

Welfare Reform in Agricultural California

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When welfare reforms were enacted in 1996, a higher than average percentage of residents in the agricultural heartland of California, the San Joaquin Valley, received cash assistance. Average annual unemployment rates during the 1990s ranged from 12% to 20%, and 15% to 20% of residents in major farming counties received cash benefits. This analysis develops and estimates a two-equation cross-sectionally correlated and timewise autoregressive model to test the hypothesis that in agricultural areas, seasonal work, low earnings, and high unemployment, as well as few entry-level jobs that offer wages and benefits equivalent to welfare benefits, promote welfare use and limit the potential of local labor markets to absorb ex-welfare recipients.

Key words: cross-sectionally correlated and timewise autoregressive model, farm workers, immigration, welfare reform

Introduction

The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PL 104-193, PRWORA) required states to move able-bodied adults receiving cash assistance into employment after two years, and limited most able-bodied adults to a “lifetime” five years of cash assistance. PRWORA singled out immigrants for additional restrictions: most legal immigrants arriving after August 22, 1996, are not eligible for federal welfare assistance until they have been in the United States at least five years, and many legal immigrants receiving assistance when PRWORA was enacted lost their eligibility for benefits.¹

California’s agricultural heartland provides a unique test of the feasibility of the PRWORA work-first approach to welfare. The San Joaquin Valley includes a farm work force that is more than 95% immigrant, has unemployment rates which ranged from 12–20% in the 1990s, and includes counties with some of the highest welfare-use rates in the United States—15% to 20% of residents of major agricultural counties were receiving cash welfare benefits in the mid-1990s (Nyberg).

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¹ PRWORA denied most federal welfare benefits to legal immigrants arriving after August 22, 1996; about \$24 billion or 45% of the projected \$54 billion over six years in savings from welfare reform came from making immigrants ineligible for benefits. Three laws since 1996 have restored about \$12.3 billion in benefits to legal immigrants: the Balanced Budget Act of 1997 restored Supplemental Security Income (SSI) and Medicaid to 420,000 legal immigrants who arrived before August 22, 1996, at an estimated cost of \$11.5 billion over five years; the Agricultural Research Act of 1998 provided food stamps for 225,000 legal immigrant children, those over 65, and disabled immigrants who were in the United States by August 22, 1996, at an estimated cost of \$818 million over five years; and the Noncitizen Technical Amendments Act of 1998 permitted some disabled immigrants receiving welfare assistance in August 1996 to continue receiving assistance, even if they were too disabled to prove their date of entry into the United States, at an estimated cost of \$41 million over five years.

This study utilizes a unique longitudinal database and simultaneous-equation techniques to test the hypothesis that a lack of well-paid jobs with benefits in California's major agricultural counties promotes welfare use and limits the potential of local labor markets to gainfully absorb ex-welfare recipients. The corollary of this hypothesis is that policies limiting adult access to welfare either will reduce the incomes of poor rural households or will induce rural welfare recipients to leave agricultural areas in order to maintain their incomes. Our findings question the assumption underlying the federal welfare reform that there should be a one-size-fits-all welfare policy. The two- and five-year PRWORA limits on cash benefits may have to be adjusted for agricultural areas with large numbers of seasonal farm jobs.

U.S. Welfare Reforms and Expectations

The 1996 welfare reforms mark a watershed in social policy. PRWORA ended welfare as a federal entitlement, replacing the 61-year-old Aid to Families with Dependent Children (AFDC) program with the Temporary Assistance for Needy Families (TANF) program. Even though socioeconomic conditions differ significantly throughout the United States, all residents are subject to the two- and five-year limits on federal cash assistance.

In California, PRWORA was implemented through the California Work Opportunity and Responsibility to Kids Program (CalWORKS), which went into effect January 1, 1998. Under CalWORKS, individual adult recipients of cash assistance are required to sign welfare-to-work contracts spelling out the requirements imposed by county counselors to engage in job search activities, or to obtain supportive services that make the recipient employable (Klerman, Reardon, and Steinberg; Haider et al.; Nyberg). There are sanctions on individuals who refuse to work, as well as on counties and the state if too few adults are working within specified time periods. In 1996, the percentage of residents receiving welfare assistance in California's 58 counties ranged from 1.6% in Marin County to 18% in Merced County, and the average annual unemployment rate ranged from 3% in Marin County to 16% in Tulare County (Nyberg).

The theory underlying welfare reform is that requiring adults to work generates wages for them and reduces the cost of welfare assistance to taxpayers. Work experience and supportive services, in turn, can increase human capital, and thus the ability of recipients to sustain themselves without assistance. Implementing a welfare-to-work strategy requires: (a) local jobs offering wages high enough to make earners ineligible or unwilling to apply for welfare benefits, or (b) recipients willing to migrate to where such jobs are available.

The number of persons receiving cash assistance in the United States peaked at 14.4 million in March 1994, and fell to 5.8 million in June 2000, a decrease of 60%. According to estimates of the President's Council of Economic Advisers, most of the decline before 1996 was due to economic and job growth and increases in minimum wages; the federal minimum wage rose from \$4.25 an hour in 1993 to \$4.75 in 1996, and \$5.15 in 1997. One-third of the decline in the caseload after 1996 was attributed to new welfare rules and regulations, and perhaps 10% to continued labor market improvements (President's Council of Economic Advisers).

In a comprehensive review of welfare reform studies, Schoeni and Blank found about 15% of the pre-1996 decline in caseload was due to policy changes, and 30–40% was due

to improved labor market conditions; thus, welfare policy changes “reduced public assistance participation and increased family earnings.” However, Schoeni and Blank went on to conclude, “the 1996 reforms had little additional impact on work behavior”—largely because early 1990s federal waivers, which gave states such as Wisconsin the freedom to change welfare policies, had more measurable impacts than post-1996 changes (Schoeni and Blank; Ziliak et al.).²

Most studies of the impacts of welfare reform examine changes in caseloads or in the work and well-being of ex-recipients at the national or state level. They do not test for differences in caseload between agricultural and nonagricultural counties or for a structural relationship between employment and welfare. California’s experience suggests both may be critical. The number of persons receiving cash assistance in California peaked at 2.7 million in 1995, and fell to 1.3 million in June 2000, a decrease of 52%. The slower decline in recipients in California than in the rest of the United States has been attributed to an unemployment rate remaining above the U.S. average rate and to persistent poverty and welfare dependence in agricultural counties. As a result, California’s share of U.S. welfare recipients rose from 17% in 1993 to 22% in 2000 (*Rural Migration News*).

PRWORA was widely expected to have different effects in rural and urban areas. High and seasonally fluctuating unemployment rates were expected to keep welfare dependency higher than average in rural areas, unless persons who depended on a mix of earnings, unemployment insurance, and welfare assistance found stable local jobs or moved from such areas. In the mid-1990s, about 60% of the U.S. counties with the highest percentage of residents receiving cash assistance also had higher than average unemployment rates, and welfare assistance rates were not expected to drop in these counties until the national unemployment rate fell. Even if they found jobs, low-wage rural workers were less likely to earn their way out of poverty than low-wage urban workers (Dyson; Findeis and Jensen; Goetz and Freshwater; Jensen and Chitose). It should be emphasized, here and in the remainder of this article, we use the term “agricultural” rather than “rural,” because most of California’s major agricultural counties are classified as “metro” or “urban.”

Labor and Welfare in Agricultural California

Many of the factors expected to make it difficult to move adults from welfare to work are present in the agricultural counties of California. California has led the nation in farm sales since 1950; its \$27 billion in farm sales in 1998 represented 13% of U.S. farm sales (California Department of Food and Agriculture). About half of California’s farm sales represent fruit and nut, vegetable and melon, and horticultural specialty crops such as mushrooms and nursery products. The production of these crops depends on hired workers, most of whom are immigrants who are employed seasonally.

Agriculture has been a port of entry for immigrants with little education for over a century, and over 80% of the seasonal farm workers in California are immigrants from rural Mexico with less than six years schooling. While most of these immigrants do not receive cash welfare assistance, in part because they often are not eligible, their children

² Ziliak et al. attribute 78% of the pre-1996 caseload to economic growth, and only 6% to federal waivers.

born in the United States are U.S. citizens, and therefore usually eligible for welfare benefits.

Second-generation children of seasonal workers who are educated in the United States tend to leave farming counties for urban counties, where wages and prospects for upward mobility are better. In contrast, second-generation children who lack the education and motivation to succeed in urban counties frequently remain in agricultural areas. However, they are often unwilling to follow their parents into the fields, yet are unable to find jobs that provide earnings and benefits which exceed welfare benefits—explaining why employment rates can be similar between agricultural and other counties while welfare rates are significantly different.

The above background discussion helps to clarify why the responses to welfare reform can be expected to differ between agricultural and urban areas. Specifically, the following important factors should be noted:

- Compared to the State of California as a whole, the welfare-reform starting point for its agricultural counties was different. In 1995, 8% of California residents, but 15% to 20% of residents in some agricultural counties, received cash assistance (Nyberg).
- Recipients in farming counties often face higher hurdles to achieving stable employment due to (a) their personal characteristics (e.g., a high percentage of recipients in the mid-1990s were not high school graduates, lacked English or other skills, or lacked transportation), and (b) the nature of the economies in which they live (e.g., higher unemployment rates, more seasonality, and fewer jobs offering benefits such as health insurance).
- There are fewer opportunities for economies of scale or experiments involving competition between public and private providers of services that help recipients get off and stay off welfare in rural areas, which tend to have relatively few recipients and a high percentage of recipients with very specific needs, including relatives of incarcerated persons, Native Americans, and refugees.

California's eight-county San Joaquin Valley provides an example of the welfare-to-work challenge in agricultural areas. The San Joaquin Valley is the nation's leading farm area. Its \$14.5 billion in farm sales in 1998 would rank it as the third largest farm "state" in the nation, after California and Texas. However, the San Joaquin Valley's per capita personal income of \$18,658 a year would rank it 49th among states; in constant dollars, per capita income in the Valley fell in the 1990s. Furthermore, the gap between earnings in the San Joaquin Valley and the rest of the state has been widening. In 1969, average annual earnings were \$3,600 in Fresno and \$4,700 in San Jose; in 1997, the respective earnings were \$19,000 and \$38,000 (Nyberg).

The San Joaquin Valley has 3.3 million residents, representing 10% of California's population, and its population has been increasing by 90,000 a year. Based on this trend, the population is projected to reach 4.3 million by 2010. San Joaquin Valley residents are 53% non-Hispanic white, 34% Hispanic, and 8% Asian. Only about 66% of the adults are high school graduates, and 14% have college degrees (Nyberg).

The San Joaquin Valley unemployment rate averaged 13% in 1998, meaning an average of 190,000 of the 1.5 million persons in the San Joaquin Valley labor force were

unemployed. To put this unemployment in perspective, the state of Iowa and the eight-county San Joaquin Valley each have labor forces of about 1.5 million persons. In November 1999, Iowa had 31,000 unemployed workers; the San Joaquin Valley had 160,000. Competition for nonfarm jobs offering more than minimum wages and benefits in the San Joaquin Valley can be intense. For example, in the fall of 1999, when a local casino advertised 80 jobs, 566 people applied, and when food distributor Fleming Foods advertised 100 jobs, 850 applied (*Rural Migration News*).

Seasonal employment for farm workers (who comprise 15–25% of all workers in San Joaquin Valley counties) and high unemployment rates raise a fundamental question: Will San Joaquin Valley adults expected to move from welfare to work—about half of whom do not have a high school diploma—be able to find jobs that provide earnings and benefits equivalent to cash and related welfare assistance? If not, the welfare-to-work challenge is likely to be different in the San Joaquin Valley than in Midwestern states such as Iowa. In Iowa, welfare recipients can be attracted by low unemployment into vacant jobs, while in the San Joaquin Valley, those leaving welfare assistance are more likely to be pushed by the threat of sanctions into the labor force, because there are relatively few vacant jobs offering wages and benefits equivalent to the welfare benefits package.

Theoretical Considerations

Individuals apply for welfare assistance, and county staff determine their eligibility for cash assistance and other benefits. Thus, a utility-maximizing individual “chooses” to apply for welfare assistance if the expected value of benefits exceeds wages and benefits that could be earned by working. Individuals currently receiving cash assistance can respond to time limits in four ways: (a) find employment, (b) seek employment but be unemployed, (c) migrate from the area, or (d) shift from welfare assistance to being out of the labor force, i.e., not receiving cash assistance or seeking employment.

Data on individuals applying for and receiving welfare assistance are confidential. Thus, most welfare-related research relies on a combination of administrative data, such as caseloads, and survey data, such as from the monthly “Current Population Survey” (CPS) (U.S. Department of Labor, Bureau of Labor Statistics), to examine how broad groups of recipients or ex-recipients are faring.³ For example, using CPS data, Katz and Murphy examined relative wage changes between groups of workers categorized by sex, education, and experience from 1963 to 1987. They used an aggregate production function to derive the demand for various types of labor and assumed, in a partial equilibrium framework, these groups of workers are imperfect substitutes, so that changes in relative wages reflect shifts in labor supply and demand.

Because data are not available for individuals, we use county-level data on caseloads, unemployment, and other indicators affecting whether individuals choose to apply for welfare benefits. Our basic hypothesis is that the probability of receiving welfare assistance is associated with higher unemployment. County unemployment at time t is the difference between total labor supply (S_t), and labor demand (D_t). The labor demand function is derived from profit maximization subject to an aggregate production function, i.e.:

³ The March “Current Population Survey” has a supplement that provides information on earnings and weeks worked in the 12 months before the survey.

$$(1) \quad \begin{aligned} \max_{Q_t, D_t} \quad & \pi_t = p_t Q_t - w_t D_t - r_t K_t, \\ \text{s.t.:} \quad & F(D_t, K_t, \mathbf{x}_t^D) = Q_t, \end{aligned}$$

where Q_t and p_t represent output and output price at time t , K_t is capital, r_t is the price of capital, w_t is the prevailing wage, and \mathbf{x}_t^D is a vector of parameters influencing the productivity of labor and capital. Capital is assumed to be fixed in the short run. Solution to this profit-maximization problem yields an aggregate labor demand function of the form $D(w_t, \mathbf{z}_t^D)$, where \mathbf{z}_t^D includes \mathbf{x}_t^D and all nonwage prices.⁴

The labor supply is derived from constrained utility maximization for a representative or average household:

$$(2) \quad \begin{aligned} \max_{s_t} \quad & U(C_t, T - \phi(s_t); \mathbf{z}_t^S), \\ \text{s.t.:} \quad & C_t \leq w_t \phi(s_t) + we_t(w_t, \phi(s_t), \mathbf{z}_t^W), \end{aligned}$$

where C_t denotes consumption (with price normalized to 1), s_t is household labor supply, $\phi(s_t) \leq s_t$ denotes actual time employed, T is the time endowment, and \mathbf{z}_t^S is a vector of supply-side shifters; we_t is welfare income, and \mathbf{z}_t^W denotes rules determining individuals' eligibility for welfare given wages and employment.

The solution to this utility-maximization problem aggregated across households gives a labor supply function of the form $S(w_t, \mathbf{z}_t^S, we_t)$. Substituting for we_t , county aggregate unemployment at any given time t can be represented as

$$UNEM_t = S(w_t, \mathbf{z}_t^S, \mathbf{z}_t^W) - D(w_t, \mathbf{z}_t^D) = \psi(w_t, \mathbf{z}_t^D, \mathbf{z}_t^S, \mathbf{z}_t^W),$$

or alternatively as a rate,

$$UR_t = \frac{\psi(w_t, \mathbf{z}_t^D, \mathbf{z}_t^S, \mathbf{z}_t^W)}{TLF_t},$$

where TLF_t is the size of the total county labor force at time t . In the econometric analysis below, we use the county employment rate,

$$E_t = \frac{1 - \psi(w_t, \mathbf{z}_t^D, \mathbf{z}_t^S, \mathbf{z}_t^W)}{TLF_t}.$$

Specifically, the employment rate depends upon variables affecting the supply and demand of labor, including welfare eligibility.

Welfare demand is endogenous in (2). It depends not on labor supply, but rather, on actual employment, wages, and welfare eligibility. Given labor supply, employment depends on the probability of finding work in a given labor market. Using the employment rate as a proxy for this probability and summing-up across households, total county welfare income is modeled as: $W_t = W(E_t, w_t, \mathbf{z}_t^W)$. Employment and welfare demand must be estimated jointly, using simultaneous equation techniques. Welfare

⁴ Alternatively, aggregate county employment may be viewed as the sum of employment across representative firms with average characteristics \mathbf{z}_t^D .

reform substantially reduced eligibility for benefits, shifting W_t downward. In empirical work, welfare reform is represented by a dummy variable in the vector \mathbf{z}_t^W .

Prevailing wages are not available on a monthly basis by county. However, in agricultural areas of California, the entry-level wage is institutionally determined by the minimum wage. The employment prospects for individuals who leave welfare depend on the demand and supply of similar workers at this minimum wage. In the econometric analysis, we assume the employment rate is determined by the supply and demand shifters (which include welfare income influencing labor supply) and the minimum wage. The number of county welfare recipients is used as a proxy for welfare demand. To preserve the triangularity of the equation system (see below), welfare demand is represented in reduced form in the employment equation (see the text equation for E_{it} , above). Therefore, all exogenous variables affecting welfare appear in the employment equation.

Estimation

The key hypothesis of this analysis is that welfare demand and unemployment are higher, *ceteris paribus*, in agricultural than in other areas, resulting in a rural “welfare-to-work gap.” The econometric model estimated to test this hypothesis is a two-equation cross-sectionally and timewise autoregressive system of equations, and the unit of analysis is counties, denoted by subscript i . Reliance on aggregate county data instead of data on individual firms and households introduces heteroskedasticity which must be accounted for in the estimation procedure. The employment equation is specified as:

$$(3) \quad E_{it} = \beta_1 + \beta_2 TLF_{it} + \beta_3 HSD_{it} + \beta_4 DQ2_t + \beta_5 DQ3_t + \beta_6 DQ4_t \\ + \beta_7 SJV_i + \beta_8 MW_t + \beta_9 APP_t + \beta_{10} PD_t + \beta_{11} POP_{it} \\ + \beta_{12} FOR_{it} + \beta_{13} CHILD_{it} + \beta_{14} ELD_{it} + \varepsilon_{1it},$$

where the dependent variable, E_{it} , represents the employment rate for county i in time period t . The right-hand-side variables include demand and supply shifters and the minimum wage (\mathbf{z}_t^D , \mathbf{z}_t^S , and MW_t , respectively). The variable TLF_{it} denotes the total labor force. In California, counties with larger populations and labor forces tend to have the lowest unemployment rates, while smaller agricultural and nonagricultural counties have relatively high unemployment rates, reflecting smaller and more specialized economies. The size of the labor force is included in the employment equation to control for scale. The variable HSD_{it} represents the high school dropout rate.

In addition to these county-specific variables, the employment equation includes quarterly dummies for quarters 2, 3, and 4 ($DQ2_t$, $DQ3_t$, and $DQ4_t$, respectively)⁵ to control for seasonality of labor demand; the minimum wage rate, MW_t ; and the number of apprehensions of illegal immigrants at time t , APP_t . The agricultural region dummy variable, SJV_i , equals one if county i is among the eight counties making up the San Joaquin Valley and zero otherwise.⁶ The San Joaquin Valley dummy variable acts as a

⁵ These represent the high (summer), low (winter), and intermediate (fall, spring) labor-demand seasons. Experimentation with monthly dummies yielded qualitatively similar results.

⁶ The eight San Joaquin Valley counties are: Fresno, Kern, Kings, Madera, Merced, Stanislaus, Tulare, and San Joaquin. We also employed a dummy variable for the Central Valley counties and California's 15 leading agricultural counties by gross value of production in 1994, but the results were similar and are not reported.

proxy for the total farm labor force in each county, because the latter variable was not available for numerous counties.⁷ Ideally, one would want to estimate the employment equation separately by worker skill level; however, monthly employment data are not available by skill level.

A policy dummy variable, PD_t , is equal to zero before January 1996, and one after January 1996, the year welfare reforms were enacted. PRWORA went into effect in California via the CalWORKS program in January 1998, but the impact of the reforms took effect when welfare reforms were enacted in 1996. County total population is represented by POP_{it} , the percentage of foreign-born population (immigrants) in county i is represented by FOR_{it} , the percentage of families with children under the age of six years old is denoted by $CHILD_{it}$, and the percentage of households with elderly members (over 65 years old) is represented by ELD_{it} . The employment rate is expected to increase with population. The number of persons 25 and older who did not complete high school is a proxy for human capital differences among counties.

The welfare equation is given by:

$$(4) \quad \begin{aligned} W_{it} = & \beta'_1 + \beta'_2 HSD_{it} + \beta'_3 DQ2_t + \beta'_4 DQ3_t + \beta'_5 DQ4_t \\ & + \beta'_6 SJV_i + \beta'_7 MW_t + \beta'_8 PD_t + \beta'_9 E_{it} + \beta'_{10} POP_{it} \\ & + \beta'_{11} FOR_{it} + \beta'_{12} CHILD_{it} + \beta'_{13} ELD_{it} + \varepsilon_{2it}, \end{aligned}$$

where the endogenous variables are the total number of adult recipients of cash assistance under AFDC/TANF (W_{it}) and the employment rate (E_{it}) in the i th county at time period t . The remaining right-hand-side variables constitute the \mathbf{z}'_t vector. Given employment and the criteria to qualify for welfare benefits, welfare demands depend upon demographics, including population, foreign-born population, and age distribution. Population (POP_{it}), the percentage of foreign-born individuals (immigrants) in county i (FOR_{it}), the percentage of families with children under six years of age ($CHILD_{it}$), the percentage of households with elderly members (over age 65) (ELD_{it}), the policy variable (PD_t), and other variables ($DQ2_t$, $DQ3_t$, $DQ4_t$, SJV_i , MW_t , and HSD_{it}) are as defined in equation (3).

The assumptions related to the disturbances in the model (Kmenta, p. 622) are as follows:

$$(5) \quad \begin{aligned} E(\varepsilon_{kit}^2) &= \sigma_{kii} \quad (k = 1, 2) && \text{(heteroskedasticity),} \\ E(\varepsilon_{kij} \varepsilon_{kij}) &= \sigma_{kij} && \text{(mutual correlation),} \\ \varepsilon_{kij} &= \rho_i \varepsilon_{ki,t-1} + u_{kit} && \text{(autoregression),} \\ E(\varepsilon_{ki,t-1} u_{kit}) &= 0, \\ E(u_{kit} u_{kjt}) &= \Phi_{kij}, \\ E(u_{kit} u_{kjt}) &= 0 \quad (t \neq s), \\ \sigma_{kii} &= \Phi_{kii} / (1 - \rho_i^2) \quad (k = 1, 2), \\ \sigma_{kij} &= \Phi_{kij} / (1 - \rho_i \rho_j) \quad (k = 1, 2), \\ u_{kit} &\sim N(0, \Phi_{kij}), \\ i, j &= 1, 2, \dots, N \quad \text{and} \quad t = 1, 2, \dots, T. \end{aligned}$$

⁷ Agriculture accounts for more than 25% of employment in the Central Valley of California (Kuminoff and Sumner).

Table 1. Definitions of Variables and Expected Signs of Model Coefficients

Variable Name	Variable Description	Employment Equation	Welfare Equation
<i>TLF</i>	Total labor force (10,000 persons)	–	NA ^a
<i>HSD</i>	High school dropout rate (%)	–	+
<i>DQ2</i>	Seasonal dummy for Quarter 2, spring	+	?
<i>DQ3</i>	Seasonal dummy for Quarter 3, summer	+	?
<i>DQ4</i>	Seasonal dummy for Quarter 4, fall	+	?
<i>SJV</i>	Dummy for San Joaquin Valley	–	+
<i>PD</i>	Policy dummy for CalWORKS	+	–
<i>MW</i>	Minimum wage (\$/hour)	–	?
<i>APP</i>	Apprehensions (10,000 persons)	+	NA
<i>EMP (E)</i>	Employment rate (%)	NA	–
<i>POP</i>	Population (10,000 persons)	+	+
<i>FOR</i>	Foreign-born (immigrants) (%)	–	–
<i>CHILD</i>	Families w/children under 6 years of age (%)	+	+
<i>ELD</i>	Families w/elderly members over 65 years of age (%)	–	+

^aNA denotes not applicable.

Recall that E and W in models (3) and (4) are endogenous variables, and the remaining variables are exogenous. The anticipated signs of the coefficients on the variables in the employment and welfare equations are summarized in table 1. The key variable in the employment equation is the San Joaquin Valley dummy variable (SJV), which captures the employment level in agricultural counties relative to nonagricultural counties. A negative sign on the San Joaquin Valley dummy variable would suggest that agricultural counties with a large farm labor force, other things being equal, have lower employment rates than urban counties. A positive sign would indicate the opposite, while an insignificant coefficient would imply there is no difference between employment rates in agricultural and nonagricultural counties.

The quarterly dummy variables allow for seasonality effects on employment. Significant coefficients would suggest seasonal shifts in employment, and thus wider gaps between the number of welfare recipients and the availability of jobs. *Ceteris paribus*, the employment rate is expected to increase in the spring, summer, and fall quarters relative to winter, and decrease with the total labor force and the percentage of high school dropouts. We expect the employment rate to decrease as the minimum wage rate rises and to increase with the number of apprehensions.

The key explanatory variable in the welfare equation is the employment rate. Because lack of earnings is a major eligibility criterion for cash assistance, a negative sign on the employment parameter is predicted; i.e., the number of adults receiving cash grant assistance decreases with employment. The sign of the population (POP) coefficient is likely to be positive. Other things (including unemployment) being equal, the larger the population, the larger the number of potential candidates for cash grants. Population size may also affect welfare indirectly, if there are scale economies in the delivery of public assistance. Dependency ratios are expected to increase the number of welfare recipients, which should be reflected in positive coefficients on the percentages of households with children under the age of six ($CHILD$) and with elderly members over age 65

(*ELD*).⁸ A negative coefficient on the foreign-born variable (*FOR*) in the welfare equation is expected, because PRWORA made most legal immigrants arriving after August 22, 1996, ineligible for federal cash assistance until they had 40 quarters of U.S. employment (10 years) or had become naturalized U.S. citizens (possible after five years).

The policy dummy variable (*PD*), which captures the impact of PRWORA, should be negatively associated with the number of adults receiving cash assistance if the policy change was effective, independent of other variables shaping welfare demand. A statistically significant positive sign on the San Joaquin Valley (*SJV*) dummy coefficient would indicate, controlling for employment and other explanatory variables, agricultural counties have a statistically distinguishable higher welfare dependence than nonagricultural counties. The number of adults receiving cash assistance is expected to increase as the high school dropout rate (*HSD*) increases.

Data and Results

The data used to estimate the model consist of monthly observations from the 58 counties in California between January 1990 and June 1999. Due to missing observations on some of the variables, the model was estimated with 114 observations from each of 50 counties, giving a total of 5,700 observations. The employment data are monthly estimates of the number of employed persons by county. The total labor force is the sum of civilian employment and civilian underemployment, or total labor supply, available monthly.⁹ The welfare data include the number of adults receiving cash assistance each month, by county, and the data on foreign-born and total population, as well as families with members under age six and over age 65 (dependency measures), taken from the 1990 decennial *Census of the Population*.¹⁰ The apprehension data are annual, from the *Statistical Yearbook of the Immigration and Naturalization Service*.¹¹

All variables were scaled to lie between zero and 100 to eliminate or reduce rounding errors in the estimation. Adults receiving cash assistance (*W*) is expressed in hundreds of persons, and the total labor force (*TLF*), apprehensions (*APP*), and population (*POP*) are expressed in tens of thousands of persons. Employment rate, high school dropout rate, foreign born, families with children under six, and families with elderly members are expressed in percentage rates of their respective bases. Minimum wages are expressed in dollars per hour. The remaining variables are dummy variables that take on values of one and zero.

In order to obtain consistent and asymptotically efficient estimators of the parameters, a cross-sectionally correlated and timewise autoregressive model was developed (Kmenta, pp. 622–25). An iterative estimation procedure was used which is equivalent

⁸ Among cash welfare recipients in California in 2000, 44% were Hispanic, 25% were white, 21% were African-American, and 10% were Asians and others (Nyberg). In many Latino households receiving cash assistance, there are elderly parents who do not qualify for Social Security or Supplemental Security Income payments. This is why we expect more elderly household members to be associated with more welfare cases.

⁹ These data are available from the California Employment Development Department (accessed online at www.calmis.cahwnet.gov/).

¹⁰ The welfare data used are the number of persons receiving cash assistance each month by county, the 237 data (online at <http://migration.ucdavis.edu/rhr/data/237.htm>); the 1990 *Census of the Population* data, the starting period for the analysis, are not online, but are published by the U.S. Department of Commerce/Bureau of the Census.

¹¹ These are U.S. Border Patrol apprehension data for the entire 2,000-mile Mexico-U.S. border, and are online at <http://www.ins.usdoj.gov/graphics/index.htm>.

Table 2. Summary Statistics of Unscaled Variables in Model

Variable	Unit of Measure	Frequency of Observ.	County Level	Mean	Standard Deviation
Endogenous Variables:					
Employment rate, <i>E</i> (<i>EMP</i>)	%	monthly	yes	90.12	5.348
Adults receiving cash assistance (<i>W</i>)	100 persons	monthly	yes	25,239	42,309
Exogenous Variables:					
Total labor force (<i>TLF</i>)	10,000 persons	monthly	yes	182,330	293,750
High school dropout rate (<i>HSD</i>)	%	annual	yes	0.116	0.042
Minimum wage (<i>MW</i>)	\$/hour	monthly	no	4.450	0.402
Apprehensions (<i>APP</i>)	10,000 persons	monthly	no	108,390	33,619
Population (<i>POP</i>)	10,000 persons	annual	yes	368,360	595,480
Foreign born (<i>FOR</i>)	%	annual	yes	0.113	0.0750
Families w/children < 6 (<i>CHILD</i>)	%	annual	yes	0.896	0.0139
Families w/elderly > 65 (<i>ELD</i>)	%	annual	yes	0.132	0.0401

Note: Sample size = 5,700 observations from 50 counties (114 monthly observations each) from January 1990 through June 1999.

to full-information maximum-likelihood estimation (Oberhofer and Kmenta; Greene, pp. 622–79; and Kmenta, pp. 618–22). The model was estimated using SHAZAM, version 9.0, on stacked data, so that the model could be estimated with the pooled cross-section and time-series routine. We also estimated a cross-sectionally heteroskedastic and time-wise autoregressive model and scaled the data by county population in order to reduce heteroskedasticity, which generated results similar to the full cross-sectionally correlated and timewise autoregressive model. In addition, it should be noted that the triangular system has an endogenous variable, employment, which appears on the right-hand side of the welfare equation, and the variance-covariance matrix of the error vector is not diagonal. However, iterative generalized least squares estimation of the entire system is both consistent and efficient (see, e.g., Greene, p. 679).

The summary statistics for the variables used in the analysis are reported in table 2, and the results of the pooled cross-section time-series estimations are presented in table 3. The model fits the data very well: Buse's R^2 for the overall model is 0.840 (table 3). These results are reported with the autoregressive coefficients unrestricted across cross-sections. The autoregressive coefficients ranged from 0.61 to 0.99, and most were in the 0.90–0.99 interval.

As observed from table 3, the results confirm that employment is significantly lower and, controlling for employment, welfare demand is higher in California's major agricultural counties relative to their nonagricultural counterparts. Other things (including seasonality) held constant, the San Joaquin Valley dummy variable has a statistically significant and large negative effect on the employment rate (-1.50 , t -ratio = 14.15). The effect of this variable on welfare is also statistically significant and large. Controlling for employment rate and other variables in the welfare equation, the expected number of adult cash welfare recipients is 421 more in agricultural counties of the San Joaquin Valley than in the other California counties (t -ratio = 3.53). This finding indicates there is significantly more dependence on cash assistance in San Joaquin counties regardless of employment.

Table 3. Iterative Generalized Least Squares (GLS) Estimates of Employment and Welfare Models

Variable	Employment (<i>E</i>) Equation		Welfare (<i>W</i>) Equation	
	Coefficient	<i>t</i> -Statistic	Coefficient	<i>t</i> -Statistic
<i>TLF</i>	0.141	50.48	—	—
<i>HSD</i>	-0.473	46.40	0.618	37.92
<i>DQ2</i>	1.242	37.71	0.055	17.55
<i>DQ3</i>	1.537	39.79	-0.095	26.41
<i>DQ4</i>	1.656	38.06	-0.093	28.17
<i>SJV</i>	-1.503	14.15	4.213	3.53
<i>MW</i>	-1.237	9.23	0.110	10.13
<i>APP</i>	0.049	8.68	—	—
<i>PD</i>	0.698	6.51	-0.211	22.86
<i>EMP (E)</i>	—	—	-6.907	86.93
<i>POP</i>	0.110	45.86	0.215	26.41
<i>FOR</i>	-0.530	57.47	0.115	18.77
<i>CHILD</i>	2.286	31.76	6.019	39.52
<i>ELD</i>	-0.229	26.04	1.696	40.30
CONSTANT	-81.506	39.46	-0.017	19.19

Buse's R^2 for model = 0.840

Log likelihood = -43,869.5

Sample size = 5,700

PRWORA reduced the number of adults receiving cash assistance; however, controlling for employment and other variables, the estimated effect of the policy change is not large. The estimated coefficient on the welfare reform dummy (*PD*), equal to 1 two years prior to when the CalWORKS program went into effect in January 1998, is -0.211, indicating welfare reform reduced the number of adults receiving cash assistance by about 21 persons per county per month. The employment rate, *ceteris paribus*, increases by 0.7 after welfare reform, most likely reflecting generalized improvements in labor markets in the later years of the time series. The finding of a small effect of the policy change on the number of welfare recipients, other things being equal, suggests these reforms had little success in moving able-bodied adults from welfare into employment.

As expected, the number of adults receiving cash assistance decreases as the employment rate increases, other things being equal. The coefficient on the employment rate variable in the welfare equation is -6.91 and highly statistically significant (table 3). A one percentage point increase in the employment rate decreases the number of adults receiving cash assistance by about 691 persons (based on a county mean of 25,239 adults receiving cash assistance; table 2). The negative coefficients on *DQ3* and *DQ4* reflect the fact that employment in San Joaquin Valley counties peaks in the third quarter, and in the fourth quarter many SJV residents return to Mexico, making them ineligible for cash assistance.

The remaining coefficient estimates generally conform to a priori expectations (table 3). A higher percentage of high school dropouts is associated with lower employment rates and a higher number of adults receiving cash assistance. Employment rates are significantly higher in spring, summer, and fall than in the default winter period.

Coefficients on the six seasonality dummies (three in each equation), although small in magnitude, are all positive and significantly different from zero in the employment equation, indicating higher employment levels in the peak spring, summer, and fall quarters than in the (default) winter period. Conversely, coefficients on the summer and fall dummies are negative in the welfare equation. A likelihood-ratio test for joint significance of the six seasonality coefficients in both equations was highly significant ($\chi^2_{(6)} = 111.2$).

As expected, variables representing dependency rates, the percentage of households with elderly members (*ELD*) and children (*CHILD*), are positively associated with both welfare and employment rates, except for the elderly rate in the employment equation, which is negative. Increases in the minimum wage are negatively associated with the employment rate. The estimated minimum wage (*MW*) coefficient is -1.237 with a *t*-value of 9.23, consistent with a negative impact of wages on labor demand. Increases in the minimum wage also increase the number of adults receiving cash assistance (estimated coefficient of 0.110 with a *t*-ratio of 10.13), implying that, if the minimum wage increases by \$1 per hour, about 11 adults more per county per month receive cash assistance. The total number of adults receiving cash assistance is positively related to county population (*POP*), and it is unexpectedly positively related to the number of foreign-born residents (*FOR*), a finding which might suggest immigrants depress wages and encourage those eligible to seek welfare benefits.

Conclusions

The empirical results reported in this study support the hypothesis that agricultural counties have both higher unemployment rates and higher welfare dependency rates than nonagricultural counties. Welfare policy changes designed to limit the eligibility of immigrants for welfare benefits and limit the time one can receive welfare assistance promise to add significantly to the supply of labor in agricultural areas, where employment opportunities are most scarce and seasonal. These findings cast doubt on the validity of a "one-size-fits-all" approach to welfare reform and suggest that programs to facilitate adjustment of welfare reforms may be needed in agricultural counties. Precedents for such adjustment assistance exist. When sector-targeted federal policy changes such as environmental regulations have reduced forestry or fishery employment, transitional transfers, unemployment insurance payments, or economic development assistance sometimes have been provided to ameliorate impacts on wages or unemployment.

Welfare reform's effects are more generalized than these sector-focused federal adjustment policies; they add to the labor supply in all U.S. counties. However, the econometric findings reported here indicate welfare reform is likely to be less effective at moving people into the work force in rural and agricultural counties because, other things being equal, these counties have higher-than-average numbers of adults receiving assistance, significantly lower employment rates, and greater seasonality than other counties. Thus, welfare-to-work programs in major agricultural areas such as the San Joaquin Valley need to be linked closely to strategies aimed at creating jobs which will offer adult recipients earnings and benefits equivalent to the value of their welfare benefits. Specifically, economic development should be an integral part of welfare reform.

The alternative to creating jobs where welfare recipients live is to encourage these individuals by assisting them in moving to where the jobs are. The More Opportunities for Viable Employment (MOVE) project, spearheaded by the Tulare County Office of Education, relocated 600 Tulare residents outside the county over a 14-month period between 1998 and 1999, an average of 43 individuals each month. About half were welfare recipients. In an ironic reversal of the 1930s migration from the Midwest to California dramatized in John Steinbeck's 1939 novel, *The Grapes of Wrath*, most of these people left for meatpacking jobs in the Midwest that paid between \$7 and \$8 an hour. Geographic mobility is the alternative to adjusting to welfare reform within California's rural and agricultural counties.

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