

**Farm Employment, Immigration, and Poverty:
A Vicious Circle?**

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Abstract

This paper examines the interrelationship between farm employment and immigration and the implications for poverty and welfare use. A simultaneous-equation model is estimated with data from a national random sample of census tracts for the 1970, 1980 and 1990 census years. The findings reveal a circular relationship between immigration and farm employment that reduced both poverty and welfare use during the 1970s, but this virtuous circle was reversed in the 1980s, when more farm jobs were associated with more immigration as well as more poverty and welfare. As immigrants spread through out rural America, virtuous circles may turn into vicious circles, creating a new rural poverty that could be difficult to extirpate.

Introduction

Is the United States re-creating rural poverty by importing immigrants to fill seasonal agricultural jobs? Fruit and vegetable production has been expanding, and its dependence on hired farm workers has been increasing (Huffman, 1999, 10). The National Agricultural Worker Survey (NAWS) found that about 80 percent of hired farm workers in the mid-1990s had farm earnings of less than \$10,000 per year--half had farm earnings of less than \$5,000 (Mines, Gabbard, and Steirman, 1997). About 80 percent of crop workers were foreign born, and 60 percent of farm worker households had incomes below the poverty line.

California has led the United States in farm sales since 1950, largely because of the expansion of high value fruit, vegetable, and horticultural (FVH) production. There, more than 90 percent of the 800,000 to 900,000 workers hired for wages sometime during the year on farms were born abroad, most in Mexico (Mines, Gabbard, and Steirman, 1997). The San Joaquin Valley, where most of California's farm activity is concentrated, contained 7 of the 20 poorest U.S. cities, ranked by the percentage of foreign-born population living in what is termed "concentrated poverty."¹ Fresno county, in the heart of the valley, leads US

counties in farm sales – its \$3.3 billion in farm sales in 1998 exceeds the farm sales of half the states. However, over 25 percent of Fresno county's almost 800,000 residents had incomes low enough to be eligible for subsidized health care and MediCal, and over 12 percent received AFDC/TANF cash assistance (compared with 6.5 percent for California). Unemployment in Fresno county averaged 12 percent (versus 6 percent for the state), yet farmers complained of labor shortages (Martin and Nyberg, 1999). A combination of little education, low earnings from seasonal farm employment, and large households gave residents of the San Joaquin Valley who were born in Mexico and entered the United States during the 1980s incomes per person of \$3,700 in 1990, about the same as the per capita income of Mexico (but higher than the per-capita income of *rural* Mexico, where most of these immigrants originate).²

Fruit, vegetable and horticultural (FVH) production and exports represent one of the fastest growing segments of U.S. agriculture, keeping overall hired worker employment stable despite continued mechanization.³ As FVH production increases and newly arrived immigrants replace those who leave for better US jobs or return to Mexico, the presence of foreign-born farm workers becomes more pronounced (Perloff, Lynch, Gabbard). In this manner, FVH expansion and worker turnover help to "change the face" of rural America. The National Agricultural Worker Survey (NAWS) found that the percentage of U.S.

farm workers who were foreign born increased from 62 percent in 1989-90 to 82 percent in 1998-99. More striking, the NAWS reported that the percentage of unauthorized workers rose from 19 percent in 1989-90, three years after the implementation of the Special Agricultural Worker (SAW) farm worker legalization program, to 52 percent in 1998-99.

This paper tests the hypothesis that labor-intensive FVH production was associated with increases in both immigration and poverty in rural U.S. communities in the 1970-80 and 1980-90 periods. Part I presents a theoretical model of poverty-farm employment-immigration interactions. It provides the basis for econometrically estimating these interactions, using data at the census tract-level from the 1970, 1980, and 1990 U.S. population censuses. Our findings point to a positive farm employment-poverty interaction during the 1980s reversing the expected negative relationship of 1970 to 1980, when more farm employment was associated with less poverty. Our policy conclusions appear in Part III.

I

Theoretical Considerations

Two very different approaches have been developed to model the impacts of immigration on local economies. One argues that the arrival of immigrants increases local economic activity and creates or preserves good jobs for local residents by creating economies of scale and multiplier effects. Using single-equation models and census data from U.S. metropolitan areas, a number of studies in the 1980s concluded that immigrants have few wage-depressing or unemployment-increasing effects in local labor markets. Instead, more immigrants were found to have positive impacts on employment and wages in the urban labor markets they entered (Borjas (1990, 1984); DeFritas; Altonji and Card; Bean, Lowell, and Taylor; LaLonde and Topel; Grossman; Muller and Espenshade; Winegarden and Khor; Simon, More and Sullivan; Card; Butcher and Card; Vroman and Worden; Fix and Passel).

The other extreme, inspired by neoclassical trade theory, argues that immigrants compete with at least some workers in local labor markets, and that native workers respond to the arrival of immigrants by moving to less immigrant-impacted labor markets. "White flight" from immigrant-impacted labor markets reduces or eliminates the outward shift in the labor supply that results from immigration, diffusing migration's impacts across labor markets and biasing the estimated effects of immigrants on local employment and wages (Frey, White and Hunter, Filer, Borjas, (1994)).

More recent studies suggest that the impacts of immigration are more complex, operating through indirect channels largely ignored by 1980s research (Borjas (1994), Taylor and Martin). New research suggests that simultaneous-equation techniques, rather than single-equation methods, should be used to explore immigration's impacts in local labor markets. For example, employment may influence immigration through a labor-demand effect (Todaro). The arrival of new workers into local labor markets, in turn, may stimulate employment by suppressing real wages for local workers and discouraging the adoption of labor-saving production practices, or alternatively, by creating positive employment linkages. Greenwood and Hunt found positive employment multipliers resulting from U.S. interstate migration between 1970 and 1980. However, there has been no effort in the literature to estimate the simultaneous relationship between farm employment, on one hand, and immigration, on the other, in the United States.⁴

Farm employment may influence poverty directly and indirectly. As the number of farm jobs increases, immigrants are attracted to fill them (over 90 percent of the new entrants into the hired farm work force are foreign born). The additional jobs may reduce poverty if farm worker earnings are above the poverty line and the local income multipliers associated with farm jobs and

immigration are large. However, immigration may increase the number of poor residents if most farm workers have below-poverty level incomes, farm employment stimulates additional immigration, and farm employment and immigration create few local income growth linkages.

Theoretical Model

A number of poverty measures have been used in empirical research (e.g., see Foster, Greer and Thorbecke and Sen). The simplest, and the one used most by policy makers, is a headcount measure:

$$(1) \quad POV = \sum_{n=1}^N \theta(Y_n, \bar{Y}_{POV})$$

where Y_n is household income, \bar{Y}_{POV} is the policy-determined poverty line (\$16,000 for a family of four in 1997), and θ is an indicator function equaling 1 if household income is less than the poverty line and 0 otherwise.

Household income is a function of the wage (w), employment (E), and other exogenous variables (X_Y):

$$(2) \quad Y_n = f(w, E, X_Y)$$

In rural communities where unemployment is high, observed employment is less than labor supply and w is not a market-clearing wage. Generally,

$$(3) \quad w = w(E, L_S)$$

where L_S denotes labor supply. The NAWS findings indicate that, while some of the agricultural work force consists of native-born workers and settled immigrants, most new additions to this work force are foreign-born. Thus,

$$(4) \quad L_S = L_S(w, MIG, X_S)$$

where MIG denotes (new) immigration and X_S represents other influences on labor supply, including the non-recent-immigrant economically-active population.

Most immigrants in the US farm work force originate from Mexico (NAWS). Immigration is a function of expected earnings differences between

origin (Y_{MEX}) and destination as well as migration costs (C), including both cash and effort required to cross the border:

$$(5) \quad MIG = MIG(Y, Y_{MEX}, C)$$

Migration costs depend critically on U.S. border enforcement and information about migrant destinations that can be provided by earlier immigrant arrivals (Massey, et al.).

Following standard producer theory, employment, or labor demand, is a function of wages, prices (P), and other inputs (X_E):

$$(6) \quad E = E(w, P, X_E)$$

Substituting for w , L_S , and Y in equations (1)-(6), we obtain:

$$(7) \quad POV = \theta_p(E, MIG, X_S, X_Y, X_{POV})$$

$$(8) \quad MIG = \theta_{MIG}(E, X_S, X_{MIG}, X_Y)$$

$$(9) \quad E = \theta_E(MIG, X_S, X_E, P)$$

where X_{MIG} is a vector of exogenous variables shaping migration costs and X_{POV} denotes exogenous variables influencing measured poverty, including determination of household-specific poverty lines. Total employment, E , includes both farm (E_{F}) and non-farm employment. We are focusing on immigration-poverty-farm employment interactions, and we define equation (9) for farm employment and use total employment in the previous census year as a proxy for total employment (see below).

Welfare coverage of the poor is incomplete, particularly in communities with recently arrived immigrants who do not qualify for benefits. The number of people living in households with welfare income (W) is thus a function of poverty and of other, intervening variables (X_{W}) influencing welfare demand and availability, including population size and age composition and possibly immigration:

$$(10) \quad W = \theta_{\text{W}}(\text{POV}, X_{\text{W}})$$

Equations (7) through (10) correspond to our econometric model. The endogenous variables are: POV , the number of people in the census tract residing in households with income below the poverty line; W , the number of people in

households receiving welfare income; MIG, the change in the number of foreign-born persons residing in the census tract since the last decennial census;⁵ and E_F , the number of people employed in farm jobs. The vectors of exogenous variables X_{POV} , X_{MIG} , X_S , X_E , and X_W include variables hypothesized to influence POV, MIG, L_S , E_F , and W , respectively. They also include a number of lagged variables used to identify the equation system. X_S includes the total labor-market size (E_{t-1}) and total population (POP_{t-1}) in the previous census year as proxies for labor supply not associated with changes in foreign-born population. These appear as explanatory variables in the equations for poverty, migration, and farm employment (equations 7, 8 and 9). X_Y , other variables influencing household incomes, are proxied by lagged average household income (Y_{t-1} ; equations 7 and 8).

Measured poverty in the previous census year (POV_{t-1}) is used as a proxy for variables influencing measured tract-level poverty, X_{POV} . In consideration of the importance of migration networks or family contacts at migrant destinations in shaping migration costs, X_{MIG} includes the number of foreign-born residents in the census tract in the previous census year ($NFOR_{t-1}$). It also includes a measure of distance (D) between the census tract and Mexico, the largest source of immigrants, particularly to fill farm and low-skilled non-farm jobs (Binational Study, 1997). The number of people in households receiving welfare income in

the previous census year is used as a proxy for factors influencing welfare coverage of the local impoverished population. The vector X_W also includes the number of children (15 years or younger) and elderly (older than 65) resident in the tract. All equations control for the census tract's degree of urbanization by including a dummy variable (CENCITY) equal to 1 if the census tract is urban and 0 otherwise. The complete equation system is:

$$(11) \quad \text{POV} = a_0 + a_1 \cdot \text{POP}_{t-1} + a_2 \cdot \text{MIG} + a_3 \cdot E_F + a_4 \cdot E_{t-1} + a_5 \cdot Y_{t-1} + a_6 \cdot \text{POV}_{t-1} \\ + \\ a_7 \cdot \text{CENCITY} + \varepsilon_1$$

$$(12) \quad \text{MIG} = b_0 + b_1 \cdot E_F + b_2 \cdot E_{t-1} + b_3 \cdot \text{POP}_{t-1} + b_4 \cdot Y_{t-1} + b_5 \cdot \text{NFOR}_{t-1} + \\ b_6 \cdot D + b_7 \cdot \text{CENCITY} + \varepsilon_2$$

$$(13) \quad W = c_0 + c_1 \cdot \text{POV} + c_2 \cdot \text{POP}_{t-1} + c_3 \cdot \text{MIG} + c_4 \cdot \text{NKIDS} + c_5 \cdot \text{NOLD} + \\ c_6 \cdot \text{CENCITY} + \varepsilon_3$$

$$(14) \quad E_F = d_0 + d_1 \cdot \text{MIG} + d_2 \cdot \text{POP}_{t-1} + d_3 \cdot E_{F,t-1} + d_4 \cdot E_{t-1} + d_5 \cdot \text{CENCITY} + \\ \varepsilon_4$$

The parameters a_2 and a_3 in equation [11] represent changes in the number of residents in poverty associated with a one-person increase in immigration and farm employment, respectively. The influence of additional farm jobs on immigration (equation [12]) is captured by the parameter b_1 . The parameters c_1 and c_3 in Equation [13] represent the effects of the number of poor residents and the foreign-born population, respectively, on the number of people receiving welfare assistance. The first of these parameters can be viewed as representing welfare coverage in census tracts, and parameter c_3 measures the independent effect of immigration on welfare demand, controlling for the influence of immigration on poverty, as implied by Borjas (1995). In equation [14], the parameter d_1 represents the influence of immigration on farm employment, controlling for initial employment levels. The stochastic error terms ε_k , $k=1,\dots,4$, 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. Equations [11] - [14] were estimated using iterative three-stage least squares, exploiting the information contained in possible cross-equation error correlations in order to improve efficiency.

Data

The data to estimate the econometric model are from a 10-percent random sample of census tracts drawn from the Urban Institute's Under Class Data Base

(UDB) for the 1970, 1980, and 1990 census years. The UDB is the richest source of data on poverty and other variables available at the census tract level. Census tracts, which include 2,500 to 10,000 people, approximate large neighborhoods, in the sense that households within a given tract tend to have similar demographic and economic characteristics. They are the only data with sufficient coverage and detail to estimate our model. There were some changes in the boundaries of census tracts between 1970, 1980 and 1990, but the UDB utilized a "comparability file" produced by the Census Bureau to reconfigure data to track changes in demographic and economic characteristics of census tracts over time.

Summary statistics for the variables included in our analysis for 1990 are reported in Table 1. In 1990, U.S. census tracts had an average population of 4,145, of whom 117 (2.8 percent) were recent (1980-1990) immigrants, 564 (13.6 percent) lived in households with incomes below the poverty line, and 357 (8.6 percent) were in households receiving welfare income. The average census tract had 1,981 employed persons, 24 (1.2 percent) in farm jobs.

A few caveats about Census data should be kept in mind. First, the census is conducted in April, and farm worker employment peaks in September. The peak to trough employment ratio is smaller in the West than in other parts of the United States, but the April census is likely to miss foreign-born seasonal

workers who return to their country of origin during the off season but reside in rural U.S. communities the rest of the year.

Second, census undercounts of unauthorized immigrants are well documented (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 than of transient workers who, for example, swell rural populations only during peak labor seasons. Findings from 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, and overstate the welfare implications of immigration and farm employment.

Expected earnings in Mexico represent the opportunity cost of migrating from Mexico to the United States in any given year. The US Census, of course, does not provide information on expected earnings for individuals in Mexico. Our best estimate of the opportunity cost of migration during an inter-census period, therefore, is average earnings in Mexico, which is a constant and therefore not included in the migration equation.

The census data provide a reliable representation of the population enumerated by the census. To the extent that recent immigrants missed by the census, once they settle, resemble persons enumerated by the census with respect to migration patterns, employment, poverty, and welfare use, our findings offer important insights into their future implications and impacts.

Findings

Parameter estimates of the equation system represented by (11)-(14) for the 1970-1980 and 1980-1990 periods are reported for the United States in Tables 2 and 3. The data columns in the tables correspond to the equations; the rows, to the explanatory variables. T-statistics appear in parentheses under each estimated parameter. The variables are all for the later census year (1980 in Table 2, 1990 in Table 3) unless otherwise indicated in the variable subscript.

The findings reveal a circular relationship between immigration and both farm and nonfarm employment in the United States. In the 1970-1980 period, one additional farm job was associated with a 0.77-person increase in foreign-born population (including both workers and their dependents; Column B). Immigration, in turn, stimulated the growth of farm jobs: one additional immigrant was associated with 0.05 additional farm jobs (Column D). Between 1980 and 1990, an additional farm job was associated with a 1.91-person increase

in immigration (Table 3, Column B). One additional immigrant, in turn, stimulated the creation of 0.04 new farm jobs (Column D). These effects are all significant at below the 0.01 level.

In the 1970s, farm employment significantly reduced poverty in the United States. Other things being equal, one additional farm job reduced the number of people living in impoverished households by 0.90 (Table 2, Column A). By contrast, during the 1980s, the circular relationship between immigration and farm employment increased poverty. *Ceteris paribus*, a one-person increase in immigration was associated with a 0.59-person increase in poverty (Table 3, Column A). Controlling for the indirect effect of farm employment on poverty through immigration, farm employment did not directly reduce poverty in U.S. census tracts in the 1980s.

There was not a one-to-one relationship between poverty and welfare; that is, welfare coverage of the impoverished population is incomplete. One additional person in poverty increased welfare rolls by 0.69 persons in the 1970s and by 0.58 persons in the 1980s (Column C in Tables 2 and 3, respectively). Controlling for poverty, U.S. census tracts with larger recent-immigrant populations had significantly smaller welfare rolls than census tracts with larger native populations, reflecting the fact that many recently arrived immigrants

were not eligible for welfare. The negative immigration effect on welfare use declined slightly (from 0.28 to 0.21) between the 1970s and the 1980s, but remained statistically significant.

Tables 2 and 3 include only the direct effects of the explanatory variables. Table 4 reports the effects of an additional farm job on poverty and welfare use in the U.S., taking into account both direct and indirect effects. It was calculated from the total derivative:

$$(15) \quad \frac{dPOV}{dE_F} = \frac{\partial POV}{\partial E_F} + \frac{\partial POV}{\partial MIG} \frac{\partial MIG}{\partial E_F}$$

In the 1970s, farm employment reduced poverty and welfare use. The total effect of a 1-person increase in farm employment was to reduce the number of census-tract residents living in poverty by 0.43 persons and to reduce welfare usage by 0.52 persons. Between 1980 and 1990, by contrast, an additional farm job increased the number of people in poverty (by 0.97) and the number of people in households receiving welfare income (by 0.16).

Other (exogenous) variables significantly affect the immigration, farm employment, poverty, and welfare relationship. Distance to the Mexican border,

our proxy for migration cost, significantly affects the number of immigrants. Other things being equal, a 1,000-mile increase in distance from the U.S.-Mexico border is associated with a 109-person decrease in census tract immigration during the 1980s. New immigrants locate in census tracts where earlier cohorts of immigrants live, a finding consistent with migration network theory (Massey, et al.; Taylor). Other things being equal, a 1-person increase in the stock of census-tract foreign-born population in 1980 was associated with a 0.24-person increase in new immigration during the 1980s.

The incidence of poverty is negatively related to average family income at the start of the decade, and it is positively associated with poverty in the previous census. However, the correlation between average income and poverty is much smaller in 1990, suggesting that fewer of the benefits of income growth reached the poor. Controlling for farm employment, total employment significantly reduces poverty, highlighting the contrast between the effects of farm and non-farm jobs on poverty in the 1980s. Initial population size is associated positively with poverty but negatively with welfare coverage. However, the presence of children and elderly residents significantly increases public assistance use.

Conclusions

There was a vicious circle between farm employment, immigration, poverty, and welfare use between 1980 and 1990, a sharp contrast to the virtuous farm employment-immigration-poverty-welfare link in the 1970s, when the rising tide of additional farm jobs reduced poverty and welfare usage. During the 1980s, labor-intensive agriculture, by attracting immigrant workers who have less than poverty-level earnings, appears to have created a negative externality: the cost of meeting public service needs of farm workers whose low earnings translate into low tax payments.

This suggests that the relationship between immigration, employment, and poverty is dynamic, as illustrated by the change in sign of the farm employment effect on poverty between the 1970-80 and 1980-90 periods. In a context of rising real farm worker wages and unionization during the 1970s, more farm employment was associated with less poverty. However, during the 1980s, when union membership fell and real farm earnings declined (Martin, 1996), more farm employment was associated with more poverty.

Data from the 2000 Census is required to replicate the detailed analysis for the 1990s, but anecdotal evidence suggests that the vicious circle is spreading throughout rural America (Rural Migration News, GAO). As farmers, poultry processors, and meat packers turn to immigrant workers, local communities wind up with more jobs and economic activity as well as more children with limited English proficiency, more pressure on limited stocks of affordable housing, and strains on health care facilities. First-generation immigrants tend to make fewer demands on public services and few complaints; they generally have higher incomes than they would have at home. However, their children may become the new rural poor.

The key to avoiding a new rural poverty is education, especially for the children of immigrants who arrive to fill farm and other rural jobs. The importance of education is widely recognized: the National Research Council (NRC) in 1997 concluded that the key variable determining the long run effects of immigrants on the U.S. economy was the level of education of the immigrants (Smith and Edmonston, 1997), a point also emphasized by Huffman (1995). The NRC, in concluding that legal and illegal immigration added \$1 billion to \$10 billion to the U.S. GDP in 1996, assumed that the U.S.-born children of immigrants would have the same education and earnings as other U.S.-born children. If this assumption proves correct, then the effects of the new rural

poverty may be short-lived. However, if it is wrong, the United States may be creating a new rural poverty that could prove even more difficult to extirpate than the poverty that was ameliorated by rural-to-urban migration in the 1950s and 1960s.

Endnotes

- (2) A person is considered to live in concentrated poverty if more than 40 percent of households within the census tract where s/he lives have incomes below the poverty line.
- (3) Unreported income may be substantial, both in the United States and in Mexico.
- (4) The U.S. expects to export a record \$11 billion of the \$30 billion of FVH commodities produced in 1998, nearly double 1990 exports; 98 percent of FVH trade is fruits and vegetables.
- (5) Taylor and Martin (1997) find evidence of a circular relationship between farm employment and immigration in rural California during the 1980s.
- (6) Not all individuals counted in the variable MIG are new immigrants. Some may be foreign-born persons who entered the United States prior to the previous census year but who migrated into the census tract during the 10-year inter-census period.

References

Abowd, John M., and Richard B. Freeman (Eds). 1991. Immigration, Trade and the Labor Market. Chicago: University of Chicago Press for the National Bureau of Economic Research.

Altonji, J. and D. Card. 1991. "The Effects of Immigration on the Labor Market Outcomes of Less-Skilled Natives." In Abowd, John M., and Richard B. Freeman (Eds). 1991. Immigration, Trade and the Labor Market. Chicago: University of Chicago Press for the National Bureau of Economic Research

Bean, F.D., B.L. Lowell, and L.J. Taylor. 1988. "Undocumented Mexican Immigrants and the Earnings of Other Workers in the United States." *Demography* 35(1):35-52.

Borjas, G.J. 1994. "The Economics of Immigration." *Journal of Economic Literature* XXXII (December):1667-1717.

_____. 1990. *Friends or Strangers: The Impact of Immigrants on the U.S. Economy*. New York: Basic Books.

_____. 1987. "Self-Selection and the Earnings of Immigrants." *American Economic Review* 77(4):531-553.

_____. 1984. "The Impact of Immigrants on the Earnings of the Native-Born."

_____. 1983. "The Substitutability of Black, Hispanic, and White Labor." *Economic Inquiry* 21(Jan.):93-106.

Butcher, K.F. and D. Card. 1991. "Immigration and Wages: Evidence from the 1980s." *Economic Impact of Immigration* 81(2):292-296.

Card, D. 1990. "The Impact of the Mariel Boatlift on the Miami Labor Market." *Industrial and Labor Relations Review* 43(2):245-257.

DeFritas, G. 1988. "Hispanic Immigration and Labor Market Segmentation." *Industrial Relations* 27(2):195-214.

Emerson, Robert and Leo Polopolus. 1995. Florida. in Martin, Philip, Wallace Huffman, Robert Emerson, J. Edward Taylor, and Refugio Rochin. Eds. 1995.

Immigration Reform and U.S. Agriculture. Berkeley, CA: Division of Agriculture and Natural Resources Publication 3358. 321-334.

Espenshade, Thomas J. (ed.). 1997. Keys to Successful Immigration: Implications of the New Jersey Experience. Washington, DC: The Urban Institute Press.

Filer, R.K. "The Effect of Immigrant Arrivals on Migratory Patterns of Native Workers." In Borjas and Freeman, eds. (1992).

Fix, M. and J. S. Passel. 1994. Immigration and Immigrants: Setting the Record Straight. Washington, D.C.: The Urban Institute.

Frey, W. H. 1994. The New White Flight. American Demographics. April: 40-48.

GAO. General Accounting Office. 1998. Community Development: Changes in Nebraska's and Iowa's Counties With Large Meatpacking Workforces GAO/RCED-98-62, February 27.

Grossman, J.B. 1982. "The Substitutability of Natives and Immigrants in Production." Review of Economics and Statistics 64(4):596-603.

Huffman, Wallace E. 1999. Changes in the Labor Intensity of Agriculture: A Comparison of CA, FL, and the Whole US. Mimeo. October.

Huffman, Wallace E. 1995. Immigration and Agriculture in the 1990s. in Martin, Philip, Wallace Huffman, Robert Emerson, J. Edward Taylor, and Refugio Rochin. Eds. 1995. Immigration Reform and U.S. Agriculture. Berkeley, CA: Division of Agriculture and Natural Resources Publication 3358. 425-442.

LaLonde, R. and R. Topel. 1991. "Labor Market Adjustments to Increased Immigration." In J. Abowd and R. Freeman, eds.

Martin, Philip L. 1992. Report of the Commission on Agricultural Workers. Washington. U.S. Government Printing Office. November. 155-166.

Martin, Philip. 1996. Promises to Keep: Collective Bargaining in California Agriculture. Ames, IA: Iowa State University Press.

Martin, Philip and David Martin. 1994. The Endless Quest: Helping America's Farmworkers. Boulder, CO: Westview Press

Martin, P.L. and J.E. Taylor. 1991. Immigration Reform and Farm Labor Contracting in California. In M. Fix, ed., *The Paper Curtain: Employer Sanctions' Implementation, Impacts and Reform*. Washington, D.C.: The Urban Institute Press, pp. 239-261.

Massey, D. S., J. Arango, G. Hugo, A. Kouaouci, A. Pellegrino, and J.E. Taylor. 1993. "Theories of International Migration: An Integration and Appraisal." *Population and Development Review* 19(3):431-66, September.

Mines, Richard, Susan Gabbard, and Anne Steirman. 1997. *A Profile of U.S. Farmworkers*. Washington: U.S. Department of Labor. March.

Muller, T. and T.J. Espenshade. 1985. *The Fourth Wave*. Washington, D.C.: The Urban Institute Press.

Passel, J.S. 1985. "Undocumented Immigrants: How Many?" In *Proceedings of the Social Statistics Section of the American Statistical Association, 1985*, 655-81. Washington, D.C.: American Statistical Association.

Passel, J.S. and K. A. Woodrow. 1984. "Geographic Distribution of Undocumented Immigrants: Estimates of Undocumented Aliens Counted in the 1980 Census by State." *International Migration Review* 18 (Fall):642-671.

Perloff, Jeffrey M. Lori Lynch, and Susan M. Gabbard. 1998. "Migration of Seasonal Agricultural Workers." *American Journal of Agricultural Economics*. February.

Runyan, Jack L. 1997. *Profile of Hired Farm Workers, 1994 Annual Averages*. USDA. Economic Research Service Report 748.

Rural Migration News. Quarterly since 1995. <http://migration.ucdavis.edu>

Simon, J.L., S. Moore, and R. Sullivan. 1993. "The Effect of Immigration on Aggregate Native Unemployment: An Across-City Estimation." *Journal of Labor Research* 14(3):299-316.

Smith, James and Barry Edmonston (Eds). 1997. *The New Americans: Economic, Demographic, and Fiscal Effects of Immigration*. Washington. National Research Council.

Taylor, J. E. 1987. "Undocumented Mexico-U.S. Migration and the Returns to Households in Rural Mexico." *American Journal of Agricultural Economics*.

Taylor, J. E. and P. L. Martin. 1997. "The Immigrant Subsidy in California Agriculture: Farm Employment, Poverty, and Welfare." *Population and Development Review*.

_____. 1995. "Immigration Reform and U.S. Agriculture." *Choices* (Third Quarter):25-28.

Taylor, J. E., P. L. Martin, and M. Fix. 1997. *Poverty Amid Prosperity: Immigration and the Changing Face of Rural California*. Washington, DC: The Urban Institute Press.

Taylor, J. E. and D. Thilmany. 1993. "Worker Turnover, Farm Labor Contractors and IRCA's Impact on the California Farm Labor Market." *American Journal of Agricultural Economics*, 75 (May): 350-360.

Thilmany, 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): 946-60 (November).

Todaro, M.P. (1969). "A Model of Migration and Urban Unemployment in Less-developed Countries." *The American Economic Review* 59:138-48.

_____. (1980). "International Migration in Developing Countries: A Survey." (In Easterlin, R.A., ed., *Population and Economic Change in Developing Countries*. Chicago: University of Chicago Press.

U.S. Department of Labor. 1993. *California Findings from the National Agricultural Workers Survey*. Office of the Assistant Secretary for Policy.

Vroman, W. and K. Worden. 1992. "Immigration and State-Level Wage Adjustments in the 1980s." Manuscript. Washington, D.C.: The Urban Institute.

Winegarden, C.R. and L.B. Khor. 1991. "Undocumented Immigration and Unemployment of U.S. Youth and Minority Workers: Econometric Evidence." *Review of Economics and Statistics* 73(1):105-112.

Table 1. Descriptive Statistics, 1980-90, for U.S. Census Tracts

VARIABLE NAME	VARIABLE DEFINITION	United States, 1980-90	
		MEAN	ST. DEV
POV	Number of People in Poverty in Census Tract	564.26	622.12
POP	Total Census Tract Population	4145.5	2193.5
MIG	Change in Number of Foreign Born, 1980-1990	116.75	342.91
Y	Average Household Income (1990 dollars)	44928	25204
E _F	Farm Employment	23.69	41.40
E	Total Employment	1981.1	1185.8
NFOR ₈₀	Foreign-Born Tract Population, 1980	345.3	508.7
W	Tract Population in Families Receiving Welfare Income	356.78	425.97
NKIDS	Tract Population 15 Years or Younger	361.22	246.31
NOLD	Tract Population Older than 65 Years	535.72	367.83
CENCITY	Tract Population Living in Central City	664.79	580.92
D	Shortest Distance from Tract State to Mexican Border	1125.6	684.8
SAMPLE SIZE		2270	

Table 2. Iterative Three-Stage Least Squares Estimation Results for U.S. Census Tracts, 1970-80

VARIABLE*	E	Q	U	A	T	I	O	N
	(A) POV ₈₀	(B) MIG ₈₀	(C) W ₈₀	(D) E _{F,80}				
POV ₈₀	-	-	0.695 (48.67)	-	-	-	-	-
MIG ₈₀	0.601 (10.63)	-	-0.280 (5.29)	0.046 (13.46)	-	-	-	-
E _{F,80}	-0.898 (4.00)	0.772 (4.14)	-	-	-	-	-	-
POV ₇₀	0.706 (37.58)	-	-	-	-	-	-	-
POP ₇₀	0.049 (4.42)	0.007 (0.89)	-0.018 (3.92)	-	-	-	-	-
NFOR ₇₀	-	0.170 (10.85)	-	-	-	-	-	-
Y ₇₀	-0.010 (6.28)	0.003 (2.47)	-	-	-	-	-	-
NKIDS ₈₀	-	-	0.443 (8.83)	-	-	-	-	-
NOLD ₈₀	-	-	0.065 (3.18)	-	-	-	-	-
E _{F,70}	-	-	-	0.814 (65.50)	-	-	-	-
CENCITY	0.135 (8.58)	0.113 (10.57)	-0.021 (1.84)	-0.004 (4.15)	-	-	-	-
D	-	-83.533 (10.80)	-	-	-	-	-	-
E ₇₀	-0.065 (2.65)	-0.072 (3.96)	-	0.002 (3.60)	-	-	-	-
CONSTANT	93.092 (3.79)	98.843 (4.71)	-57.723 (5.25)	4.672 (5.12)	-	-	-	-
R-SQUARE	0.66	0.19	0.71	0.61	-	-	-	-

*Subscript "80" ("70") denotes variable is for 1980 (1970)

Numbers in parentheses are (absolute value of) t-statistics.

System R-square = 0.93

Chi Square (df) = 6037.0 (24)

N = 2275

Table 3. Iterative Three-Stage Least Squares Estimation Results for U.S. Census Tracts, 1980-90

VARIABLE*	E	Q	U	A	T	I	O	N
	(A) POV	(B) MIG	(C) W	(D) E _F				
POV	-	-	0.585 (47.79)	-				
MIG	0.590 (20.22)	-	-0.214 (6.28)	0.036 (13.33)				
E _F	-0.157 (0.95)	1.913 (10.31)	-	-				
POV ₈₀	0.834 (55.57)	-	-	-				
POP ₈₀	0.075 (8.24)	-0.028 (3.37)	-0.043 (8.78)	-				
NFOR ₈₀	-	0.242 (19.42)	-	-				
Y ₈₀	-0.002 (3.27)	-0.001 (1.00)	-	-				
NKIDS	-	-	0.492 (13.10)	-				
NOLD	-	-	0.110 (6.49)	-				
E _{F,80}	-	-	-	0.881 (55.88)				
CENCITY	0.086 (6.78)	0.100 (7.92)	0.024 (1.96)	-0.002 (1.72)				
D	-	-108.83 (12.56)	-	-				
E ₈₀	-0.163 (9.62)	0.022 (1.38)	-	0.001 (1.79)				
CONSTANT	64.208 (3.45)	129.79 (5.53)	-30.021 (2.48)	2.150 (1.89)				
R-SQUARE	0.81	0.35	0.65	0.64				

*Suffix "80" denotes variable is for 1980, otherwise it is for 1990.

Numbers in parentheses are (absolute value of) t-statistics.

System R-square = 0.97

Chi Square (df) = 7822.0 (24)

N = 2270

Table 4. Total Estimated Effects of an Additional Farm Job on Poverty and Welfare in U.S. Census Tracts*

Census Year	Total Estimated Effect of an Additional Farm Job On....	
	Poverty (POV)	Welfare (W)
1980	-0.434	-0.518
1990	0.972	0.159

*Estimated using equation (15).