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The Immigrant Subsidy in US Agriculture: Farm Employment, Poverty, and Welfare

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FARM LABOR HAS ALWAYS been an uncomfortable topic in American history. The plight of farmworkers has been a leitmotiv of American literature for over a century. Books with the self-explanatory titles *The Grapes of Wrath*, *The Slaves We Rent*, and *Sweatshops in the Sun* pricked the nation's conscience with their descriptions of low farm wages and poor working conditions and emphasized that most farmworkers have not participated in the American dream of coming from a distant land and starting anew in the promised land. For most farmworkers, economic mobility has required geographic mobility. Only after farmworkers and their children leave the farm labor market do most have a chance to achieve middle-class lifestyles.

About 2.5 million individuals are employed sometime during a typical year on farms in the United States, including 800,000 in California. Most of these farmworkers—about two-thirds in the United States and over 90 percent in California—are immigrants. Despite labor-saving mechanization, the number of persons employed for wages on US farms has been stable over the past 25 years, largely because the production of hand-harvested fruits and vegetables has more than doubled. The United States is a net exporter of fruits and vegetables—for example, about 25 percent of the fresh fruit grown in the United States is exported—and American fruit and vegetable exports are projected to increase by over 5 percent annually for the next decade.

This article investigates a seemingly simple question: What are the consequences of importing immigrant farmworkers to harvest commodities, some of which are exported to the migrants' countries of origin, for the communities in which these workers settle? We focus on "farmworker communities"—cities of less than 20,000 that are often over 90 percent Hispanic, poor, and growing rapidly because of the immigration of young adults—scattered across California's 12 major agricultural counties. These 12 counties in 1993 had farm sales of over $12 billion, larger than the farm sales of any US state except California itself.

California's San Joaquin Valley, where most agriculture and many farmworker communities are located, is also one of the areas of the United States with the highest degree of poverty among immigrants. In 1990, the eight-county San Joaquin Valley included seven of the poorest 20 US cities, ranked by the percentage of foreign-born population living in concentrated poverty.[1]

Increasing sales of agricultural products exist side by side with poverty in rural America. This article examines the relationship between farm employment, immigration, poverty, and public assistance to determine whether the farm jobs that attract immigrants are creating externalities for the communities in which they settle and potentially for US cities to which immigrant farmworkers and their children may move.

In theory, these externalities may be positive or negative. The arrival of immigrants might stimulate job and wage growth. If local economic activities expand to meet immigrants' demands for transportation, housing, food, and other services, the demand for labor may shift outward, exerting new upward pressure on local employment and possibly wages but also triggering new rounds of immigration.

The distribution of direct and indirect expenditures associated with immigration is important. The employment and income generated by immigrant expenditures may accrue not to capital-poor immigrants, but instead to those with the physical and human capital necessary to meet farmworker service demands. These include labor contractors and foremen, whose main form of capital is networks of personal contacts with farmers who can provide jobs for immigrants; *raiteros*, local residents with vans who provide transportation services in many rural areas; local residents with rooms to rent to seasonal workers; and food, check cashing, and other service providers.[2]

In an agricultural sector characterized by a highly elastic immigrant labor supply, immigration is demand-driven; that is, one should observe a positive association between changes in farm employment and immigration. The association between immigration and poverty, however, is theoretically ambiguous. If a lack of capital prevents new immigrants from benefiting from the multiplier effects of farmworker incomes, income growth and increased poverty can occur simultaneously.

Previous research

Previous attempts to describe how immigrants affect local populations and economies can be framed by two extremes. One extreme argues that the presence of immigrant workers creates economies of scale and multiplier effects—the arrival of immigrants increases local economic activity and creates or preserves good jobs for local residents. This view characterizes much research done in the 1980s.

The other extreme, which dominates the immigration literature in the 1990s, argues that immigrants take over local jobs and freeze low wages into place, or that the continued arrival of unskilled immigrants transforms the economy of the destination area into something resembling the migrants' place of origin. In response, local workers who might have to compete with immigrants tend to move away.

Little worker displacement: The 1980s

Many studies in the 1980s concluded that immigrants do not have a negative impact, and in some cases have positive impacts, on employment and wages in the urban labor markets to which they move (i.e., in US Census Standard Metropolitan Statistical Areas, or SMSAs).[3] These findings generally support Michael Piore's (1979) argument that recent immigrants are concentrated in distinct labor-market segments. According to Piore,

> The jobs [immigrants take] tend to be unskilled, generally but not always low paying, and to carry or connote inferior social status; they often involve hard or unpleasant working conditions and considerable insecurity; they seldom offer chances of advancement toward better-paying, more attractive job opportunities. . . . (p. 17)

Immigrants, in other words, tend to complement native workers in production.

These studies use single-equation methods. They treat immigration as an exogenous independent variable and various indicators of economic outcomes as dependent variables. Most regress hourly or annual earnings and employment or weeks worked for different native-worker groups on the number of immigrants in local labor markets (SMSAs) and on other labor market indicators. Some disaggregate the total number of immigrants in the local labor market into distinct immigrant groups, for example recent (last five years) versus earlier immigrants (e.g., DeFritas 1988) and legal versus (a proxy for) undocumented immigrants (e.g., Bean, Lowell, and Taylor 1988). All have a common goal—to simulate a statistical experiment in which immigrants are randomly injected into a number of closed labor markets, so that coefficients relating immigration to earnings or employment indicators can be interpreted as the effects of immigrants

on native workers. A negative coefficient implies that immigrants and native workers are substitutes, while a positive coefficient implies that immigrants and natives are complements.[4]

Most empirical studies uncovered few statistically significant coefficients, reporting that immigrants had small estimated impacts in local labor markets. A typical finding is that a 10 percent increase in the immigrant labor force reduces hourly earnings by well under 5 percent. Borjas summarized the 1980s literature with the assertion that "modern econometrics cannot detect a single shred of evidence that immigrants have a sizable adverse impact on the earnings and employment opportunities of natives in the United States" (Borjas 1990: 81).

Migration and displacement: The 1990s

In the 1990s, evidence has begun to shift in favor of the view, inspired by neoclassical trade theory, that immigrants compete with at least some workers in local labor markets. Two important changes explain this shift. First, the 1980s assumption that immigrants are injected into a closed labor market was relaxed. If native workers respond to the arrival of immigrants by moving to labor markets less affected by immigrants, the outward shift in the labor supply will be reduced or eliminated, explaining why hourly earnings did not change with immigration. The composition of the workforce may change, instead.

White and Hunter (1993) and Filer (1992) find that the cities to which immigrants move have less native-worker inmigration, and more native outmigration, than metropolitan areas where immigrants do not cluster. Frey (1994) calls such native-born migration in response to immigration "the new white flight." The movement of native-born residents away from immigrant areas reduces the estimated effects of immigrants in such areas—"native mobility . . . dissipates the impact of immigration" (Borjas 1994).

The second 1990s shift in immigrant impact studies was the realization that the wages of many workers, including many of those thought to compete with immigrants, are largely immune to immigration. For example, the wages and earnings of federal, state, and local government employees (school teachers, postal employees, government bureaucrats), workers under national or regional collective bargaining agreements, and corporate managers may have little connection with local labor market conditions. For example, if a high percentage of African-Americans are employed in government, then estimates of the effects of unauthorized Mexican immigrants on the earnings of African-Americans may be biased because, while those who do not compete with immigrants remain, others move away.

In short, the most recent studies suggest that the consequences of immigration are complex, operating through indirect channels largely ignored by 1980s research (Isbister 1996). They imply that simultaneous-equation tech-

niques, rather than single-equation methods, should be used to explore immigration's impacts in local labor markets. However, they do not take the logical next step of employing such techniques for immigration-impacts analysis.

Farmworker communities

California has about 450 cities, including 65 rural *colonias*—independent towns and cities that are over 50 percent Hispanic. In the latter, sometimes referred to as "overgrown labor camps," a majority of residents were typically born abroad, and 25 to 50 percent of the families have incomes below federal poverty levels. Seven of California's ten poorest cities are farmworker towns.

Parlier, 20 miles southeast of Fresno, and some 300 miles from the Mexican border, is such a city. It had 10,000 residents in 1990, over 97 percent of them Hispanic. Half of the residents had immigrated since 1985 or are the children of recent immigrants. The city's economy is based on serving farmworkers, including those employed in nonfarm but agriculture-related industries such as packing and processing tree fruits and grapes. Parlier grew rapidly during the 1970s and 1980s as farmers eliminated on-farm housing for workers and farmworkers settled or stayed in Parlier while performing farm labor.

Provision of non-tradable services like housing, job contracting, transportation, and food to a large seasonal influx of farmworkers creates some income and employment for established residents, in a manner analogous to a tourist town. However, the poverty-level earnings of most farmworkers severely limit incomes in these immigrant service activities. Economic linkages between established residents and immigrants are also limited by the openness of small rural communities. Many of the goods demanded by farmworkers are tradables, often purchased in commercial centers located outside the towns that house the farm workforce. To the extent that the immigrants exert downward pressure on farmworker wages, landowners surrounding these communities also benefit. The best local jobs are held by those who have access to public funds to provide education, health, and other services to farmworkers.

Both the 1980s and 1990s models of immigrant impacts may be useful for characterizing the effects of immigration in agricultural localities of California such as Parlier. Most of the immigrants moving to agricultural areas have very low levels of education: few have completed eight years of schooling. These newcomers create markets for established, usually older immigrants, many of whom have some access to capital. The established immigrants provide newcomers with services such as housing, transportation, food, and job placement.

The farm operators who employ immigrant farmworkers typically do not live in farmworker colonias. In most cases, farm operators live in nearby

towns that have fewer than 50 percent Hispanic residents and fewer recently arrived immigrants.

Farm operators create farm jobs, and migration networks fill them. Migration networks are the informal systems that link rural California to rural Mexico, transmitting information on job availability and wages and often providing the funds migrants need in order to be smuggled into the United States and to obtain false documents. Seasonal farmwork is performed primarily by foreigners who have recently arrived in the United States through these networks—most have little human or other capital and few US job options.

Community studies provide evidence of competition between old, established migration networks (e.g., Mestizo, from central Mexico) and new networks (e.g., Mixtec, from southern Mexico) for more desirable, year-round jobs (Taylor, Martin, and Fix 1997). This competition often takes the form of rivalry between labor contractors for jobs—the labor contractor with a crew of indigenous Oaxacan workers, for instance, who underbids the contractor with Michoacan workers and wins the job of picking fruit (Taylor and Thilmany 1993).

Despite a stable demand for labor on California farms, real wages for California farmworkers have fallen since 1980 (Taylor and Martin 1995). Although real wages have also fallen for most unskilled American workers, farmworker benefits and working conditions have deteriorated disproportionately, as farmers shift from hiring workers directly to hiring them through labor contractors. For example, the shift to labor contractors often reduces take-home pay of migrant workers by 25 percent, from $200 weekly ($5 x 40 hours) to $150 or less after the worker pays for housing and rides to work; in the past, many farm employers housed migrant workers on their farms at no cost.

The mixture of positive income linkages for some groups and competition for low-wage, seasonal farm jobs among low-skilled immigrants describes the socioeconomic geography of rural California. It also highlights a distributional issue: the communities that house immigrant farmworkers often remain pockets of poverty even as the regions around these towns prosper.

Interactions between farm employment, immigration, and poverty

Taking the cue from recent immigration-impacts research, we propose a simultaneous-equation econometric approach to model immigration–employment–poverty–welfare use interactions in rural California. In this model, immigration is determined by, and in turn determines, key economic variables. Immigration to rural towns in California is treated as being elastic, its quantity determined by domestic demand variables. This assumption is not only required for our econometric analysis;[5] it is also realistic. Evidence

from village surveys in Mexico (Massey and Singer 1995), from INS border apprehensions data (INS 1996), and from US farm labor market studies (Martin et al. 1995) support the assumption that the supply of low-skilled laborers from Mexico is highly elastic.

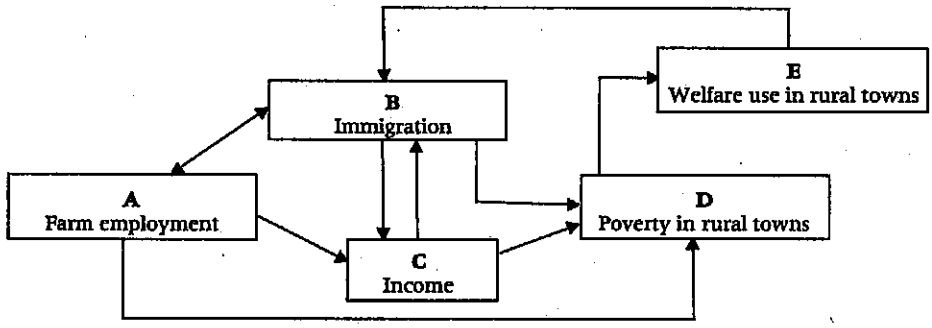
Our conceptual model is illustrated in Figure 1. Farm employment may influence immigration directly, through a labor-demand effect (pathway AB), and indirectly, by influencing incomes in rural towns (pathway ACB). In an economy where the supply of farmworker labor is highly elastic and in which few income opportunities outside agriculture are available to new arrivals, the direct effect can be expected to outweigh the indirect effect (see preceding section). Immigration, in turn, may stimulate farm employment by suppressing real wages for farmworkers and discouraging the adoption of labor-saving production practices (pathway BA).

Most farmworker families have incomes below the poverty line (US Department of Labor 1993); average annual farm earnings for farmworkers in California were $7,320 in 1990. Most immigrant farmworkers have few skills, with average schooling of only five years. The hypothesized link between farm employment and poverty is illustrated by pathway AD, and the link between immigration and poverty is illustrated by BD.

The possible associations between average income and poverty (pathway CD) are bracketed by two extremes. Income may be negatively associated with poverty if the benefits of local income growth reach the poor. It may be positively associated with poverty if local income growth results from the provision of services to poor farmworkers whose employment is outside the farmworker service economy.

The link between poverty and welfare use is depicted by pathway DE. If coverage of welfare services for the impoverished rural population is complete, there will be a nearly one-to-one correspondence between poverty and welfare use. Finally, if welfare income is a motivation for immigration (as discussed in Borjas 1994), then, controlling for poverty, welfare coverage may independently influence immigration. This possible effect is illustrated by pathway EB.

FIGURE 1 Illustration of the relationships between farm employment, immigration, poverty, and welfare use in rural towns



An econometric model

We used 1990 census data on immigration, poverty, and welfare use in 65 rural California towns containing a total population of 450,840 to test the hypothesis that labor-intensive agriculture, by attracting large numbers of unskilled foreign workers and offering many of them only poverty-level earnings, creates a negative welfare externality for the rural communities in which they settle. We test the farm employment–immigration–poverty–welfare use link by estimating a simultaneous-equation system, in which immigration, employment, and income are jointly determined and changes in poverty and welfare use in rural towns are endogenous outcomes.

Other things being equal, we expect higher average incomes to be associated with fewer poor residents. For example, if average income is just above the poverty line, any inequality in the income distribution implies some poverty. Controlling for average income, higher immigration and farm employment imply more poverty if immigrants and farmworkers are concentrated at the bottom of the income pyramid.

Income, immigration, and farm employment are specified as simultaneously determined. Most immigration models assume that immigrants are attracted to relatively high-income areas (e.g., Borjas 1987; Todaro 1980). Immigration positively affects incomes at immigrant destinations if it reduces labor constraints on growth, or if immigrant expenditures have multiplier effects in local economies. It stimulates farm employment, ceteris paribus, by exerting downward pressure on farm wages and other labor costs.

The variables in our model are described in Table 1. Our six-equation system is:

$$(1)\ \text{NPOV} = a_0 + a_1\text{*POP} + a_2\text{*MIG} + a_3\text{*FARMEMP} + a_4\text{*NFEMP} + a_5\text{*INCOME} + a_6\text{*NPOV80} + e_1$$

$$(2)\ \text{MIG} = b_0 + b_1\text{*FARMEMP} + b_2\text{*NFEMP} + b_3\text{*POP80} + b_4\text{*INCOME} + b_5\text{*NFOR80} + e_2$$

$$(3)\ \text{INCOME} = c_0 + g_1\text{*POP} + c_2\text{*MIG} + c_3\text{*FARMEMP} + c_4\text{*NFEMP} + c_5\text{*INCOME80} + e_3$$

$$(4)\ \text{WELFARE} = d_0 + d_1\text{*NPOV} + d_2\text{*POP} + d_3\text{*MIG} + d_4\text{*NKIDS} + d_5\text{*NOLD} + e_4$$

$$(5)\ \text{FARMEMP} = f_0 + f_1\text{*MIG} + f_2\text{*FARMEMP80} + f_3\text{*POP} + e_5$$

$$(6)\ \text{NFEMP} = g_0 + g_1\text{*MIG} + g_2\text{*NFEMP80} + g_3\text{*POP} + e_6$$

The parameters a_2 and a_3 in equation (1) represent changes in the number of residents in poverty associated with a one-person increase in immigration and in farm employment, respectively. Immigration (equation 2) and income (equation 3), in addition to being functions of each other, are af-

TABLE 1 Summary census statistics for variables included in the model: 65 rural towns in California, 1980–90

Variable	Definition	Mean	Standard deviation
POP	Total population, 1990	6,936	3,175
POP80	Total population, 1980	5,849	2,687
NKIDS	Population 15 years or younger, 1990	975	874
NOLD	Population 65 years or older, 1990	773	797
NFOR80	Number of foreign born, 1980	1,403	1,196
MIG	Change in number of foreign born, 1980–90	766	928
FARMEMP	Farm employment, 1990	787	567
FARMEMP80	Farm employment, 1980	673	474
NFEMP	Nonfarm employment, 1990	1,714	847
NFEMP80	Nonfarm employment, 1980	1,356	679
INCOME	Household income, 1990	$35,917	$13,585
INCOME80	Household income, 1980	$21,123	$7,894
NPOV	Number of people in poverty, 1990	1,960	1,768
NPOV80	Number of people in poverty, 1980	1,238	1,280
WELFARE	Population in households receiving welfare services, 1990	1,488	1,568

NOTE: The total population of the 65 communities included in the sample is 450,840.

fected by the structure of local labor markets (farm and nonfarm employment).

The parameters d_1 and d_3 in equation (4) are the effects of the population in poverty and the foreign-born population, respectively, on the number of people receiving welfare income. The first of these parameters can be viewed as representing welfare coverage in rural towns, and the second can test for an independent effect of immigration on rural welfare use, controlling for the influence of immigration on poverty and income.

In equation (5), the parameter f_1 represents the influence of immigration in the 1980s on farm employment, controlling for the initial (1980) farm employment level. Analogously, parameter g_1 in equation (6) depicts the effect of immigration on nonfarm employment. All six equations control for total population in 1990 (1980 in equation 2). The stochastic error terms e_k, k=1,...,6, are assumed to be distributed as approximately normal with 0 mean and a variance of σ_k^2, uncorrelated across observations but not necessarily across equations.

The system of equations (1) to (6) was estimated using three-stage least squares, exploiting the information contained in possible cross-equation error correlations in order to improve efficiency.

Data

The data used to estimate these equations are from the California Rural Community (CARUCOM) database, which we constructed from census tract–level data in the Urban Institute's underclass database (UDB) for census years 1980 and 1990.[6] To create the community database, we first extracted data on all census tracts in California's 12 major agricultural regions. Then, using census maps, we identified all tracts in rural towns with populations between 1,000 and 20,000 and with 8 percent or more of their employment principally in agriculture. This yielded a sample of 65 communities containing a total population of 450,840 in the counties of Fresno, Imperial, Kern, Kings, Madera, Merced, Monterey, Napa, San Joaquin, Stanislaus, Tulare, and Ventura.

Although there were some changes in census tracts between 1980 and 1990, the UDB uses a "comparability file" produced by the Census Bureau to reconfigure data from 1990 into the tract boundaries used in the 1980 census. This makes it possible to track changes in demographic and economic characteristics of the communities we have "constructed" from these census tracts over time.

Two caveats are in order. First, the census is conducted in April, whereas farmworker employment peaks in September. The peak-to-trough employment ratio is smaller in California, particularly in southern California, than in other parts of the United States, but the April census is likely to miss some foreign-born seasonal workers who return to their country of origin during the off season but reside in California rural communities the rest of the year. On the other hand, the census is more likely to enumerate migrant workers who are in Oregon or Washington in September but live in California during the off season. Second, as is well documented, the census undercounts unauthorized immigrants (Passel 1985; Passel and Woodrow 1984). Census data, therefore, are likely to provide a more reliable statistical portrait of settled native and foreign-born populations in rural areas than of transient farmworkers who swell rural town populations during peak labor seasons. Other studies (e.g., Borjas 1994) suggest that the incidence of poverty is greater but public assistance demands are lower for recent immigrants than for more settled and established immigrants. If this is correct, our results may understate correlations between farm employment and immigration, on the one hand, and poverty, on the other, while exaggerating the welfare implications of immigration and farm employment.

The census data provide a reliable representation of the population actually enumerated by the census, but they miss some residents. To the extent that recent immigrants missed by the 1990 census, once they settle in rural towns, resemble persons enumerated by the census with respect to migration patterns, employment, poverty, and welfare use, our findings should offer insights into their future impacts on rural towns.

Results

Summary statistics for the variables included in our model appear in Table 1. The 65 rural towns had an average population of 6,936 in 1990, of whom 1,960 (28 percent) were in impoverished households and 1,488 (21 percent) reported receiving welfare income. Immigration is proxied by the net change in foreign-born population during the 1980s. It averaged 766 persons, equivalent to 11 percent of the average 1990 town population. The average workforce of 2,501 was approximately one-third agricultural.

Table 2 reports simple correlations (r) between our six dependent variables. Poverty is highly correlated with welfare use (r = .97), with farm employment (r = .82), and with immigration (r = .75). Farm employment is also highly correlated with immigration (r = .71) and with welfare use (r = .73). Correlations between income and both poverty and welfare use are smaller (r = .54 and .65, respectively). The lowest welfare and poverty correlations are with nonfarm employment (r = .46 and .49, respectively), and the lowest correlation in the table is between farm employment and household income (r = .24).

Parameter estimates for the equation system represented by equations (1)–(6) are reported in Table 3. The columns in this table correspond to the dependent variables in the equations; the rows, to the explanatory variables. T-statistics appear in parentheses beneath each estimated parameter. The estimated coefficients in the table represent the effects of one-person increases in poverty, immigration, and employment. By multiplying these coefficients by 100, we can consider the effects of 100-person increases in these variables, which permits us to think in terms of numbers, rather than fractions, of people.

The poverty and immigration regressions (equations 1 and 2) reveal a significant positive relationship between farm employment and both im-

TABLE 2 Simple correlations between dependent variables

	Change in number of foreign born, 1980–90 (MIG)	Household income, 1990 (INCOME)	Population in households receiving welfare services, 1990 (WELFARE)	Farm employment, 1990 (FARMEMP)	Nonfarm employment, 1990 (NFEMP)
Number of people in poverty, 1990 (NPOV)	0.75	0.54	0.97	0.82	0.49
Change in number of foreign born, 1980–90 (MIG)		0.28	0.69	0.71	0.62
Household income, 1990 (INCOME)			0.65	0.24	0.24
Population in households receiving welfare services, 1990 (WELFARE)				0.73	0.46
Farm employment, 1990 (FARMEMP)					0.43

TABLE 3 Results of three-stage least squares regression for farm employment, poverty, immigration, and welfare use in rural towns

Variable	Equation (1) Number of people in poverty, 1990 (NPOV)	(2) Change in number of foreign born, 1980–90 (MIG)	(3) Household income, 1990 (INCOME)	(4) Population in households receiving welfare services, 1990 (WELFARE)	(5) Farm employment, 1990 (FARMEMP)	(6) Nonfarm employment, 1990 (NFEMP)
Number of people in poverty (NPOV, NPOV80)	0.85[a] (11.60)			0.57 (10.81)		
Change in number of foreign born, 1980–90 (MIG)	0.66 (6.49)		–0.70 (0.46)	–0.05 (0.74)	0.37 (6.39)	0.19 (–1.37)
Household income (INCOME, INCOME80)	5.28 (1.17)	6.65 (1.36)	1.64[a] (15.06)			
Total population (POP, POP80)	–0.03 (0.44)	–0.08[a] (2.02)	–0.51 (0.58)	–0.05 (2.83)	0.00 (0.10)	0.28 (6.08)
Number of foreign born, 1980 (NFOR80)		–0.17 (1.83)				
Farm employment (FARMEMP, FARMEMP80)	0.49 (3.38)	1.36 (9.13)	0.06 (0.03)		0.66[a] (8.95)	
Nonfarm employment (NFEMP, NFEMP80)	0.22 (1.44)	0.46 (5.03)	1.28 (0.60)			0.01[a] (0.06)
Population 15 years or younger, 1990 (NKIDS)				0.72 (5.65)		
Population 65 years or older, 1990 (NOLDS)				0.16 (1.88)		
Constant	–354.68 (1.77)	–628.56 (2.87)	3,202.6 (1.20)	–42.87 (0.47)	49.37 (0.52)	–73.17 (0.46)
R^2	0.96	0.67	0.82	0.98	0.79	0.76

NOTE: The total population of the 65 communities included in the sample is 450,840.
[a] Variable is for 1980; all others in row are for 1990.
Log likelihood: –2497.05
Chi-square (df): 382.66(23)

migration and poverty. The direct poverty impact of farm employment is both statistically significant and quantitatively large: a 100-person increase in farm employment is associated with a 49-person increase in the number of individuals in poverty.

This is only the direct effect, however. Indirectly, farm employment increases poverty by stimulating immigration. The immigration equation estimates lead us to reject easily the null hypothesis that immigration is not related to farm employment. Other things being equal, an additional 100 farm jobs are associated with a 136-person increase in immigration (significant at well below the .01 level). Immigration, in turn, has a direct, positive effect on poverty: a 100-person increase in foreign-born population in rural California towns is associated with a 66-person increase in the

population living in impoverished households (also significant at the .01 level). The positive effect of farm employment on immigration, combined with a positive effect of immigration on poverty, results in an indirect effect of farm employment on poverty that exceeds the direct effect. An additional 100 farm jobs add 90 more individuals to the poverty roles indirectly, through immigration. Summing direct and indirect effects, 100 additional farm jobs result in a 139-person increase in poverty in rural California towns.

The farm employment–immigration link is circular: farm employment draws immigrants to rural towns, and, in turn, immigration stimulates the creation of new farm jobs. Other things being equal, a 100-person increase in foreign-born population is associated with a 37-person increase in farm employment. This circular relationship between farm employment and immigration produces additional adverse effects on rural poverty over time.

Controlling for employment and immigration, the incidence of poverty in rural California towns is not significantly related to total town population. Not surprisingly, however, it is strongly associated with poverty in the previous (1980) census year.

Employment drove immigration into rural California towns in the 1980s. In addition to being stimulated by farm employment, immigration was also positively and significantly stimulated by nonfarm employment, although the immigration effect of nonfarm employment (46 immigrants per 100 nonfarm jobs) is much smaller than that of farm employment. In the 1980s, immigrants significantly avoided rural towns with large populations and, remarkably, they also avoided towns where the largest numbers of foreign-born people lived at the beginning of the decade. Other things being equal, a 100-person increase in town population was associated with an 8-person decrease in immigrants, and a 100-person increase in the number of foreign-born living in a town in 1980 was associated with a 17-person decrease in immigration during the 1980s.

The positive effect on new migration exerted by migration networks or by contacts with people who have previously migrated is well documented in the literature, especially for North America (e.g., see Massey et al. 1994). The findings just presented do not necessarily contradict earlier findings about the role of networks in promoting migration. Migration networks, in general, are individual, household, or community specific. If immigrants' places of origin change over time, new networks will evolve to channel immigrants into new destinations. It would not be surprising, for example, to see recent Mixtecs from the southwestern Mexican state of Oaxaca settling outside the towns where past waves of European or Mestizo Mexican immigrants settled. The ethnic reconfiguration of the Mexican-origin workforce in rural California is well documented (e.g., Taylor, Martin, and Fix 1997). It should also be recalled that in the past, many immigrant farmworkers lived in farmer-provided housing, rather than in rural towns and cities.

Income growth in itself is not an effective way of alleviating poverty in rural towns. The estimated association between average family income and poverty is not statistically significant. This finding supports the argument that income growth in rural California towns bypasses the poor, and it is consistent with the argument that the economic welfare of many established residents is structurally linked to poverty, such as by providing services to poor farmworkers. Controlling for employment, average income does not significantly explain immigration (equation 2) nor vice versa (equation 3). The direct effect of farm employment on average income in rural towns is not significantly different from zero.

Many poor rural residents do not obtain public assistance. Other things being equal, a 100-person increase in poor residents is associated with a 57-person increase in the number of welfare recipients (significant at well below the 0.01 level). Controlling for poverty incidence, immigration is not significantly related to welfare use. This latter finding casts doubt on the public perception that the prospect of receiving welfare assistance is a primary motive for immigration. The farm employment–immigration–welfare use link operates entirely through the poverty variable: a 100-person increase in farm employment increases the number of persons in households receiving welfare income by 79.[7] Controlling for poverty incidence, population size is negatively related to welfare coverage. However, the presence of children and elderly household members significantly increases public assistance demands.[8]

In the census, households were asked to report the amount of cash assistance they received. This makes it possible to estimate the marginal dollar impact of farm employment on public income assistance. The average amount of cash assistance reported by welfare-receiving households in these 65 rural towns in 1989 was $6,126. There are no data on the size of welfare-receiving households in the CARUCOM database, but if the average size of welfare-receiving households is the same as the average size of all households (4.4 persons), the average per capita welfare payment was $1,392. Multiplying this per capita cash assistance by the marginal effect of farm jobs on welfare incidence, we obtain a welfare cost of each additional farm job as equal to $1,103. Average annual earnings for farmworkers in California in 1990 were $7,320, which means that each farm job was associated with a cash assistance payment equivalent to 15 percent of average farm earnings (US Department of Labor 1993: 36–37).

This implicit welfare subsidy for farm employment understates the full marginal impact of farm employment on public expenditures aimed at alleviating poverty. Nationwide, about 7 percent of households headed by native-born persons and 9 percent of households headed by foreign-born persons reported receiving cash assistance in the 1990 census. An analysis of 1990 Survey of Income and Program Participation (SIPP) data by Borjas (1994) indicates that, in California, about 14 percent of households headed

by a native-born person and 40 percent of households headed by a foreign-born person received federal in-kind benefits such as Medicaid and food stamps.

In addition to cash assistance and in-kind benefits, migrant and seasonal farmworkers (MSFW) and their dependents are eligible for benefits under 13 targeted programs that provide education, training, and health services. In the early 1990s, the federal government spent about $600 million annually on MSFW assistance programs, equivalent to about 10 percent of what MSFWs in the United States earn each year (Martin and Martin 1994). These assistance programs provide many of the "good jobs" in rural towns.

One might argue that because the marginal farm job is filled by a recently arrived immigrant and recent immigrants are below-average users of cash and in-kind assistance, the welfare effect of farm employment may be lower than reported above, at least in the short run. However, the increase in public assistance is not due primarily to newly arrived farmworkers obtaining cash assistance, but rather to poor settled and eligible immigrants receiving such assistance. This is the employment–immigration–welfare use link illuminated by our regression analysis. The estimated effects of farm employment on welfare services leave little doubt that the farm employment–immigration–welfare use link is significant, both statistically and quantitatively. And if recent immigrants integrate and take on the characteristics of the settled population, these estimates may foreshadow the medium-to-long-run social costs of new immigration to support the expansion of labor-intensive agriculture.

One might also argue that these estimates overstate the welfare costs of immigrant labor because the immigrant farmworkers pay taxes. Immigrant farmworkers have low earnings and many do not file tax returns; those who do would be more likely to obtain Earned Income Tax Credits than to owe taxes.[9] Farm employers are supposed to deduct and match each worker's social security tax, as well as make appropriate contributions for unemployment insurance and workers' compensation, but neglect of this obligation is widespread.

Conclusions and policy implications

Labor-intensive agriculture, by attracting immigrant workers and offering many of them only poverty-level earnings, creates a negative externality in rural towns: the cost of meeting the public service needs of farmworkers whose paychecks cannot support them. Across "farmworker communities" in 1990, there is a positive farm employment–immigration–poverty–welfare use link that is both statistically and quantitatively significant. Income growth in itself is not an effective way to alleviate poverty in rural California towns, since the benefits of income growth bypass the rural poor.

The expansion of farm employment raises the real incomes of some Americans. It also generates poverty, thereby widening the gap between rich and poor and generating an external cost that must be borne by the society as a whole in the form of increased welfare services. Our analysis found no significant direct effect of immigration on welfare use. All of immigration's impacts on rural welfare use are indirect, through the interactions between farm employment, immigration, and poverty.

A simultaneous-equation model is essential for uncovering the complex relationships between farm employment, immigration, and poverty. Flat or declining real wages resulting from a highly elastic supply of immigrant labor create an incentive for farmers to expand production of labor-intensive specialty crops. Increased production, in turn, stimulates immigration, creating a vicious circle of poverty and public assistance and leading to a patchwork of prosperous farms and impoverished farmworker towns in rural areas. In research on immigration's impacts, immigration must be treated also as a dependent variable in an interactive system.

An unusual aspect of the poverty externality associated with labor-intensive agriculture in California is that, from the immigrant workers' point of view, it is almost certainly Pareto optimal, reflecting the prevailing question-and-answer in rural Mexico: "What is worse than being exploited in California agriculture? Not being exploited in California agriculture." California's farm workforce and new additions to the United States farm workforce are comprised almost entirely of immigrants, for whom seasonal US farm earnings are preferred to not migrating to the United States.

Three broad policy options are available for breaking the farm employment–immigration–poverty–welfare use cycle. The first option is to reduce the supply of immigrant labor by stepping up border and interior enforcement. This is the strategy of the Clinton administration and the Congress, reflected in more border patrol agents, new fencing, lighting, and detection technology along the border, and a doubling of the number of workplace inspectors.

Can increased enforcement reduce the supply of immigrant workers? Apprehensions were 40 percent higher in 1995 than in 1994, and they were higher in 1996 than they were in 1995. Even so, neither the presumably greater risk of being apprehended nor higher smuggling fees paid by immigrants had, as of late 1997, deterred enough entrants to produce credible complaints of farm labor shortages or evidence of rising wages. Indeed, the major complaint of most unauthorized farmworkers in the raisin harvest in fall 1995 was that the time required to cross the border had risen—a week of work might be lost in making two or three crossing attempts.[10] The reservation wage in rural Mexico is so low, however, that longer border-crossing waits do not deter most migrants.

A second policy response would be to promote economic development in migrant-supplying areas, particularly in Mexico, in an effort to

reduce the supply elasticity of immigrant labor. US assistance in that endeavor could be justified on the grounds that failure to address the problems of unemployment and poverty in rural Mexico may mean having to address these problems in the rural United States.

Nearly one-fourth of Mexico's 30 million workers are dependent on agriculture, and many of these 6 to 7 million farmers and farmworkers have little hope of achieving even the $3,000 annual average per capita Mexican income. Migration within Mexico and to the United States is an integral part of the income-earning strategies of many rural Mexicans (Taylor 1987). There is general agreement that events in Mexico in the 1990s, especially since the December 1994 peso devaluation, are encouraging Mexicans to "go north" in search of opportunity, either in the expanding factories in Mexican border areas or in the United States. Opportunities in rural America at a time when Mexico appears poised to undergo a period of "Great Migration" promise to accelerate the "Latinization of rural America."

A third response would be to develop policies to internalize the social costs of labor-intensive agriculture; that is, make US farmers and consumers responsible for more of the costs associated with seasonal farmwork. In theory, a head tax on farm labor, similar to a Pigovian tax, could be used to compensate for the negative externality created by poorly paid, seasonal farm jobs, encouraging farm employers to offer more stable employment to a smaller "core" farm workforce.

Since the supply of US workers to seasonal farm jobs is probably inelastic, most of the adjustments to such a tax would be on the demand side. Indeed, most of the increases in labor productivity in American agriculture have come from labor-saving technologies and management practices.

A Pigovian tax on seasonal farm employment could take many forms. Most farmers no longer house seasonal farmworkers, so that many workers pay $30 to $40 per week for housing in the backyards of rural farmworker towns, or *colonias*, and then pay $4 to $6 daily for rides to the fields. In addition, many workers pay to have checks cashed, and they face above competitive market prices for meals and food from the local businesses that cater to them.

The divorce of farm operators and packer-shippers from the seasonal farm labor force means that farmworkers not lucky enough to reside in public facilities typically spend 25 to 35 percent of their wages on services that were in the past provided by growers at little or no cost. Ways to reestablish the link between workers and the beneficiaries of their labor include requiring farm employers to provide or pay for housing, levying fees on selected agricultural commodities as they are sold to cover the costs of housing and other services, or raising minimum wages enough—or reducing seasonality enough—so that farmworkers can afford to obtain adequate housing without subsidies.

In a labor-surplus environment, such as the one characterizing US agriculture in the 1980s and 1990s (Martin et al. 1995), policies to internalize the social costs of low-wage agriculture would be difficult to implement. For example, introducing a tax on employment without making other changes in the farm labor market would probably accelerate the shift away from direct hiring toward the use of difficult-to-regulate labor market intermediaries (Martin and Taylor 1991; Taylor and Thilmany 1993).

Although the ingredients of a policy initiative to address immigration–poverty–welfare use linkages in rural areas are known, both the optimal policy mix and the political will to implement it effectively are lacking. However, the "corner solutions" of focusing on border enforcement at the one extreme, and permitting easy entry in the hope that immigrants can pull themselves up by their bootstraps at the other extreme, are almost certainly not the answer to America's new rural poverty.

Notes

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1 The Urban Institute's definition of concentrated poverty is neighborhoods (census tracts) where 40 percent or more of all residents have below poverty-level incomes.

2 The incentives to employ all available capital to supply services to seasonal farmworkers in impoverished towns are strong. In California's Coachella Valley, we observed a small market renting spaces in its parking lot to migrant workers for a nightly fee. The city ultimately required the owners of the market to place portable toilets in its parking lot during the peak farm labor months.

3 Examples of such studies include Borjas (1984, 1990); DeFritas (1988); Altonji and Card (1991); Bean, Lowell, and Taylor (1988); LaLonde and Topel (1991); Grossman (1982); Muller and Espenshade (1985); Winegarden and Khor (1991); Simon, Moore, and Sullivan (1993); Card (1990); Butcher and Card (1991); Vroman and Worden (1992); Fix and Passel (1994).

4 The finding that native-worker earnings are positively related to immigration may indicate complementarity between the two labor groups in specific production activities or it may reflect the creation of employment for native workers through immigrants' demand for goods and services.

5 US census data do not provide information on immigrants' place of origin.

6 The CARUCOM database was created as a part of the Changing Face of Rural America project. The data can be found on the home page of the monthly newsletter *Rural Migration News*, at http://migration.ucdavis.edu. The database provides city planners and researchers access to census data on rural California communities. Census tracts, typically containing 2,500 to 8,000 residents, approximate large neighborhoods—they tend to contain groups of residents with similar social characteristics, economic status, and housing conditions. The rural towns included in this study typically were comprised of one to three census tracts in 1990.

7 This is the estimated effect of a 100-person increase in farm employment on poverty (139, from equations 1–3) multiplied by the effect of poverty incidence on welfare use (0.57, from equation 4).

8 At a reviewer's suggestion, we experimented with alternative specifications of the model, including the elimination of the income equation, whose only significant coefficient was base-year (1980) income. The findings reported in Table 3 are remarkably robust to the model specification. For example, substituting the income equation out of the model (i.e., omitting the income equation and replacing 1990 income with 1980 income in the poverty and migration equations) did not change any of our findings qualitatively, and the quantitative changes in estimated coefficients were not large. The effect of migration on poverty decreased, from .66 to .60; the effect of farm employment on poverty increased from .49 to .53; and the effects of farm and nonfarm employment on migration decreased from 1.36 to 1.31 and from .46 to .45, respectively.

9 Low earners received $21 billion in EITC benefits in 1995. Poor people with earnings report their earnings on their tax forms, and the government mails them a check for up to 40 percent of their earnings. For example, a family with two or more children and earnings of up to $8,890 can receive up to $3,556 in EITC payments.

10 Some 50,000 individuals are employed to harvest acres of raisin grapes for four to six weeks around Fresno, California each August–September, the single most labor-intensive activity in North America.

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