Food Insecurity and Public Assistance

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Abstract

This paper examines the extent to which welfare programs reduce the probability that vulnerable household are food insecure, where food insecurity occurs when the household experiences food deprivation because of financial resource constraints. The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) made fundamental changes in the federal system of public assistance, and specifically limited the eligibility of immigrant households to receive many types of aid. Many states chose to protect their immigrant populations from the presumed effects of PRWORA by offering state-funded assistance to these groups. I exploit these exogenous changes in eligibility rules to examine the link between food insecurity and public assistance. The data indicate that those immigrants most likely to be adversely affected by the welfare reform legislation experienced a sizable relative decline in the probability of welfare receipt, and a substantial relative increase in the probability of food insecurity. The evidence suggests that a cut of 10 percentage points in the fraction of the population that receives public assistance increases the fraction of households experiencing food insecurity by 5 percentage points. The data, therefore, provide some evidence to support the hypothesis that welfare programs achieve one of their key objectives, providing households with a minimal level of food sufficiency.

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I. Introduction

The rapid growth of the welfare state in recent decades spawned a large literature examining the factors that determine whether households participate in particular programs, and investigating the programs' impact on various social and economic outcomes, such as labor supply, household income, and family structure.[1] To a large extent, this literature focuses on identifying the behavioral distortions caused by these programs, and then proceeds to calculate various measures of the costs of these distortions, such as reduced work activity or an increased rate of marriage dissolution.

In contrast, relatively few studies attempt to measure the benefits associated with public assistance programs. Presumably, the social goal of enacting programs that provide housing assistance is to improve housing conditions among disadvantaged households. The objective of Medicaid is to improve health outcomes in vulnerable populations. And the purpose of food stamps is to reduce the vulnerability of needy households to bouts of food insecurity and hunger. Remarkably, after a half century of experimentation with welfare programs and after thousands of empirical studies that examine many aspects of these programs, the answers to these questions remain elusive.

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[1] Moffitt (1992) gives a comprehensive review of the literature. Blank (1997), Ellwood (1988), and Murray (1984) provide very different assessments of what the evidence implies for how the welfare state has affected the well-being of the targeted population.

In recent years, there has been a growing awareness of the skewed nature of the questions that have dominated research on the economics of welfare programs. Such studies as Hamermesh (1982), Gruber (1997), and Crossley and Browning (2001) have begun to estimate some of the benefits that arise from the consumption-smoothing effects of the unemployment insurance program. Similarly, Currie and Thomas (1995) document that Head Start, a program designed to improve the skills and health outcomes of disadvantaged children prior to their entering school, improves test scores in the targeted population. Finally, Currie and Yelowitz (2000) suggest that public housing relieves overcrowding and may even improve the educational outcomes of the affected children.

This paper examines the extent to which welfare programs reduce the probability that vulnerable households are food insecure, where food insecurity occurs when the household experiences food deprivation because of financial resource constraints. If the primary objective of public assistance is to guarantee that households do not experience severe spells of various types of hardships and deprivation, ensuring the food security of vulnerable households must then surely be one of the central goals of the welfare state.[2]

The link between food insecurity and public assistance is difficult to analyze empirically because a "built-in" spurious correlation precludes researchers from drawing credible inferences about the sign and magnitude of the effect: the households that are most likely to be food insecure are also the households that are most likely to qualify for and participate in welfare programs. The identification of the impact of public assistance on food insecurity could be obtained through a randomized experiment wherein the government provides aid to some households and denies aid to a control group. Although such an idealized experiment does not

exist in practice, the huge changes in program eligibility and benefits introduced by the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA) provide a great deal of exogenous variation that could, in principle, help address this important question.[3]

Although PRWORA changed the ground rules for receiving almost all types of welfare benefits for almost all households in the United States, the changes were particularly acute for immigrant households. The immigrant population may be particularly susceptible to spells of food insecurity because immigrants today are, on average, relatively less skilled than they were thirty years ago, and face worsened economic opportunities in a rapidly changing labor market. For example, the typical male immigrant worker in 1970 earned about 4 percent more than the typical native worker. By 1998, the typical immigrant earned 23 percent less (Borjas, 1999, p. 21), and the poverty rate in immigrant households was 21.8 percent, as compared to only 12.0 percent for natives (Camarota, 1999).

It is well known that immigrant participation in welfare programs rose rapidly in recent decades.[4] By 1998, 22.4 percent of immigrant households received some type of assistance (such as cash benefits, Medicaid, and food stamps), but only 15.4 percent of native households received such benefits (Borjas, 1999, p. 109). The political concern over the steep rise in immigrant welfare use motivated Congress to include a number of eligibility restrictions in the 1996 welfare reform legislation. These restrictions were specifically designed to halt and perhaps even reverse the direction of the trend. It has been estimated that almost half of the $54 billion

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[2] Rossi (1998) presents a comprehensive review of the literature that attempts to evaluate the effectiveness of the Food Stamp Program. The key conclusion of the review is that we know very little about the extent to which this program actually helps to "feed the poor."

[3] In a related study, Gundersen and Oliveira (2001) use data drawn from the Survey of Income and Program Participation (SIPP) to examine if the Food Stamp Program helps targeted households reach a level of food sufficiency.

[4] See Blau (1984) and Borjas and Trejo (1991).

savings attributable to the welfare reform bill can be traced directly to the restrictions on immigrant use of welfare (Primus, 1996-97, p. 14). It turns out, however, that the immigrant provisions in welfare reform could potentially affect only a subset of the immigrant population, depending on the household's state of residence, on whether the household entered the country as refugees, and on whether the foreign-born person was naturalized or not. As a result, the idiosyncratic restrictions on immigrant eligibility present a unique opportunity to examine if public assistance programs alleviate the adverse social outcomes, such as food insecurity, that justify the existence of these programs in the first place.

Remarkably little is known about the extent of food insecurity in the United States, either within the native or foreign-born populations.[5] Not surprisingly, the evidence indicates that there is more food insecurity among immigrant households than among native households. The data also indicate that food insecurity increased most during the 1994-98 period among the immigrants most adversely affected by the eligibility restrictions in welfare reform. In other words, those immigrants who became least eligible to receive public assistance (i.e., non-refugee, non-citizen households), and who lived in states that did not extend a state-funded safety net to the immigrant population experienced sizable increases in food insecurity, while food insecurity in other immigrant (or native) households either declined or remained stable. In fact, the evidence suggests that a 10 percentage point cut in the fraction of the population that receives public assistance leads to a 5 percentage point increase in the fraction of the population that is food insecure. The study, therefore, provides some evidence of a causal link between the availability of public assistance programs and the existence of food insecurity among targeted households.

II. Welfare Reform

The welfare reform legislation enacted in 1996 made fundamental changes in the federal system of public assistance. The overriding objective of the legislation was to move welfare recipients into work. In addition to granting state governments a great deal of authority to set their own eligibility and benefit rules, the legislation mandates that most welfare recipients go to work after two years and imposes a five-year lifetime limit for receiving assistance.[6] In addition to these universal changes in coverage and eligibility, PRWORA includes a number of provisions that specifically limit the extent to which immigrant households can receive public assistance. As signed by President Clinton, PRWORA contained two key provisions applying to legal immigrants who did not enter the country as refugees:[7]

1. Most non-citizens who arrived in the country *before* August 22, 1996, the "pre-enactment" immigrants, were to be kicked off from the SSI and food stamp rolls within a year. (This provision of the legislation, however, was never fully enforced).
2. Immigrants who entered the United States *after* August 22, 1996, the "post-enactment" immigrants, are prohibited from receiving most types of public assistance. The ban is lifted when the immigrant becomes an American citizen. Post-enactment immigrants are also subject to stricter "deeming" regulations: The income and assets

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[5] A strand of the food security literature investigates the validity of food security indices collected in survey data; see Blumberg et al (1999), Frongillo (1999), and Lorenzana and Sanjur (1999). Andrews et al (2000) and Nord, Jemison, and Bickel (1999) provide detailed summaries of the evidence for the U.S. population.

[6] The studies contained in Blank and Haskins (2001) present a detailed discussion of the various provisions of PRWORA and of the short-run impact of the legislation.

[7] If the net flow of illegal aliens were on the order of 300,000 per year, 62.5 percent of the *total* flow of foreign-born persons who entered the country in 1998 was composed of persons who are legal immigrants and are not refugees (U.S. Immigration and Naturalization Service, 1997, p. 19).

of the immigrant's sponsor will be deemed to be part of the immigrant's application for most types of public assistance for up to ten years.[8]

In contrast to these restrictions on the (legal) non-refugee, non-citizen population, the legislation did not restrict refugee participation in the various public assistance programs. In addition, the legislation continued to prohibit illegal immigrants from receiving most types of aid.

One can loosely interpret the restrictions on the post-enactment immigrants as setting up a five-year "waiting period" before they can qualify for public assistance. After five years in the United States, the immigrant can apply for naturalization and, if the application is successful (as it typically is), the ban on welfare use is lifted. Partly because of the increasing importance in the distinction between citizens and non-citizens, there was a rapid rise in the number of immigrants who wished to become naturalized (Wasem, 1998). In 1991, for example, the INS received only 207 thousand petitions for naturalization; in 1997, the INS received 1.4 million such petitions (U.S. Immigration and Naturalization Service, 1997, p. 142).

The restrictions on immigrant welfare use brought together a number of powerful interest groups after the 1996 presidential election—all of which lobbied hard for their repeal. And, as noted above, some of the immigrant-related provisions of the legislation were never enforced. The balanced budget agreement reached in 1997 between President Clinton and the Republican-controlled Congress effectively repealed some of the most draconian aspects of the legislation. The partial restoration of federal aid, combined with actions taken by individual states (discussed below), implies that relatively few of the pre-enactment immigrants ended up being kicked out of

[8] The legislation also tightened the rules for sponsorship. The income of immigrants who reside legally in the United States and who wish to sponsor the entry of family members must exceed 125 percent of the poverty line. The sponsors must also file affidavits of support that are legally binding, making the sponsor financially liable for many of the expenses incurred by the immigrant.

the SSI and Food Stamp Programs.[9] The mandated waiting period for post-enactment immigrants, however, remained on the books.

Table 1 presents a more detailed summary of the restrictions that the welfare reform legislation (as subsequently amended) now imposes on immigrant welfare use. Since most of the restrictions on the pre-enactment immigrants were never enforced, and since only a relatively small fraction of the immigrant population in the United States arrived after 1996, it would seem that PRWORA could not have had a large impact on welfare participation rates in the immigrant population. Existing studies, however, find that this is not the case (Fix and Passel, 1999; Borjas, 2001). The welfare participation rate declined in both immigrant and native households between 1994 and 1998, but the decline was much steeper in the immigrant population. This finding has led some to conclude that "because comparatively few legal immigrants were ineligible for public benefits as of December 1997, it appears that the steeper declines in non-citizens' than citizens' use of welfare…owe more to the '*chilling effect*' of welfare reform and other policy changes than they do to actual eligibility changes" (Fix and Passel, 1999, p. 8; emphasis added).

It is instructive to illustrate the nature of these trends. The Current Population Surveys (CPS) began to collect information on the immigration status of survey participants in 1994. The Annual Demographic Files (also known as the March Supplement) of the CPS provide detailed information on participation in various types of social assistance programs during the calendar year prior to the survey. I use the 1995-99 March Supplements, which provide program participation data for the 1994-98 calendar years, in the empirical analysis reported below.[10]

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[9] See U.S. General Accounting Office (1998) for a discussion of the various policy changes that occurred after the enactment of PRWORA at both the federal and state levels. MaCurdy and O'Brien-Strain (1998) discuss how the various policy changes affected immigrant welfare use in California.

[10] I do not use the 1994 Current Population Survey because that survey provided limited information on the national origin of immigrants. There also seem to be some data problems with the foreign-born sample in the 1994 and 1995 surveys. In particular, the "official" person weights provided in these surveys do not yield an accurate

Throughout the paper, the household is the unit of analysis. I restrict the study to households that do not reside in group quarters. A household will be classified as an immigrant household if the household head was born outside the United States and is either an alien or a naturalized citizen. All other households are classified as native households. In addition, an immigrant household will be classified as a citizen household or a non-citizen household based on the naturalization status of the household head.[11]

Table 2 summarizes some of the key trends for the 1994-98 period. As suggested by earlier research, the decline in welfare use was indeed much steeper among immigrant households. For example, the fraction of native households that received some type of assistance (defined as receiving cash benefits, food stamps, or Medicaid) fell from 15.6 to 13.4 percent (or 2.2 percentage points) between 1994 and 1998. In contrast, the fraction of immigrant households receiving some type of assistance declined by 3.4 percentage points over the period. Moreover, the decline was even steeper among non-citizen households—precisely the group targeted by welfare reform. Their participation rate fell by 6.5 percentage points (from 29.4 to 22.9 percent).

In terms of the food stamp program—a program that may play a vital role in determining the food security status of the household—the data are equally striking: the proportion of native households receiving food stamps fell by 2.7 percentage points; the proportion receiving food stamps among citizen households fell by .6 percentage points, but the proportion receiving food stamps among non-citizen households declined by 7.4 percentage points. The evidence,

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enumeration of the immigrant population in the United States. Passel (1996) gives a detailed discussion of this problem, and uses a complex algorithm to calculate revised weights for each person in both the 1994 and 1995 surveys. I use the "Passel weights" in all calculations that involve the 1995 survey.

[11] I also used the nativity and citizenship status of other household members to obtain alternative definitions of what constitutes a native or an immigrant household. For example, one can categorize the household as an "exclusively citizen" household if all household members are either native-born or naturalized citizens, and as an "exclusively non-citizen" household if all household members are non-citizens. The qualitative nature of the evidence presented in this paper is not affected by these alternative definitions, so I use the simpler classification in the empirical analysis reported here.

therefore, suggests that welfare reform—at least at the national level—may have had a sizable chilling effect on immigrant participation in welfare programs.

Since 1995, an annual supplement of the Current Population Surveys attempts to measure the extent of food security at the household level. The measures of food security are obtained by evaluating the household's response to an 18-item array of questions (see the appendix for the full set of questions). These questions attempt to determine if the household did not have enough to eat because there was "not enough money for food," "could not afford to eat balanced meals," and was "hungry but did not eat" because they could not afford to buy food. Various summary measures of food security are then calculated from these responses. Bickel et al (2000) define four key classifications are:

a. Food secure: the "household shows no or minimal evidence of food insecurity."
b. Food insecure without hunger: there are concerns "about adequacy of the household food supply and.adjustments to household food management, including reduced quality of food and increased unusual coping patterns."
c. Food insecure with hunger (moderate): "Food intake for adults in the household has been reduced to an extent that implies that adults have repeatedly experienced the physical sensation of hunger."
d. Food insecure with hunger (severe): "Households with children have reduced the children's food intake to an extent indicating that the children have experienced hunger. Adults in households with and without children have repeatedly experienced more extensive reductions in food intake."

The nature of the survey instrument used in the Food Security Supplements ensures that food insecurity measures the hardship attributable to financial resource constraints, and not because

the household chose to eat a diet that was not sufficiently nutritious or because the household did not have time to prepare proper meals.

I construct a summary measure of the household's food insecurity experience during the 12-month period prior to the survey that simply indicates if the household is food insecure (i.e., the joint set of classifications *b*, *c*, and *d*).[12] Table 2 shows that there is a sizable difference in food insecurity rates between immigrant and native households.[13] In 1994, for instance, 11.3 percent of native and 17.9 percent of immigrant households were food insecure. The relatively worse performance of immigrant households along this socioeconomic dimension is not surprising since the typical immigrant is relatively less skilled than the typical native, and has a higher probability of being in poverty. It is important to point out, however, that food insecurity rates are substantially larger for immigrant households even among households living in poverty. The CPS Food Security Supplements report whether the household is below the 185% threshold of the poverty line (roughly the 30th percentile of household income). Table 2 indicates that in this group of poor or near-poor households, 31.4 percent of immigrant households are food insecure in 1994, as compared to 25.5 percent of native households.

Although there was a steep decline in welfare participation among immigrant households between 1994 and 1998, the immigrant population did not experience a corresponding increase

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[12] This particular definition of the household's food insecurity status has the virtue that it measures a relatively frequent event in both the native and immigrant populations. Other alternative definitions would capture much rarer events. For example, only 2.9 percent of native households and 3.9 percent of immigrant households were food insecure with hunger (either moderate or severe) in 1999. Similarly, only .5 percent of native households and .6 percent of immigrant households were food insecure with severe hunger in 1999.

[13] The Food Security Supplements of the CPS are the April 1995, September 1996, April 1997, August 1998, and April 1999 supplements. There is a timing inconsistency between the data provided by the March CPS and the Food Security Supplements. The variables summarizing participation in welfare programs in the March CPS refer to participation in these programs in the previous calendar year. In contrast, the food insecurity variable in the Food Security Supplements refers to the 12-month period prior to the survey. To avoid terminological confusion, I will report the data obtained from the Food Security Supplement data *as if* it referred to the prior calendar year (i.e., the April 1995 survey is used to obtain data for the 1994 calendar year; the September 1996 survey gives the data for the 1995 calendar year, and so on). I use the supplement weights in all of the calculations reported in this paper.

in food insecurity. The fraction of native households that are food insecure fell from 11.3 to 9.5 percent (or 1.8 percentage points), while the respective decline among immigrant households was actually *larger*, from 17.9 to 14.9 percent. The historic economic boom of the late 1990s probably accounts for the decline in food insecurity among all types of households, but it is difficult to explain why the contraction of the welfare state did not have a particularly adverse effect on food security in immigrant households. Moreover, the distinctive trends between citizen and non-citizen households only deepen the puzzle. Food insecurity actually rose slightly for citizen households and declined by 4.3 percentage points for non-citizen households, precisely the opposite of what one would have expected since welfare reform targeted mainly non-citizen households.[14]

In sum, the aggregate trends indicate that the period of welfare reform was marked by a relatively steep decline in welfare participation among immigrant households, but that this decline did not seem to increase food insecurity in this vulnerable population. I will show below, however, that these nationwide trends mask distinct movements among different types of immigrant households, mainly because they ignore the fact that different states responded differently to the federal restrictions on immigrant welfare use.

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[14] The Food Security Supplements also provide some limited information on household participation in public assistance programs. In particular, these supplements indicate if the household participated in either the Food Stamp Program or the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). These participation data, however, do not seem to be very useful. The definition of program participation is not consistent over time and the screen used to determine which households were asked the participation questions also varies across surveys. For instance, the 1995-96 Food Security Supplements report program participation in the 30-day period prior to the survey, while the post-1996 Supplements report program participation in the twelve-month period prior to the survey. As a result of these data problems, the well-documented downward trend in welfare participation revealed by other sources—both administrative data as well as the March CPS---is mostly missed by the Food Security Supplements. For example, the percent of native households in the Food Security Supplements that received food stamps fell from 6.0 to 5.6 percent between 1995 and 1998. This contrasts dramatically with the 5.6 percentage point drop observed in the March CPS. See Figlio, Gundersen, and Ziliak (2000) and Wallace and Blank (1999) for studies of the factors responsible for the sizable drop in the number of food stamp recipients during this period.

III. Welfare Participation

To better assess the role played by PRWORA on welfare participation in immigrant households, it is instructive to conduct a more detailed analysis of the CPS data, an analysis that takes into account three unrelated facts that influence how welfare reform differentially affected various types of immigrants. First, the restrictions in PRWORA are targeted to immigrants who are not naturalized and who did not enter the country as refugees. Second, the post-enactment immigrants face more severe statutory restrictions on welfare eligibility than do the pre-enactment immigrants, so that welfare reform may have had a more dramatic impact on welfare participation rates among newer arrivals (i.e., those immigrants who entered the United States after 1996). Finally, and perhaps most important, a key provision of PRWORA allows states to enact state-funded assistance programs specifically targeted to their immigrant populations if they wish to attenuate the presumed adverse impact of welfare reform on the foreign-born. In other words, as part of the devolution of authority to state governments, PRWORA presented states with a new set of political decisions: whether to institute or expand state-funded programs that would replace the federal benefits lost by the immigrant population.

And, in fact, different states reacted very differently to the federal legislation. Some states chose to provide state-funded assistance to immigrants, while others did not. For instance, the welfare reform legislation made most immigrants who entered the United States before August 22, 1996 ineligible for many types of assistance, such as food stamps or SSI. A few states, however, chose to offer state-funded substitutes for these programs to their immigrant populations (even before the federal restoration of such aid). Some states also offered various types of state-funded assistance to the post-enactment immigrants. As we have seen, these immigrants are typically ineligible for most types of federal aid.

Zimmermann and Tumlin (1999) have tabulated the various programs that states extended to immigrants in the wake of welfare reform. These programs include offering TANF, Medicaid, food assistance, and SSI to pre-enactment and/or post-enactment immigrants. As Table 3 shows, almost all states extended TANF and Medicaid to pre-enactment immigrants. A few states went beyond this "minimal" level of generosity and offered other programs to their immigrant populations. It is worth noting that many of the states with large concentrations of immigrants exceeded the minimal level of generosity. In fact, California, the state with a third of the immigrant population, was one of only two states that offered all eight possible programs to immigrants (the other such state was Maine).

To show how the "chilling effect" of welfare reform depended on the decisions made by individual states, I pool the 1994-95 calendar years of the March CPS to calculate the welfare participation rates prior to welfare reform, and the 1997-98 calendar years to calculate those rates after welfare reform.[15] I use three alternative measures of welfare participation: the probability that the household receives some type of assistance (defined as receipt of cash benefits, food stamps, or Medicaid); the probability that the household receives food stamps, and the probability that the household receives cash benefits. To easily summarize the evidence, I group states into two categories: "more generous" states (i.e., the states that offered immigrants at least three of the programs listed in Table 3), and "less generous" states (i.e., states that offered two or fewer programs to immigrants).[16] Finally, the welfare participation rates are calculated in four mutually exclusive population groups, depending on their birthplace, citizenship status, and year of arrival into the United States. These groups are: (1) native households; (2) citizen households

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[15] Note that I do not use data from the 1996 calendar year in the calculations. This helps to isolate the break in the time series that can presumably be attributed to PRWORA.

[16] By this definition, 28 states are classified as "more generous."

that have been in the United States at least 2 to 3 years (i.e., they arrived prior to 1992 in the pooled 1994-95 data and prior to 1996 in the pooled 1997-98 data); (3) non-citizen households that have been in the United States at least 2 to 3 years; and (4) newly arrived immigrant households (i.e., they arrived between 1992 and 1995 in the pooled 1994-95 data, and between 1996 and 1998 in the pooled 1997-98 data). The definition of the newly arrived immigrant cohorts in the two pooled data sets is particularly useful because it helps to identify the impact of welfare reform on post-enactment immigrant households.[17]

Table 4 summarizes the evidence. The table clearly shows that the decisions made by some states to offer a state-funded safety net to their immigrant populations did not have an appreciable effect on the trend of welfare participation for *native* households. For example, the probability that native households receive some type of assistance declined by about 1 to 2 percentage points during the period, regardless of whether the state was generous or not to its immigrant population.

In contrast, the state decisions clearly had a substantial impact on the trends in welfare participation of immigrants who have been in the United States at least three years, with the magnitude of the effect depending crucially on whether the household head is naturalized. For example, the welfare participation rate of non-citizen households declined by almost 13 percentage points (from 29.8 to 16.9 percent) in the less generous states, but by only 5.8 percentage points in the more generous states (from 30.3 to 24.5 percent). In contrast, the participation rate of citizen households declined by 2.4 percentage points in the less generous states and rose by 1.3 percentage points in the more generous states. It is clear that non-citizen

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[17] The sample sizes for the four groups are as follows. In the 1994-95 pooled sample, there are 94,814 native households, 4,497 "older" citizen households (i.e., who have been in the country at least 2 to 3 years), 6,299 older non-citizen households, and 1,013 newly arrived immigrant households. In the 1996-98 pooled sample, there are 89,226 native households, 5,016 older citizen households, 6,113 older non-citizen households, and 774 newly

households experienced a much larger relative decline in welfare participation than citizen households, who in turn experienced a larger relative decline in welfare participation than native households.

The data also indicate that the decline in welfare participation experienced by newly arrived immigrant households was roughly the same as that experienced by the non-citizens who had arrived prior to the enactment of PRWORA. For example, the participation rate of new immigrants declined by almost 9 percentage points in the less generous states, and by 5 percentage points in the more generous states.

The differential trends for non-citizen households between the less generous and more generous states remain when the sample is restricted to the non-refugee population. Although the CPS data do not report the type of visa used by a particular immigrant to enter the country, one can approximate the refugee sample by using information on the national origin of the foreign-born households. In particular, most refugees tend to originate in a small set of countries.[18] I classified all households where the household head originated in the main refugee-sending countries as refugee households, while all other households were classified as non-refugee households. The non-refugee, non-citizen households residing in the less generous states experienced a 13 percentage point decline in their welfare participation rate, as compared to a 5 percentage point decline for the non-refugee, non-citizen households residing in the more generous states.

Finally, it is useful to analyze the trends in welfare participation outside California. Because a third of the immigrants live in California, it could be the case that California-specific

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arrived immigrant households. Not surprisingly, the sample of newly arrived immigrants is almost exclusively non-citizen: 95 percent of the newly arrived immigrants are not naturalized.

[18] The main refugee-sending countries over the 1970-95 period were: Afghanistan, Bulgaria, Cambodia, Cuba, Czechoslovakia, Ethiopia, Hungary, Laos, Poland, Romania, Thailand, the former U.S.S.R., and Vietnam.

events could determine much of the national trend in immigrant welfare participation. Proposition 187, which denied almost all types of public assistance (including schooling) to *illegal* aliens residing in California, was enacted with the support of 59 percent of California voters in November 1994. Although most of the provisions in the proposition were never enforced, its symbolic impact on the political and social climate in California is undeniable and could have caused a chilling effect on the willingness of California's immigrant population to apply for welfare benefits. Because this chilling effect has nothing in common with the presumed chilling effect of PRWORA, it is important to determine if the differential trends in welfare participation experienced by non-citizen households are observed among immigrants unaffected by the seismic change in social and political conditions that occurred in California at roughly the same time. As Table 4 shows, the qualitative nature of the evidence does not change when households residing in California are excluded from the analysis. The non-citizen households residing in the less generous states experienced a 13 percentage point decline in welfare participation rates, as compared to a 3 percentage point decline experienced by households residing in the more generous states.[19]

The bottom panels of Table 4 replicate the analysis for two specific types of welfare programs: food stamps and cash benefits. It is evident that the state-funded programs had a differential impact on the probability that immigrant households participate in these programs in the post-PRWORA period. Although the probability that a native household received food

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[19] Borjas (2001) provides a more detailed analysis of the differences in the welfare participation trends between California and other states. It turns out that even though California was one of the most generous states in extending a state-funded safety net to its immigrant population, immigrants living in California experienced relatively steep declines in welfare participation. For example, the fraction of native households in California that received some type of assistance dropped by 1.6 percentage points (from 15.2 to 13.6 percent) between 1994-95 and 1997-98. In contrast, the fraction of immigrant households in California that received some type of assistance fell from 31.2 to 23.2 percent. Neither the welfare reform legislation nor the waivers granted to individual states prior to PRWORA had any provisions that could have had a particularly adverse effect on the eligibility of immigrant households living in California (Schoeni and Blank, 2000). One obvious candidate for explaining the California effect is the enactment of Proposition 187 in November 1994.

stamps declined by about 2 percentage points regardless of the state's generosity towards its immigrant population, food stamp participation declined by almost 10 percentage points for non-citizens living in the less generous states and by 5.1 percentage points for non-citizens residing in the more generous states. The impact of the restrictions was particularly powerful in the sample of newly arrived non-refugees: their participation rates in the food stamp program fell by about 1 percentage point if they lived in the more generous states (from 7.9 to 6.9 percent), but declined to almost zero (from 9.6 to 0.5 percent) if they lived in the less generous states. In other words, in the absence of any attenuating effects provided by state-funded programs, the restrictions imposed by PRWORA effectively removed the newly arrived immigrant population from the food stamp rolls

It is instructive to formalize and extend these descriptive results by estimating a simple regression model. By controlling for various socioeconomic characteristics, the regression approach allows one to determine if the differential trends in welfare participation observed between the more generous and the less generous states can be explained in terms of the fact that different types of immigrants tend to live in different states, or can be attributed to state-specific trends in economic activity or social conditions that may be correlated with the measure of the state's welfare generosity. To illustrate the basic methodology, pool the CPS data available for the calendar years 1994, 1995, 1997, and 1998, and consider the triple-difference regression specification:

$$(1) \qquad p_{ij} = X_{ij}\beta + \alpha_0 t_{ij} + \alpha_1 I_{ij} + \alpha_2 G_j + \gamma_0 (I_{ij} \times t_{ij}) + \gamma_1 (I_{ij} \times G_j) + \gamma_2 (G_j \times t_{ij}) + \theta_p (I_{ij} \times G_j \times t_{ij}) + \varepsilon_{ij} ,$$

where p_{ij} is a dummy variable indicating if household i in state j receives public assistance; X_{ij} is a vector of socioeconomic characteristics defined below; t_{ij} is a dummy variable set to unity if the observation refers to the post-PRWORA period (i.e., calendar years 1997 and 1998); I_{ij} is a vector of two dummy variables indicating if the head of the household is a naturalized citizen or a non-citizen (the left-out variable indicates if the head of the household is native-born); and G_j is the index of the state's welfare generosity towards immigrants, set to unity if the state offered at least three of the programs listed in Table 3 and zero otherwise. Note that the regression specification in (1) simplifies the presentation of the evidence by classifying households into three groups (native, citizen, and non-citizen households), and ignores the distinction between pre- and post-enactment immigrants. I will account for the immigrant's year of entry into the United States by including a vector of variables indicating calendar year of arrival in the vector X. Finally, equation (1) will be estimated using the linear probability model.

The coefficient vector θ_p in equation (1) measures the impact of the state-provided safety net on the *relative* trend in immigrant welfare use. In particular, it measures the extent to which the pre- and post-PRWORA change in welfare participation differs between states that were less generous and states that were more generous. The element of the coefficient vector θ_p pertaining to the non-citizen households should be positive if the state-funded assistance attenuates the adverse impact of federal welfare reform on the relative probability that non-citizen households receive aid.

Table 5 reports the interaction coefficient estimated for the non-citizen households from a number of alternative specifications of the model. The first column of the table does not include any variables in the vector X, so that it is effectively reporting the difference-in-difference-in-difference estimate of the impact of welfare reform that can be calculated from the descriptive

statistics summarized in Table 4.[20] The second column of the table adds a vector of state fixed effects, and these fixed effects are interacted with the time dummy variable (t_i). The state-time interactions capture not only state-specific differences in the level of welfare participation, but also state-specific trends in participation rates (induced perhaps by changing economic and political conditions in different states). The third column adds a vector of country of origin fixed effects to control for potential differences in participation propensities across national origin groups.[21] Finally, the regression reported in column 4 adds a vector of socioeconomic characteristics that describe the skills, economic opportunities, and composition of the household. The socioeconomic characteristics include: the age, gender, and educational attainment of the household head, the number of persons in the household, the number of children, elderly persons, and disabled persons in the household, the log of household income, and the year of arrival in the United States (if the head of the household is foreign-born).[22]

In the most general specification, the magnitude of the triple-difference coefficient θ_p is around .06 for regressions that estimate the probability that the household receives some type of assistance, around .04 for regressions that estimate the probability that the household receives food stamps, and around .03 for regressions that estimate the probability that the household receives cash benefits. The evidence, therefore, strongly suggests that the state-funded programs

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[20] Because the regression ignores the distinction between newly arrived immigrants and earlier immigrants, and because the newly arrived immigrants are almost exclusively non-citizens, there is one missing piece of information that is required to calculate the regression coefficient from the raw data provided in Table 4: the relative number of non-citizens who are new immigrants.

[21] The vector of country-of-birth fixed effects contains 102 dummy variables indicating the birthplace of the household head (if foreign-born).

[22] Throughout the analysis, the variable measuring the age of the household head is a vector of dummy variables indicating if the head is 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, or over 75 years old. Similarly, the variable measuring the educational attainment of the household head is a vector of dummy variables indicating if the head is a high school dropout (less than 12 years), a high school graduate (12 years), has some college (13-15 years), or is a college graduate (at least 16 years). The year of arrival dummy variables indicate if the household arrived after 1995, 1990-94, 1985-89, 1980-84, 1975-79, 1970-74, 1965-69, 1960-64, 1950-59, or before 1950.

helped attenuate the potential chilling effect of federal welfare reform. Equally important, the evidence implies that the state decisions (combined with the fact that welfare reform was targeted mainly to non-citizens and non-refugees) provide a great deal of variation in how the chilling effect differentially affected different groups in the population. This differential impact of welfare reform can be used to define the "treatment" that would help identify if the cutback in public assistance programs initiated by PRWORA increased food insecurity among the targeted households.

IV. Food Insecurity

The previous section showed that state-level decisions to offer alternative programs to immigrants in the aftermath of PRWORA had a substantial impact on the probability that immigrant households received public aid. I now examine if these state choices also influenced food insecurity in the affected households.

The top panel of Table 6 summarizes some of the key trends in food insecurity before and after PRWORA. As before, these trends are presented separately by the level of the state's generosity, and by the immigration status of the household. Consider initially the trends in food insecurity rates experienced by native households. The fraction of native households that is food insecure declined by about 1 percentage point in both the less generous and more generous states. In contrast, the proportion of non-citizen households that is food insecure rose substantially in the less generous states (from 18.9 to 22.9 percent), but declined in the more generous states (from 22.7 to 20.6 percent). Similarly, the fraction of newly arrived immigrant households who are food insecure rose from 11.3 to 16.3 percent in the less generous states, but declined from 16.1 to 14.8 percent in the more generous states. In short, the states that extended public assistance to their immigrant populations after 1996 were able to arrest and reverse the

rise in food insecurity that would likely have occurred had no actions been taken—both in absolute terms and relative to the trends in food insecurity experienced by the native population.

Table 6 also shows a similar rise in food insecurity among the less generous states even when the analysis is restricted to non-refugee households, or to households residing outside California. For example, the food insecurity rate for non-refugee, non-citizen households rose from 18.8 to 23.8 percent in the less generous states, but declined by 2.5 percentage points (from 23.0 to 20.5 percent) in the more generous states. Similarly, the data indicate that these trends cannot be explained by a "California effect." The food insecurity rate of non-citizens living outside California rose by 4 percentage points if they lived in a less generous state, but declined by about 1 percentage point if they lived in a more generous state.

The evidence thus suggests that federal welfare reform—and the subsequent actions taken by individual states—concurrently affected participation in welfare programs and food insecurity in the targeted households. It may be the case that the observed increase in food insecurity can be attributed to the fact that the eligibility restrictions simply increased the number of poor immigrant households, so that the trends documented in the top panel of Table 6 reflect a "scale effect" in vulnerability to food insecurity. It turns out, however, that the eligibility restrictions associated with welfare reform also had a significant impact on the food insecurity of *poor* non-citizen households, so that households that were already vulnerable to food insecurity became even more vulnerable.

The simplest way to document this fact is to replicate the descriptive analysis in the sample of households that lies below the 185% threshold of the poverty line. The bottom panel of Table 6 reports some of the key trends in the poverty sample. The differential trends in food insecurity among the various groups are quite similar to those observed in the entire population. For example, the fraction of poor native households that is food insecure was roughly constant in

both the less generous and more generous states. In contrast, the fraction of poor non-citizen households that is food insecure rose by 3.5 percentage points in the less generous states, and remained constant in the more generous states. The impact of the various statutory changes was perhaps most evident on the sample of poor immigrant households that had just arrived in the United States. The food insecurity rate of these new arrivals increased by almost 9 percentage points (from 19.5 to 28.1 percent) if they chose to live in a less generous state, but rose by only 3 percentage points (from 25.3 to 28.4 percent) if they chose to live in a more generous state. In sum, the evidence clearly suggests that the various changes in welfare regulations had a substantial adverse impact on food insecurity among immigrant households at the bottom end of the income distribution.

To investigate the extent to which these trends can be explained by differences in socioeconomic characteristics among the groups or by state-specific trends in economic or social conditions, consider again the triple-difference regression model:

$$(2) \qquad f_{ij} = X_{ij}\beta + \alpha_0 t_{ij} + \alpha_1 I_{ij} + \alpha_2 G_j + \gamma_0 (I_{ij} \times t_{ij}) + \gamma_1 (I_{ij} \times G_j) + \gamma_2 (G_j \times t_{ij}) + \theta_f (I_{ij} \times G_j \times t_{ij}) + \varepsilon_{ij} ,$$

where f_{ij} is a dummy variable indicating if the household is food insecure. Note that the regression specification in (2) is identical to the one used in the previous section to quantify the impact of welfare reform on welfare participation rates. The coefficient θ_f, however, now measures the impact of the state-provided safety net on the relative trend in immigrant food insecurity.

Table 7 reports the relevant regression coefficients from alternative specifications of the model in equation (2). The key parameter of interest, the element of θ_f that refers to non-citizen

households, is negative and statistically significant in almost all of the specifications. Consider initially, the regression results presented in the first row of the table, which uses the entire sample of households. The unadjusted estimate of θ_f is -.073 (with a standard error of .023). In other words, the pre- and post-PRWORA *relative* growth in the fraction of immigrant households that experienced food insecurity was 7 percentage points lower in the more generous states than in the less generous states. Put differently, the decisions taken by the more generous states to extend a state-funded safety net to immigrants greatly attenuated the impact of federal welfare reform on food insecurity. The remaining columns of the table show that this triple difference estimate of the impact remains the same when the regression adds a vector of variables that interacts state-of-residence fixed effects and time (*t*). These state-time interactions, of course, help control for any state specific differences in both the level and growth of food insecurity. The third column adds a vector of country of origin fixed effects to the model. The coefficient θ_f is now -.063 and significant, indicating that the various statutory changes increased food insecurity for the targeted households even within national origin groups. Finally, the fourth column includes the state/time fixed effects, the country of origin fixed effects, and a vector of variables describing various socioeconomic characteristics of the household. The coefficient θ_f is now -.046, with a standard error of .023.

The remaining rows of the top panel of Table 7 show that the key implication of the regression—that there was a substantial relative increase in food insecurity among non-citizen households living in the less generous states—is not sensitive to various sensitivity tests, such as limiting the analysis to non-refugee households or excluding California from the sample. Similarly, the bottom panel of the panel of the table replicates the regressions in the sample of households that are poor or near-poor. For the most part, the analysis indicates that non-citizen poor households living in the less generous states had a relative increase in the likelihood of

experiencing food insecurity in the post-PRWORA period (though the standard errors are relatively large).

Different Types of State-Funded Assistance

For simplicity, the analysis has aggregated all types of state-funded assistance into a single measure of the state's generosity. This measure indicates if the state offered at least three of the eight programs that states could have offered to their immigrant populations after 1996. It seems sensible to suspect that food insecurity may be more closely related to some particular types of programs than to others. After all, unless all types of aid are completely fungible, states that extended food assistance programs may have eased the potential adverse impact of PRWORA on food insecurity more than the states that offered non-food types of assistance. I now exploit some of the variation in the choices made by the states to examine if the trends in food insecurity are sensitive to the types of programs offered to the immigrant population.

Instead of using a single dummy variable to indicate the state's level of generosity towards immigrants, I now define a vector of dummy variables that indicate: (1) if the state offered only food assistance programs to its immigrant population; (2) if the state offered only non-food programs to its immigrant population (in particular, cash benefits and medical benefits); and (3) if the state offered both food and non-food programs to its immigrant population. I then re-estimated equation (2) using this alternative definition of the generosity index G. Table 8 summarizes the evidence. To simplify the exposition, I only report the estimated of the triple difference interaction term for the most complete specification of the model.

In general, the regression suggests that non-citizen households experienced relative increases in food insecurity *regardless* of the type of program that the state offered to its

immigrant population. The point estimates would seem to indicate that offering non-food programs (perhaps because they may have a larger monetary value) have much larger effects on food insecurity. For example, the relative food insecurity rate declined by 3.4 percentage points if the state offered only food assistance, by 8.8 percentage points if the state offered only non-food assistance, and by 5.1 percentage points if the state offered both types of programs. As the last column of the table shows, however, one cannot typically reject the hypothesis that all types of state-funded program offered to the immigrant population had the same impact on the relative rate of change in food insecurity between 1994 and 1998. The data seem to indicate that what matters is that the state made some effort to limit the scope of the restrictions imposed by PRWORA. Any such reaction helped alleviate the potential impact of welfare reform on food insecurity in the targeted households.

V. Food Expenditures and Food Insecurity

One potential problem with the analysis presented in the previous section is that the measure of food insecurity is subjective. One could conjecture that much of the evidence summarizes a "voice" effect. Immigrants perhaps perceived that both PRWORA and the decisions made by the less-generous states treated them unfairly. They then began to voice their dissatisfaction, and complained that the statutory changes had all types of harmful effects, including an increase in food insecurity.

It is likely, however, that the correlations reported in Tables 7 and 8 measure an actual change in the household's opportunity set. The Food Security Supplements provide limited data on the "usual" weekly food expenditures made by the household. These data are problematic in one important way: the survey instrument differs dramatically in some years, and the screens used to identify the subsample of households that gets asked the battery of food expenditure

questions also varies across surveys. These year-to-year differences in the survey instrument impede any type of analysis that would examine the trends in the household's food expenditures during the period in which welfare reform could have had a chilling effect on immigrant welfare use.

Nevertheless, the data can be used to ascertain if there exists a correlation between a household's reported food expenditures and the household's subjective level of food insecurity. Consider the regression model:[23]

$$\log E_{it} = X_{it}\beta + \phi f_{it} + \tau_{it} + \varepsilon_{it}, \tag{3}$$

where E_{it} gives the household's usual weekly expenditures on food in survey year t; X is a vector of socioeconomic characteristics; f is a dummy variable set to unity if the household is food insecure and zero otherwise; and τ is a fixed effect indicating the survey from which the observation was drawn.[24]

The first row of Table 9 reports the regression coefficient ϕ estimated using alternative specifications for the regression model in (3). The evidence is unambiguous: There is a strong and negative correlation between reported food expenditures and the subjective measure of food insecurity. On aggregate, households that are food insecure spend approximately 20 percent less on food than households that are not food insecure. This correlation persists even after the regression controls for an extensive set of socioeconomic characteristics, including state fixed

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[23] Of course, the regression model in (3) does not represent a structural model between food expenditures and food insecurity. It is simply used as a way of easily summarizing the observed correlations between the two variables.

[24] I use the data from all of the available Food Security Supplements between 1995 and 1999 to estimate equation (3). The mean level of food expenditures (in 1999 dollars) is $94.1 for all households in the sample; $93.1 for native households; and $103.3 for immigrant households.

effects, country of origin fixed effects, and socioeconomic variables describing the age, income, age, and educational attainment of the household head, as well as household composition. In the most complete specification, reported in column (4) of the table, the data indicate that households that are food insecure spend around 5 percent less on food than households that are not.

One can also use the available data to determine if there exists a correlation between the subjective measures of food insecurity and a variable that measures if the household is spending "enough" on food to allow it to purchase a nutritious diet. The United States Department of Agriculture (USDA) defines a market basket that specifies the type and quantity of foods that people could consume at home to obtain a nutritious diet at a minimal cost. In fact, this "Thrifty Food Plan" serves as a national standard for a nutritious diet at a minimal cost and is used as the basis for food stamp allotments.[25] The cost of the thrifty food plan for a particular household member (as calculated by USDA) depends mainly on household composition, particularly the age and sex of the household members. I combine the information on the household's actual food expenditures with the cost of the thrifty food plan to define a dummy variable indicating if the household's expenditures are below those required to purchase the thrifty food plan. It would then be unlikely that the household is allocating sufficient resources to purchase a nutritious diet.[26]

The second row of Table 9 shows that there is a strong positive correlation between the probability that the household is not spending a sufficient amount to purchase the thrifty food plan and the subjective measure of food insecurity. Households that are food insecure have a 20

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[25] See U.S. Department of Agriculture (1999) for a detailed description of the Thrifty Food Plan.

[26] The mean probability that the household is not spending enough on food to purchase the Thrifty Food Plan is 30.3 percent for all households; 30.0 percent for native households; and 34.4 percent for immigrant households.

percent higher probability of spending below the minimum required to purchase the thrifty food plan. Even after controlling for a vast array of differences in socioeconomic characteristics, food-insecure households still have a 6.4 percent higher probability of spending below the minimum required to buy the thrifty food plan.

In sum, the evidence indicates that the subjective measure of food insecurity contained in the Food Security Supplements is strongly correlated with both the actual level of food expenditures, and with the probability that the household is not spending "enough" on food.

VI. Does Public Assistance Reduce Food Insecurity?

The descriptive evidence summarized in the previous sections presents a strong circumstantial case in favor of the hypothesis that public assistance accomplishes one of its key goals, the reduction of food insecurity in the targeted population. In other words, it seems that food insecurity increased most among the households that suffered the greatest shrinkage in welfare opportunities in the post-1996 period (i.e., the non-citizen, non-refugee population living in less generous states). This section examines the causal link between food insecurity and public assistance. Consider the regression model:

$$f_{ij} = W_{ij}\beta + \delta\, p_{ij} + \omega_{ij}, \tag{4}$$

where f_{ij} is a dummy variable indicating the food insecurity status of household i in state j; W_{ij} is a vector of socioeconomic characteristics defined below; and p_{ij} is a dummy variable indicating if the household receives public assistance.

The correlation between f_{ij} and p_{ij} in the population is likely to be positive simply because those households that are most at risk of being food insecure are the ones that qualify for and

receive public assistance. The exogenous variation in welfare eligibility introduced by the immigrant provisions in the welfare reform legislation—accompanied by the responses of individual states to the changes in the federal safety net—can be used to net out this spurious correlation. In other words, the welfare reform legislation *and* subsequent state responses introduced a number of exogenous changes in program eligibility on particular subgroups of the population—with different rules applying to immigrants who differ in their citizenship status, refugee status, and state of residence. I use these exogenous eligibility changes to instrument for program participation in equation (4). The first-stage regression is given by:

$$p_{ij} = X_{ij}\beta + \lambda_1 R_{ij} Z_{ij} + \lambda_2 (1 - R_{ij}) Z_{ij} + v_{ij}, \tag{5}$$

where R_{ij} is a dummy variable set to unity if the household is a refugee household; and the vector $Z_{ij} = (t_{ij}, I_{ij}, G_j, I_{ij} \times t_{ij}, G_j \times t_{ij}, I_{ij} \times G_j, I_{ij} \times G_j \times t_{ij})$. Note that the vector Z_{ij} contains precisely the same set of variables used in the descriptive triple difference regression models estimated in the previous sections. The vector W_{ij} in the second stage regression in equation (4) can then be defined as $W_{ij} = [X_{ij}, R_{ij}\tilde{Z}_{ij}, (1 - R_{ij})\tilde{Z}_{ij}]$, where $\tilde{Z}_{ij} = (t_{ij}, I_{ij}, G_j, I_{ij} \times t_{ij}, G_j \times t_{ij}, I_{ij} \times G_j)$. The identification of the structural coefficient δ then depends entirely on the exclusion of the triple-difference interaction terms from the second-stage regression.[27]

[27] The parameter δ estimates the average impact of the treatment on the treated, namely the impact of public assistance receipt on the food insecurity of households that actually received the assistance; see Angrist, Imbens, and Rubin (1996) for a useful discussion of how to interpret the estimated parameters in this family of structural models. Note also that the available evidence indicates that food expenditures are generally quite income inelastic, so that the household might cut its expenditures on food only as a "last resort" as it tries to satisfy its budget constraint. This would imply that estimates of the parameter δ in equation (4) might underestimate the relative hardship caused by changes in welfare policy; see Attanisio and Weber (1996) for a related discussion. Finally, I estimated the two-equation model using the linear probability model. The results are quite similar if the two equations are estimated using a logistic framework.

As noted earlier, although the Food Security Supplement of the CPS provides limited information on program use by survey participants, the available data is problematic. First, it only contains information on receipt of food assistance. More importantly, the screens used to select the subsample of respondents who would be asked the program participation questions varies haphazardly across years. Because the data required to estimate the system of equations in (4) and (5) is then contained in two separate data sets, I use the technique of Two Sample Instrumental Variables (TSIV) introduced by Angrist and Krueger (1992, 1995). This statistical procedure is particularly useful whenever two data sets share a common set of instruments, but the endogenous regressors and the dependent variable are not jointly included in both data sets. In the current context, the first-stage regression on program participation is estimated using data from the March CPS. These regressions are then used to predict the probability that a particular household in the Food Security Supplements receives public assistance. The predicted probabilities form the regressor that stands in for p_{ij} in the second-stage food insecurity regressions.[28] The standard error of the structural coefficient δ is then corrected for the fact that a predicted variable is used in the second stage.

The first three columns of Table 10 present the key results of the analysis. For illustrative purposes, the first row of the table reports the relevant coefficient from the OLS regression that can be estimated in the Food Security Supplement using the limited data available in that survey on program participation. It is evident that there is a strong positive correlation between receipt of food insecurity and food stamps. Moreover, the coefficient is positive and significant regardless of the set of explanatory variables included in the vector X. This strong positive correlation, of course, does not suggest that food stamps increase food insecurity. Rather they

[28] The method of Two Sample Instrumental Variables leads to consistent estimates of the coefficients as long as the moments estimated from the two samples are independent, a condition that is likely to hold in the present

probably capture the spurious correlation that the households most likely to be food insecure are the ones that most likely qualify for and participate in the food stamp program.

The second row of the table uses TSIV to net this spurious correlation. The dependent variable in the first stage indicates if the household receives *some* type of public assistance (defined as cash benefits, food stamps, and Medicaid). The IV estimate of δ is negative and marginally significant. The magnitude of the coefficient in column 1, which controls for the household's socioeconomic background, but does not include state-time fixed effects and country of origin, is -.532, with a standard error of .304. An increase in the probability of receiving assistance of 10 percentage points roughly cuts down the probability of food insecurity by around 5 percentage points. Note that this numerically large effect is not sensitive to the inclusion of the state-time fixed effects or country of origin fixed effects. In the most complete specification reported in column 3, the coefficient is -.472, with a standard error of .302.[29]

It could be argued that the household's citizenship status (one of the variables used to form the instruments) is itself an endogenous variable. After all, households most affected by welfare reform could choose to neutralize many of the legislation's restrictions by simply becoming U.S. citizens. And, in fact, the number of naturalization applications rose markedly in the 1994-96 period, generating a huge backlog at the Immigration and Naturalization Service.

One can avoid this potential endogeneity problem by using information on birthplace rather than citizenship status to create the instruments. In particular, I classify households as

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context.

[29] It is instructive to provide a back-of-the-envelope calculation of the Two Sample Instrumental Variables methodology to get a sense of the size of the structural effect suggested by the reduced-form evidence summarized in the previous sections. Consider a population that consists only of native and non-citizen households. There would only be one triple-difference interaction term in the reduced form models, so that the model is exactly identified. The first row of Table 5 suggests that the reduced-form impact of welfare reform on program participation would be around .063 (in the most complete specification). Similarly, the first row of Table 7 indicates that the approximate reduced-form impact of welfare reform on food insecurity is –.046. The TSIV estimate of the structural coefficient, which in the exactly identified case is equivalent to the Wald estimator is $\delta = \theta_f/\theta_p = -.046/.063 = -.730$.

"native" and "immigrant" depending entirely on the birthplace of the household head. I use this classification to define the single dummy variable that now makes up the vector I_i (this vector, in turn, plays a crucial role in defining the triple-difference interaction terms that enter Z_i in the first-stage regression). Columns (4)-(6) of Table 10 shows that the results are essentially unchanged when I use this alternative set of instrumental variables (although the standard errors are slightly higher). In the most complete specification, the coefficient δ is -.441, with a standard error of .305. The similarity between the two sets of results likely occurs because the household's citizenship status can be predicted with some accuracy using information on socioeconomic characteristics, country of birth, and year of arrival.[30]

A potentially interesting application of the methodological approach would be to determine which types of public assistance programs—food stamps, cash benefits, or other types of aid—have the biggest impact on reducing food insecurity. Ideally, one could expand the specification in equation (4) by including various programs on the right-hand-side of the equation, so that each type of program could have a different structural impact on food insecurity.

Of course, the relevant parameters would be identified only if participation in each of the programs could be instrumented using slightly different sets of exogenous variables. In theory, the interstate difference in the types of state-funded assistance provided to the immigrant population after 1996 could be used to identify this expanded model. After all, some states chose to extend food assistance programs to their immigrant households, other states chose to extend

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[30] Yet another identification approach would exclude the native population from the analysis and identify the structural effect from the triple difference interaction terms that measure the changes experienced by non-citizens relative to citizens, and the changes experienced by newly arrived immigrant households relative to citizens. Although this approach leads to similar point estimates, the sample is much smaller (13,189 observations) and the standard errors are much larger. As a result, none of the estimated structural coefficients is even marginally significant. The structural coefficient that is analogous to the estimate in column (1) of Table 10 is - 1.075 (with a

cash benefit programs, other states chose to extend medical benefits, and some states chose to extend various combinations of these programs. Unfortunately, the interstate dispersion in the types of state-funded programs extended to immigrants is not sufficient to identify the various parameters reliably. If, for example, food stamp participation is instrumented with data indicating if the state extended food assistance programs to its immigrant population, and cash benefit participation is instrumented with data indicating if the state extended cash benefits to its immigrant population, the correlation between the two predicted probabilities is .98. Consequently, the coefficients on the predicted coefficients in the first-stage regression have very high standard errors.

An alternative approach would be simply to use alternative measures of program participation as the endogenous variable in equation (4). In particular, instead of regressing food insecurity on a (predicted) variable indicating if the household receives some type of assistance, one could regress food insecurity on a (predicted) variable indicating if the household receives food stamps.[31] The third row of Table 10 reports the structural coefficients obtained from this regression. It is evident that food stamp receipt has a strong negative impact on food insecurity, with the coefficient hovering around -.5. The remaining rows of Table 10 illustrate what happens when food insecurity is related to participation in other programs. The negative impact of program participation on food insecurity is largest when the right-hand-side variable measures participation in either food stamps or cash benefits. Participation in other programs, such as

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standard error of .925). The inclusion of state-time fixed effects changes the coefficient to -.522 (.756), and the further inclusion of the country of origin fixed effects changes the coefficient to -.470 (.684).

[31] The TSIV estimates reported in rows 2 through 6 of Table 10 all use the same set of right-hand-side variables in the first-stage regression. In particular, the generosity index (*G*) used in all of the regressions indicates whether the state offered at least 3 of the 8 possible programs to the immigrant population. I also experimented with an expanded definition of the generosity index, which I defined as a vector indicating if the state offered food benefits, non-food benefits, or both types of benefits, and used this vector as the basis for defining the variables on the right-hand-side of the first stage. The results were quite similar to those reported in Table 10.

Medicaid or housing assistance, has weaker impacts on food insecurity. The coefficients reported in Table 10, therefore, provide some weak evidence suggesting that food stamps may play a somewhat unique role in reducing food insecurity among vulnerable households. It is important to stress that the standard errors of these structural coefficients are quite large, so that it is not possible to reject the hypothesis that all programs have the same effect on food insecurity.

Part of the difficulty in identifying the unique role that might be played by food stamps likely arises because there are important interactions in participation among the various programs. As a result, it is relatively rare for households to receive only one particular type of assistance. More typically, households participate in two or three of the programs at the same time. For example, 62.1 percent of the households receiving cash benefits also receive food stamps, 80.4 percent of the households receiving Medicaid also receive food stamps, and 45.6 percent of the households receiving housing assistance also receive food stamps. As a result, it should not be surprising that it is difficult to isolate the particular impact of a single program on food insecurity.

Finally, the interpretation of the evidence presented in Table 10 as providing evidence of a causal link between public assistance programs and food insecurity implicitly assumes that the state decisions on extending state-funded assistance to immigrants were exogenous. As the summary of choices reported in Table 3 shows, however, the list of more generous states is far from random. In particular, it is clear that states with large immigrant populations were much more likely to be generous in the post-1996 period.

From a purely economic perspective, the responses made by the states with large immigrant populations seem puzzling. One could have easily argued that once Congress granted states the opportunity to offer state-specific welfare policies, many of the states most adversely affected by immigrant welfare use would have chosen *not* to pursue policies that further

encouraged welfare use (and at the state's expense). Yet this race to the bottom did not occur. In contrast, the data suggest that the states with the largest immigrant populations were the ones that extended the most generous safety nets to immigrants. This choice is consistent with a model where the state choices were determined in a political equilibrium with the immigrant population having a substantial voice.

The endogeneity of the state choices would bias the results of this study (and the conclusion that public assistance helps reduce food insecurity) if the states that offered the more generous programs were also the states where food insecurity in the immigrant population was going to fall in any case. It is unlikely, however, that this situation accurately describes the data. It is well known that immigrants who live in high-immigrant areas tend to do worse than immigrants who live in other states (Altonji and Card, 1991; LaLonde and Topel, 1991). This fact suggests that the states that offered the most generous programs to immigrants were the states where food insecurity would have probably been a more serious problem after 1996. If this interpretation is valid, the structural coefficients estimated in Table 10 underestimate the true impact of the state-funded assistance on the food insecurity of immigrant households.

VII. Summary

The central objective of many of the programs that make up the welfare state is to help needy families attain a sufficient level of consumption in many of life's necessities, such as housing, health care, and food. Although a large literature evaluates the social and economic costs of these programs, relatively fewer studies address the issue of whether the programs are actually successful in terms of their stated goals—that is, do these programs help the targeted households avoid homelessness, chronic illnesses, and hunger? This paper evaluated the extent to which these programs help needy families escape the prospect of food insecurity.

The 1996 welfare reform legislation contained a number of crucial provisions that greatly limited the eligibility of immigrant households to receive many types of public assistance. In response to the federal legislation, many states chose to protect their immigrant populations from the presumed adverse impact of PRWORA by offering state-funded assistance to these groups. The empirical analysis uses data drawn from the 1995-99 Annual Demographic Files and the Food Security Supplements of the CPS to determine if these changes in the eligibility rules had a substantial impact on food insecurity in the immigrant population.

The study yields two key empirical findings. First, the immigrants most likely to be adversely affected by the welfare reform legislation—the non-refugee, non-citizen population living in states that did not extend post-PRWORA assistance to immigrants—did, in fact, experience a significant relative decline in the likelihood of welfare receipt. At the same time, this population also experienced a significant relative increase in food insecurity. By combining data from the two samples, the evidence suggests that eligibility restrictions that cut back the fraction of welfare recipients by 10 percentage points likely increase the fraction of households experiencing food insecurity by 5 percentage points. The data, therefore, provide some evidence to support the hypothesis that welfare programs achieve one of their key objectives, providing households with a minimal level of food sufficiency.

The findings of this paper have policy implications for two of the most contentious issues in the debate over social policy. The results clearly suggest that adverse changes in welfare eligibility rules have adverse outcomes. In other words, although tightened eligibility rules reduce the cost of welfare expenditures, they also aggravate the social ills that the programs were designed to address. This tradeoff has been largely ignored by most social science research that attempts to quantify the costs and benefits of the welfare state.

The findings also have key implications for immigration policy. The earliest restrictions on immigration in the United States—dating back to the Colonial days—enacted limitations on the potential migration of "public charges." There is little disagreement over the fact that immigrant use of public assistance grew rapidly in the past three decades. Congress perceived an actual problem, and tried to do something about it by including a number of immigrant-related provisions in the welfare reform legislation. It seems, however, that there may be a significant social cost to limiting eligibility to public assistance programs in a disadvantaged population. The evidence, therefore, suggests that it may be easier and cheaper to address the problems raised by the immigration of public charges not by "ending welfare as we know it," but by reforming immigration policy instead.

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Appendix: Measurement of Food Insecurity

The Food Security Supplements of the CPS contain an 18-item array of questions that are combined to create the food insecurity index used in this paper. The questions are:

Now I'm going to read you several statements that people have made about their food situation. Please tell me whether the statement was often, sometimes, or never true in the last 12 months:

1. "I worried whether our food would run out before we got money to buy more."
2. "The food that we bought just didn't last, and we didn't have money to get more."
3. "We couldn't afford to eat balanced meals."
4. "We relied on only a few kinds of low-cost food to feed the children because we were running out of money to buy food."
5. "We couldn't feed the children a balanced meal because we couldn't afford that."
6. "The children were not eating enough because we just couldn't afford enough food."

Additional questions:

7. In the last 12 months, did you or other adults in your household ever cut the size of your meals or skip meals because there wasn't enough money for food?
   8. How often did this happen—almost every month, some months but not every month, or in only one or two months?

9. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?

10. In the last 12 months, were you ever hungry but didn't eat because you couldn't afford enough food?

11. Sometimes people lose weight because they don't have enough to eat. In the last 12 months, did you lose weight because there wasn't enough food?

12. In the last 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?
    13. How often did this happen—almost every month, some months but not every month, or in only one or two months?

14. In the last 12 months, did you ever cut the size of any of the children's meals because there wasn't enough money for food?

15. In the last 12 months, did any of the children ever skip meals because there wasn't enough money for food?
    16. How often did this happen—almost every month, some months but not every month, or in only one or two months?

17. In the last 12 months, were the children ever hungry but you just couldn't afford more food?

18. In the last 12 months, did any of the children ever not eat for a whole day because there wasn't enough money for food?

Table 1. Alien Eligibility for Means-Tested Federal Programs

Category of alien:	Program			
	SSI	Food stamps	Medicaid	TANF
Non-citizen arrived before 8/22/96	Eligible, if receiving SSI on 8/22/96, or subsequently disabled	Eligible, if age 65 or over on 8/22/96, or under age 18, or subsequently disabled	Eligible, for SSI-derivative benefits; otherwise, eligibility is a state option	Eligibility is a state option
Non-citizen arrived after 8/22/96	Not eligible	Not eligible	Eligible for emergency services only	Not eligible
Refugees and asylees	Eligible	Eligible	Eligible	Eligible
Non-immigrants and illegal aliens	Not eligible	Not eligible	Eligible for emergency services only	Not eligible

Source and notes: Vialet and Eig (1998), Table 1. Non-immigrants include foreign-born persons who are in the United States on a temporary basis, such as foreign students and tourists. The information provided for non-citizens who arrived after 8/22/96 and for refugee and asylees refers to their eligibility status during the first five years after arrival.

Table 2. Trends in Program Participation and Food Insecurity

		Calendar Year				
		1994	1995	1996	1997	1998
March CPS:						
Percent receiving assistance	Natives	15.6	15.0	15.3	14.0	13.4
	Immigrants	23.4	23.9	21.9	20.2	20.0
	Citizens	14.3	15.8	16.1	16.5	16.3
	Non-citizens	29.4	29.3	26.6	27.2	22.9
Percent receiving food stamps	Natives	8.7	8.1	8.0	6.8	6.0
	Immigrants	12.5	11.7	10.1	9.3	7.5
	Citizens	6.0	6.9	6.1	6.3	5.4
	Non-citizens	16.7	14.9	13.2	11.6	9.3
Food Security Supplements:						
Percent food insecure	Natives	11.3	10.9	9.1	11.3	9.5
	Immigrants	17.9	15.2	13.3	16.8	14.9
	Citizens	9.6	9.5	8.4	11.7	10.0
	Non-citizens	23.4	19.4	17.4	21.2	19.1
Percent food insecure in poverty sample	Natives	25.5	25.3	21.9	27.3	25.4
	Immigrants	31.4	27.8	23.2	31.2	30.8
	Citizens	22.5	19.9	17.3	24.6	25.3
	Non-citizens	34.8	31.3	26.1	34.8	33.3

Notes: The household receives assistance if it receives cash benefits, food stamps, or Medicaid. The timing of the data differs somewhat for the food insecurity rates. The Food Security Supplements of the CPS are the April 1995, September 1996, April 1997, August 1998, and April 1999 surveys. Although the food insecurity rates refer to the 12-month period prior to the survey, this table simplifies the exposition by reporting the food insecurity rates as if they referred to the calendar year prior to the survey. The poverty sample contains households that lie below the 185% threshold of the poverty line.

Table 3. State-Funded Assistance to Immigrants After 1996

	Pre-enactment immigrants				Post-enactment immigrants			
State	TANF	Medicaid	Food Assistance	SSI	TANF	Medicaid	Food Assistance	SSI
Alabama	No	Yes	No	No	No	No	No	No
Alaska	Yes	Yes	No	No	No	No	No	No
Arizona	Yes	Yes	No	No	No	No	No	No
Arkansas	Yes	Yes	No	No	No	No	No	No
California	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Colorado	Yes	Yes	No	No	No	No	Yes	No
Connecticut	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Delaware	Yes	Yes	No	No	No	Yes	No	No
District of Columbia	Yes	Yes	No	No	No	No	No	No
Florida	Yes	Yes	Yes	No	No	No	No	No
Georgia	Yes	Yes	No	No	Yes	No	No	No
Hawaii	Yes	Yes	No	No	Yes	Yes	No	No
Idaho	Yes	Yes	No	No	No	No	No	No
Illinois	Yes	Yes	Yes	Yes	No	Yes	No	No
Indiana	Yes	Yes	No	No	No	No	No	No
Iowa	Yes	Yes	No	No	No	No	No	No
Kansas	Yes	Yes	No	No	No	No	No	No
Kentucky	Yes	Yes	No	No	No	No	No	No
Louisiana	Yes	Yes	No	No	No	No	No	No
Maine	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maryland	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Massachusetts	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Michigan	Yes	Yes	No	No	No	No	No	No
Minnesota	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Mississippi	Yes	Yes	No	No	No	No	No	No
Missouri	Yes	Yes	Yes	No	Yes	No	No	No
Montana	Yes	Yes	No	No	No	No	No	No
Nebraska	Yes	Yes	Yes	No	Yes	Yes	Yes	No
Nevada	Yes	Yes	No	No	No	No	No	No
New Hampshire	Yes	Yes	No	Yes	No	No	No	No
New Jersey	Yes	Yes	Yes	No	No	No	No	No
New Mexico	Yes	Yes	No	No	No	No	No	No
New York	Yes	Yes	Yes	No	No	No	No	No
North Carolina	Yes	Yes	No	No	No	No	No	No
North Dakota	Yes	Yes	No	No	No	No	No	No
Ohio	Yes	Yes	Yes	No	No	No	No	No
Oklahoma	Yes	Yes	No	No	No	No	No	No
Oregon	Yes	Yes	No	Yes	Yes	No	No	Yes
Pennsylvania	Yes	Yes	No	No	Yes	Yes	No	No
Rhode Island	Yes	Yes	Yes	No	Yes	Yes	No	No
South Carolina	Yes	Yes	No	No	No	No	No	No
South Dakota	Yes	Yes	No	No	No	No	No	No
Tennessee	Yes	Yes	No	No	Yes	No	No	No
Texas	Yes	Yes	Yes	No	No	No	No	No
Utah	Yes	Yes	No	No	Yes	No	No	No
Vermont	Yes	Yes	No	No	Yes	No	No	No
Virginia	Yes	Yes	No	No	No	Yes	No	No
Washington	Yes	Yes	Yes	No	Yes	Yes	Yes	No
West Virginia	Yes	Yes	No	No	No	No	No	No
Wisconsin	Yes	Yes	Yes	No	Yes	No	Yes	No
Wyoming	Yes	No	No	No	Yes	No	No	No
States offering program	50	50	17	5	19	14	10	3

Source: Zimmermann and Tumlin (1999, Table 5). The state-funded programs for post-enactment immigrants are offered during the (federal) five-year bar following the time of entry into the United States.

Table 4. Trends in Program Participation
(Percent of households receiving assistance)

	Households in less generous states				Households in more generous states			
	Natives	Citizen	Non-citizen	New Arrivals	Natives	Citizen	Non-citizen	New arrivals
Some type of assistance								
Entire sample								
Pre-1996	16.8	15.1	29.8	20.7	14.7	14.8	30.3	24.5
Post-1996	14.5	12.7	16.9	11.9	13.4	16.9	24.5	19.3
Non-refugee households								
Pre-1996	16.8	16.0	30.1	17.1	14.7	14.7	28.8	18.0
Post-1996	14.5	12.4	17.4	9.3	13.4	15.8	23.4	15.2
Non-California households								
Pre-1996	16.8	15.1	29.8	20.7	14.7	13.4	25.7	22.3
Post-1996	14.5	12.7	16.9	11.9	13.4	16.3	22.8	19.2
Food stamps								
Entire sample								
Pre-1996	9.4	6.3	17.6	12.8	8.0	6.2	16.1	14.2
Post-1996	7.2	3.1	8.0	2.3	6.1	6.1	11.0	9.7
Non-refugee households								
Pre-1996	9.4	6.4	18.0	9.6	8.0	6.0	14.4	7.9
Post-1996	7.2	3.0	8.6	.5	6.1	5.3	9.9	6.9
Non-California households								
Pre-1996	9.4	6.3	17.6	12.8	8.3	6.7	15.8	13.6
Post-1996	7.2	3.1	8.0	2.3	6.2	6.7	10.7	9.4
Cash benefits								
Entire sample								
Pre-1996	7.8	6.9	10.7	9.7	7.7	6.9	15.6	12.7
Post-1996	6.6	3.8	5.0	2.9	6.2	8.3	10.8	8.5
Non-refugee households								
Pre-1996	7.8	7.2	9.7	7.2	7.7	7.0	13.4	6.6
Post-1996	6.6	3.5	4.8	2.0	6.2	7.4	9.3	5.3
Non-California households								
Pre-1996	7.8	6.9	10.9	9.7	7.5	6.1	12.7	9.3
Post-1996	6.6	3.8	5.0	2.9	6.0	7.8	10.2	8.8

Notes: The household receives some type of assistance if it receives cash benefits, food stamps, or Medicaid. The sample of citizen and non-citizen households includes households where the head arrived prior to 1992 in the "Pre-1996" data, and prior to 1996 in the "Post-1996" data. The sample of newly arrived immigrants includes households where the head arrived between 1992 and 1995 in the "Pre-1996" data, and between 1996 and 1998 in the "Post-1996" data.

Table 5. Impact of Welfare Reform on Program Participation, Triple Difference Estimates (Non-citizen households relative to native households)

	Regression model			
Dependent variable / sample:	(1)	(2)	(3)	(4)
Any type of assistance				
All households	.045	.047	.052	.063
	(.022)	(.023)	(.023)	(.020)
Non-refugee households	.047	.048	.050	.065
	(.024)	(.024)	(.024)	(.021)
Non-California households	.073	.073	.075	.078
	(.022)	(.023)	(.023)	(.020)
Food stamps				
All households	.037	.030	.030	.035
	(.017)	(.017)	(.020)	(.015)
Non-refugee households	.042	.033	.032	.042
	(.017)	(.018)	(.018)	(.016)
Non-California households	.038	.035	.033	.031
	(.017)	(.017)	(.017)	(.015)
Cash benefits				
All households	.014	.016	.017	.026
	(.016)	(.016)	(.016)	(.015)
Non-refugee households	.013	.014	.013	.024
	(.017)	(.017	(.017)	(.016)
Non-California households	.038	.037	.038	.042
	(.016)	(.016)	(.016)	(.015)
Controls for:				
State-time fixed effects	No	Yes	Yes	Yes
Country of birth fixed effects	No	No	Yes	Yes
Socioeconomic characteristics	No	No	No	Yes

Notes: Standard errors are reported in parentheses. There are 207,752 observations in the entire sample, 204,563 observations in the non-refugee sample, and 189,795 observations in the non-California sample. The vector of state-time fixed effects include a dummy variable for each state, as well as the interaction between that variable and a dummy variable indicating if the observation was drawn from the "pre-1996" or "post-1996" period. The vector of country of birth fixed effects includes 102 variables that indicate the birthplace of the household head (if foreign-born); the omitted variable indicates if the household head is native-born. The "socioeconomic characteristics" include the age, sex, and educational attainment of the household head, the total number of persons, children, elderly persons, and disabled persons in the household, the log of family income, and a vector of dummy variables indicating the household's year of arrival in the United States.

Table 6. Trends in Food Insecurity
(Percent of households that are food insecure)

	Households in less generous states				Households in more generous states			
	Natives	Citizen	Non-citizen	New Arrivals	Natives	Citizen	Non-citizen	New Arrivals
Entire Population								
All households								
Pre-1996	11.9	7.4	18.9	11.3	10.8	9.8	22.7	16.1
Post-1996	10.6	8.7	22.9	16.3	10.3	11.0	20.6	14.8
Non-refugee households								
Pre-1996	11.9	7.0	18.8	12.0	10.8	10.0	23.0	15.3
Post-1996	10.6	9.3	23.8	15.5	10.3	11.6	20.5	13.1
Non-California households								
Pre-1996	11.9	7.4	18.9	11.3	10.7	8.8	20.4	13.4
Post-1996	10.6	8.7	22.9	16.3	10.1	10.7	19.0	15.6
Poverty sample								
All households								
Pre-1996	24.9	17.1	31.6	19.5	25.6	21.6	34.8	25.3
Post-1996	24.7	20.8	35.1	28.1	27.2	25.5	34.5	28.4
Non-refugee households								
Pre-1996	24.9	17.6	32.1	21.4	25.6	21.8	34.1	25.3
Post-1996	24.7	23.5	36.4	28.0	27.2	27.5	34.6	26.2
Non-California households								
Pre-1996	24.9	17.1	31.6	19.5	25.1	20.0	34.1	22.3
Post-1996	24.7	20.8	35.1	28.1	26.5	25.8	32.6	29.0

Note: The poverty sample contains households that lie below the 185% threshold of the poverty line. The sample of citizen and non-citizen households includes households where the head arrived prior to 1992 in the "Pre-1996" data, and prior to 1996 in the "Post-1996" data. The sample of newly arrived immigrants includes households where the head arrived between 1992 and 1995 in the "Pre-1996" data, and between 1996 and 1998 in the "Post-1996" data.

Table 7. Impact of Welfare Reform on Food Insecurity, Triple Difference Estimates (Non-citizen households relative to native households)

	Regression model			
	(1)	(2)	(3)	(4)
Entire population:				
All households	-.073	-.074	-.063	-.046
	(.023)	(.023)	(.023)	(.023)
Non-refugee households	-.084	-.087	-.074	-.049
	(.024)	(.025)	(.025)	(.024)
Non-California households	-.060	-.063	-.057	-.050
	(.023)	(.023)	(.023)	(.024)
Poverty sample:				
Entire sample	-.065	-.067	-.047	-.041
	(.044)	(.046)	(.046)	(.044)
Non-refugee households	-.076	-.080	-.059	-.047
	(.047)	(.048)	(.049)	(.044)
Non-California households	-.068	-.074	-.056	-.051
	(.044)	(.046)	(.046)	(.046)
Controls for:				
State-time fixed effects	No	Yes	Yes	Yes
Country of birth fixed effects	No	No	Yes	Yes
Socioeconomic characteristics	No	No	No	Yes

Notes: Standard errors are reported in parentheses. In the entire population, there are 163,902 observations in total, 161,831 observations in the non-refugee sample, and 151,363 observations in the non-California sample. In the poverty sample, there are 51,112 observations in total, 50,219 observations in the non-refugee sample, and 47,120 observations in the non-California sample. The vector of state-time fixed effects include a dummy variable for each state, as well as the interaction between that variable and a dummy variable indicating if the observation was drawn from the "Pre-1996" or "Post-1996" period. The vector of country of birth fixed effects includes 102 variables that indicate the birthplace of the household head (if foreign-born); the omitted variable indicates if the household head is native-born. The "socioeconomic characteristics" include the age, sex, and educational attainment of the household head, the total number of persons, children, elderly persons, and disabled persons in the household, the log of family income, and a vector of dummy variables indicating the household's year of arrival in the United States.

Table 8. Differential Impact of State-Funded Programs, Triple-Difference Estimates (Non-citizen households relative to native households)

	State-funded programs offered to immigrants			
	Only food assistance programs	Only non-food programs	Both food and non-food programs	Test for equality of coefficients: *F* statistic (*p*-value)
Entire population				
All households	-.034	-.088	-.051	1.93
	(.024)	(.034)	(.024)	(.15)
Non-refugee households	-.040	-.079	-.053	.99
	(.025)	(.036)	(.025)	(.37)
Non-California households	-.035	-.092	-.068	2.73
	(.023)	(.033)	(.028)	(.07)
Poverty sample				
All households	-.028	-.134	-.043	1.38
	(.047)	(.073)	(.047)	(.25)
Non-refugee households	-.043	-.127	-.050	.81
	(.049)	(.076)	(.049)	(.45)
Non-California households	-.024	-.131	-.085	2.07
	(.046)	(.072)	(.057)	(.13)

Notes: Unless otherwise noted, standard errors are reported in parentheses. In the entire population, there are 163,902 observations in total, 161,831 observations in the non-refugee sample, and 151,363 observations in the non-California sample. In the poverty sample, there are 51,112 observations in total, 50,219 observations in the non-refugee sample, and 47,120 observations in the non-California sample. The vector of state-time fixed effects include a dummy variable for each state, as well as the interaction between that variable and a dummy variable indicating if the observation was drawn from the "Pre-1996" or "Post-1996" period. The vector of country of birth fixed effects includes 102 variables that indicate the birthplace of the household head (if foreign-born); the omitted variable indicates if the household head is native-born. The "socioeconomic characteristics" include the age, sex, and educational attainment of the household head, the total number of persons, children, elderly persons, and disabled persons in the household, the log of family income, and a vector of dummy variables indicating the household's year of arrival in the United States.

Table 9. Relation between Food Expenditures and Food Insecurity

	Regression model			
	(1)	(2)	(4)	(5)
Dependent Variable				
Entire sample				
Log of usual food expenditures	-.197	-.202	-.054	-.054
	(.005)	(.005)	(.004)	(.004)
Usual food expenditures ÷ cost of thrifty food plan	.196	.197	.063	.064
	(.003)	(.003)	(.003)	(.003)
Controls for:				
State-time fixed effects	No	Yes	Yes	Yes
Socioeconomic characteristics	No	No	Yes	Yes
Country of birth fixed effects	No	No	No	Yes

Notes: Standard errors are reported in parentheses. The regressions pool all the data available in the Food Security Supplements between 1995 and 1999, and include dummy variables indicating the survey from which the observation is drawn. The regressions have 191,246 observations. The vector of state fixed effects includes a dummy variable for each state. The vector of country of birth fixed effects includes 102 variables that indicate the birthplace of the household head (if foreign-born); the omitted variable indicates if the household head is native-born. The "socioeconomic characteristics" include the age, sex, and educational attainment of the household head, the total number of persons, children, elderly persons, and disabled persons in the household, the log of family income, and a vector of dummy variables indicating the household's year of arrival in the United States.

Table 10. The Impact of Public Assistance on Food Insecurity

	Specification					
	Using citizenship status			Using immigration status		
Type of program participation:	(1)	(2)	(3)	(4)	(5)	(6)
1. Food stamps (OLS)	.216	.216	.216	.216	.216	.217
	(.003)	(.003)	(.003)	(.003)	(.003)	(.003)
2. Any type of assistance (TSIV)	-.532	-.515	-.472	-.532	-.506	-.441
	(.304)	(.297)	(.302)	(.312)	(.303)	(.305)
3. Food stamps (TSIV)	-.539	-.569	-.556	-.678	.775	-.720
	(.357)	(.401)	(.430)	(.397)	(.464)	(.498)
4. Cash benefits (TSIV)	-.400	-.395	-.322	-.810	-.774	-.733
	(.457)	(.450)	(.475)	(.474)	(.464)	(.507)
5. Medicaid (TSIV)	-.472	-.457	-.414	-.604	-.567	-.493
	(.351)	(.338)	(.342)	(.354)	(.340)	(.341)
6. Housing assistance (TSIV)	-.335	-.309	-.320	-.550	-.528	-.461
	(.519)	(.519)	(.570)	(.322)	(.316)	(.319)
Controls for:						
Socioeconomic characteristics	Yes	Yes	Yes	Yes	Yes	Yes
State-time fixed effects	No	Yes	Yes	No	Yes	Yes
Country of birth fixed effects	No	No	Yes	No	No	Yes

Notes: Standard errors are reported in parentheses. The regressions have 150,943 observations. Columns (1)-(3) use the household citizenship status to construct the vector of instruments; columns (4)-(6) use information on whether the household was born in the United States to construct the vector of instruments. All of the variables included in the first-stage regression, except for the triple-difference interaction terms, are included in all second-stage regressions. The vector of state-time fixed effects include a dummy variable for each state, as well as the interaction between that variable and a dummy variable indicating if the observation was drawn from the "Pre-1996" or "Post-1996" period. The vector of country of birth fixed effects includes 102 variables that indicate the birthplace of the household head (if foreign-born); the omitted variable indicates if the household head is native-born. The vector of "socioeconomic characteristics" includes the age, sex, and educational attainment of the household head, the total number of persons, children, elderly persons, and disabled persons in the household, the log of family income, and a vector of dummy variables indicating the household's year of arrival in the United States.