Workforce Coalition (the member list for the Coalition can be found at http://www.agworkforcecoalition.org/about-awc/awc-members/).

[3] A few of the state-level policy publications were available online, and for those that were not available, I requested a copy via personal communication. I am missing data for nine states (that are not included in Figure 1) as they had strict policies that did not allow them to share their policy publication with non-members.

[4] The parent lobby organization only engaged in explicit policy preferences for immigration reform starting in 2013, and is now an active member of the Agriculture Workforce Coalition.

[5] Program crops are defined as crops for which federal support programs are available to producers, including wheat, corn, barley, grain sorghum, oats, extra-long staple and upland cotton, rice, oilseeds, peanuts, and sugar (USDA-ERS 2012).

[6] A larger agricultural labor supply may be utilized by employers in both crop and animal agriculture; however, because guest worker programs have traditionally been used to hire seasonal employees the analysis focuses on crop agriculture.

References

Alston, J.M., G.W. Norton, and P.G. Pardey. 1995. *Science Under Scarcity: Principles and Practice for Agricultural Research Evaluation and Priority Setting*. Ithaca, NY: Cornell University Press.

Barnett, B.J., and K.H. Coble. 2011. "Understanding regional differences in farm policy preferences." *American Journal of Agricultural Economics* 94(2): 528–534.

Basok, T. 2000. "He came, he saw, he … stayed. Guest worker programmes and the issue of non-return." *International Migration* 38(2): 215–238.

Becker, G.S. 1983. "A theory of competition among pressure groups for political influence." *Quarterly Journal of Economics* 98(3): 371–400.

Calvin, L., and P. Martin. 2010. "The U.S. produce industry and labor: Facing the future in a global economy." USDA-ERS, Washington, DC. Economic Research Report No. 106.

Castles, S. 2006. "Guestworkers in Europe: A resurrection?" *International Migration Review* 40(4): 741–766.

Chiswick, B.R. 1988. "Illegal immigration and immigration control." *Journal of Economic Perspectives* 2(3): 101–115.

Emerson, R.D. 2007. "Agricultural labor markets and immigration." *Choices* 22(1): 57–66.

Grossman, G.M., and E. Helpman. 2001. *Special Interest Politics*. Cambridge, MA: MIT Press.

Gunter, L.F., J.C. Jarrett, and J.A. Duffield. 1992. "Effect of U.S. immigration reform on labor-intensive agricultural commodities." *American Journal of Agricultural Economics* 74(4): 897–906.

Huang, K.S., and B.H. Lin. *Estimation of Food Demand and Nutrient Elasticities from Household Survey Data*. Technical Bulletin 1887. U.S. Department of Agriculture, Economic Research Service, Food and Rural Economic Division, 2000.

Kim, S.M. 2014. "Immigrations reform's other hurdle." *Politico*, February 5, 2014. Available at: http://www.politico.com/story/2014/02/immigration-reform-house-republicans-103182.html

Martin, P.L. 1994. "Good intentions gone awry: IRCA and U.S. Agriculture." *Annals of the American Academy of Political and Social Science* 534(1): 44–57.

Martin, P.L. 2002. "Mexican workers and U.S. agriculture: The revolving door." *International Migration Review* 36(4): 1124–1142.

Martin, P.L. 2013. "Immigration and farm labor: Policy options and consequences." *American Journal of Agricultural Economics* 95(2): 470–475.

Muth, R.F. 1964. "The derived demand curve for a productive factor and the industry supply curve." *Oxford Economic Papers* 16(2): 221–234.

Okrent, A.M., and J.M. Alston. *Demand for Food in the United States: A Review of the Literature, Evaluation of Previous Estimates and Presentation of New Estimates of Demand.* Berkeley, CA: Giannini Foundation of Agricultural Economics Monograph 48. 2011. Available at: http://giannini.ucop.edu/Monographs/48-FoodDemand.pdf

Passel, J.S., D. Cohn, and A. Gonzalez-Barrera. 2013. "Population Decline of Unauthorized Immigrants Stalls, May Have Reversed." Pew Research Center. Available at: http://www.pewhispanic.org/files/2013/09/Unauthorized-Sept-2013-FINAL.pdf

Reichert, J.S., and D.S. Massey. 1982. "Guestworker programs: Evidence from Europe and the United States and some implications for U.S. policy." *Population Research and Policy Review* 1(1): 1–17.

Sumner, D.A., H. Lee, and D.G. Hallstrom. 1999. "Implications of trade reform for agricultural markets in northeast Asia: A Korean example." *Agricultural Economics* 21(3): 309–322.

Thilmany, D.D. 1996. "FLC usage among California growers under IRCA: An empirical analysis of farm labor market risk management." *American Journal of Agricultural Economics* 78(4): 946–960.

United States Department of Agriculture, Economic Research Service (USDA-ERS). 2012. *Farm and Commodity Policy Glossary*. Available at: http://www.ers.usda.gov/topics/farm-economy/farm-commodity-policy/glossary.aspx

United States Department of Labor. 2005. "Findings from the National Agricultural Workers Survey (NAWS) 2001 – 2002: A demographic and employment profile of United States farm workers." U.S. Department of Labor, Office of the Assistant Secretary for Policy, Office of Programmatic Policy, Washington, DC. Research Report No. 9. Available at: http://www.doleta.gov/agworker/report9/naws_rpt9.pdf

Wong, L.T. 1984. "Canada's guestworkers: Some comparisons of temporary workers in Europe and North America." *International Migration Review* 18(1): 85–98.

Yamanaka, K. 1993. "New immigration policy and unskilled foreign workers in Japan." *Pacific Affairs* 66(1): 72–90.

Zahniser, S., T. Hertz, P. Dixon, and M. Rimmer. 2012. "The potential impact of changes in immigration policy on U.S. agriculture and the market for hired farm labor: A simulation analysis." USDA-ERS, Washington, DC. Economic Research Report No. 135.

Figure 1. Share of acreage devoted to program crops and attention given to labor issues by state-level lobbying efforts, 2012

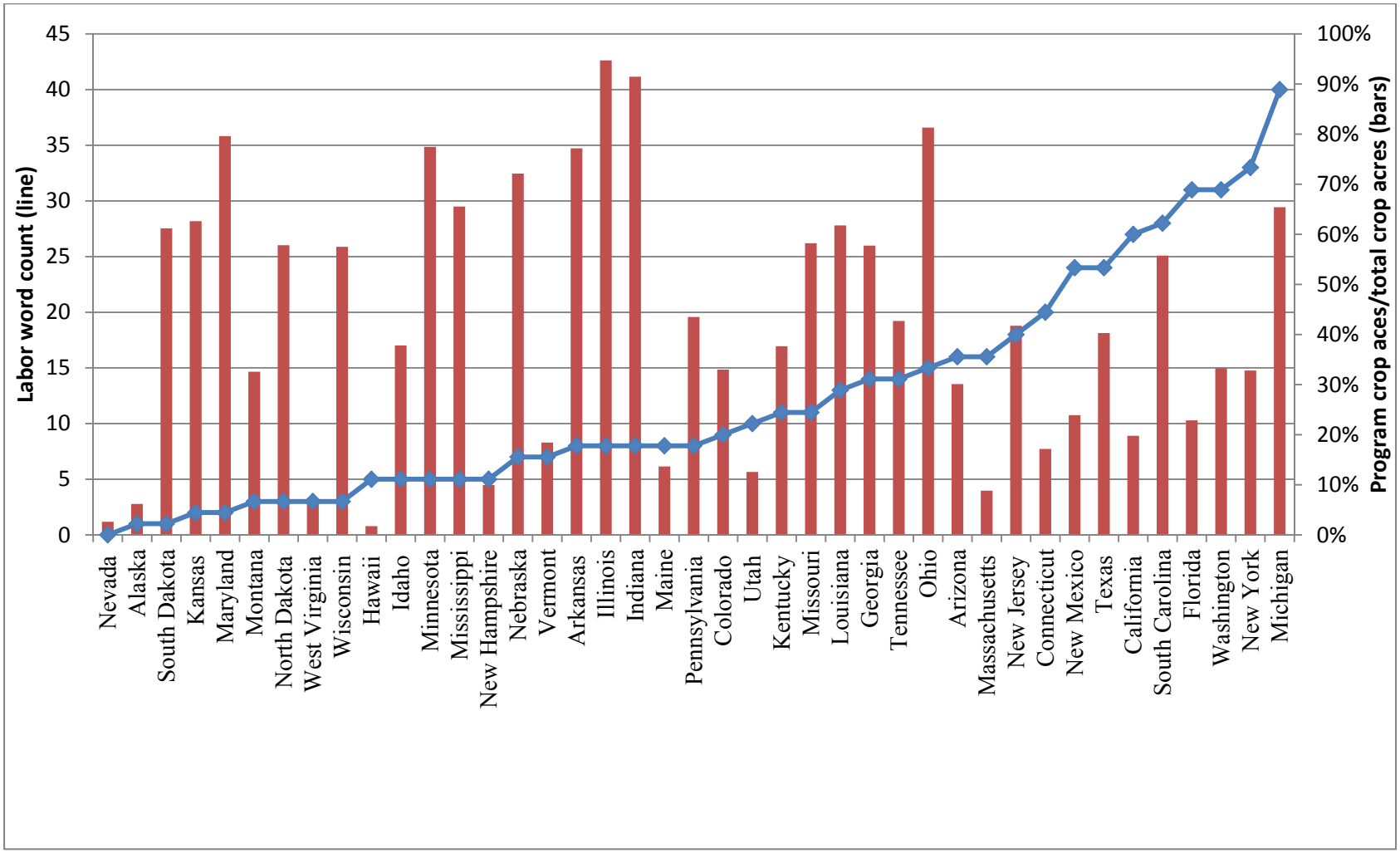

Table 1. Parameters used in the simulation model

Parameter description	Parameter Notation	Parameter values (alternative values shown in parentheses)	
		Horticultural crops	Grain crops
Demand elasticity			
Own price	η_{ii}	-1.2	-0.6
Cross price [a]	η_{ij}	0 (0.2)	0 (0.2)
Supply elasticity			
Labor	ε_l	0.2	0.2
Land	ε_d	0.2	0.2
Other inputs	ε_r	1.0	1.0
Input substitution elasticity [b]			
Labor/land	σ_{ld}	0 (1)	0 (1)
Labor/Other inputs	σ_{lr}	0 (1)	0 (1)
Land/Other inputs	σ_{dr}	0 (1)	0 (1)
Input cost shares			
Labor	γ_l	0.5	0.1
Land	γ_d	0.2	0.6
Other inputs	γ_r	0.3	0.3
Industry use shares			
Labor	λ_l	0.8	0.2
Land	λ_d	0.1	0.9
Other inputs	λ_r	0.3	0.7

[a] The baseline results are calculated with the cross price elasticities set equal to zero.

[b] The baseline results are calculated with all input substitution elasticites set equal to zero.

Table 2. Baseline simulation results for a 10% increase in labor supply

Simulated changes in:	Horticultural crops	Grain crops
	—Percentage changes—	
Crop markets		
Price	-6.98	0.70
Quantity	8.38	-0.42
Total Revenue	1.40	0.28
Input markets		
Labor		
Price	-16.89	-16.89
Quantity	8.38	-0.42
Total Revenue	-8.51	-17.31
Land		
Price	2.31	2.31
Quantity	8.38	-0.42
Total Revenue	10.69	1.89
Other inputs		
Price	3.33	3.33
Quantity	8.38	-0.42
Total Revenue	11.71	2.91

Table 3. Additional results for a 10% increase in labor supply under alternative parameter assumptions

Simulated changes in:	Including cross-price elasticities between crops[a]		Including input substitution elasticities between all inputs[b]		Including cross-price elasticities and input substitution elasticities[a,b]	
	Horticultural crops	Grain crops	Horticultural crops	Grain crops	Horticultural crops	Grain crops
	—Percentage changes—					
Crop markets						
Price	-7.41	-0.91	-7.34	-1.81	-8.80	-3.95
Quantity	8.71	-0.93	8.80	1.09	9.77	0.61
Total Revenue	1.30	-1.85	1.47	-0.73	0.97	-3.34
Input markets						
Labor						
Price	-16.10	-16.10	-14.47	-14.47	-15.96	-15.96
Quantity	8.71	-0.93	8.70	0.72	8.95	-1.75
Total Revenue	-7.39	-17.03	-5.77	-13.75	-7.01	-17.70
Land						
Price	0.15	0.15	-0.67	-0.67	-3.83	-3.83
Quantity	8.71	-0.93	1.60	-0.33	1.74	-1.04
Total Revenue	8.86	-0.79	0.93	-0.99	-2.09	-4.87
Other inputs						
Price	2.03	2.03	0.11	0.11	-0.20	-0.20
Quantity	8.71	-0.93	1.43	-0.76	1.03	-3.28
Total Revenue	10.74	1.09	1.54	-0.65	0.83	-3.48

[a] These results are calculated with the cross price elasticities set equal to 0.2.

[b] These results are calculated with all input substitution elasticites set equal to 1.0.

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