The Decline, Rebound, and Further Rise in SNAP Enrollment: Disentangling Business Cycle Fluctuations and Policy Changes

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Abstract

1-in-7 Americans received benefits from the Supplemental Nutrition Assistance Program in July 2011, an all-time high. We analyze changes in SNAP enrollment over the past two decades. Business cycle fluctuations correlate strongly with SNAP take up, with a sustained one percentage point increase in the unemployment rate raising SNAP enrollment by 18 percent. Policy changes had different impacts in different periods. From 1994 to 2001, coincident with welfare reform, take-up fell from 75 percent to 54 percent of eligible people, with this decline attributable to both the strong economy and to welfare reform. The take-up rate then rebounded, and, following several policy changes to improve program access, stabilized at 69 percent in 2007. At least half of the increase in take-up during this period was policy-driven. Finally, take-up rose dramatically in the Great Recession, reaching 87 percent in 2011. We find that changes in local unemployment can explain 73 percent the increase in enrollment during the Great Recession and temporary rule changes that are triggered when unemployment is high can explain another 10 percent. Permanent state-level policy expansions can explain only 8 percent. Thus most of the recession-era increase in SNAP enrollment was the result of the program’s automatic stabilizer features.

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1 Introduction

In July 2011, 45.3 million people were enrolled in the Supplemental Nutrition Assistance Program (SNAP), fifteen percent of the US population.\(^2\) This was a sharp increase from 26.6 million and nine percent of the population in July 2007. There has been considerable debate about the growth in SNAP enrollment in the aftermath of the 2007-2009 recession. Researchers at the US Department of Agriculture (Hanson and Oliveira (2012)) analyzed national annual time series evidence and concluded that the increase in unemployment rates can explain most of the growth, while Mulligan (2012) found that changes in SNAP policies played a central role. In this paper, we examine the impact of both local economic conditions and state-level SNAP policies in an attempt to explain trends in SNAP enrollment over the past twenty years and to bring new data to bear on the debate over recent SNAP enrollment.

This analysis is also important for understanding the extent to which SNAP enrollment should be viewed as an “automatic stabilizer,” rising directly in response to unemployment, or, alternatively, as a deliberate fiscal policy response to the recession. In the aftermath of the 1996 conversion of cash assistance to a block grant, SNAP has emerged as one of the most important automatic stabilizers in the US safety net (Bitler and Hoynes (2013)). There is a wide consensus among economists that automatic stabilizers are good policy for responding to business cycles, but there is considerable disagreement over the usefulness of discretionary fiscal policy.\(^3\) Blanchard et al. (2010) distinguish between two kinds of automatic stabilizers – progressive tax-and-transfer schedules, which have permanent fiscal costs and incentive consequences, and temporary policies which respond to unemployment, which they view as “more

\(^2\)The 2008 Farm Bill changed the program name from the “Food Stamp Program” to the “Supplemental Nutrition Assistance Program.” We use SNAP throughout the paper to refer to this program, regardless of time period. Similarly, we use the term “cash assistance” to refer to both Aid to Families with Dependent Children and Transitional Aid to Needy Families.

\(^3\)See Auerbach (2003) for a critique of fiscal policy responses and Blinder (2006) for a response to the critics of fiscal policy.
promising.” Blundell and Pistaferri (2003) and Gundersen and Ziliak (2003) estimate the consumption insurance provided by SNAP, which fits Blanchard’s first type of automatic stabilizer, while this paper highlights the response of SNAP to unemployment, consistent with Blanchard’s second kind of stabilizer. In other recent work, McKay and Reis (2013) argue that SNAP is particularly effective as an automatic stabilizer.

Figure 1 shows the percent of the US population enrolled in SNAP and estimates of the SNAP take-up rate. A household’s eligibility for SNAP is determined administratively on a monthly basis. Because monthly household income is volatile and not all of the information needed to establish eligibility is available in household surveys, it is quite difficult to estimate the number of people who are eligible for SNAP at a point in time. Mathematica Policy Research (Eslami et al. (2012)) produces estimates of eligibility using data on annual income in the March Current Population Survey, combined with adjustment procedures for a variety of program requirements including legal residency, asset tests, and work requirements. While this procedure clearly involves some measurement error, changes in estimated take-up closely track changes in the percent of the population enrolled in SNAP, a calculation that can be done more directly by combining administrative data on enrollment and Census Bureau estimates of the overall US population. Take-up fell from 75 percent in 1994 to 54 percent in 2001. It then rebounded up to 69 percent in 2006. Finally, take-up rose significantly in the recent recession, reaching 85 percent in 2011.

After providing an overview of the SNAP program in Section 2, we begin our analysis in Section 3 where we examine the relationship between unemployment and SNAP enrollment at the county level for the entire 1992-2011 time period. Using both OLS regressions and Bartik-style IV regressions that instrument for local unemployment with changes in industry shares, we demonstrate that there is a tight connection between local unemployment and SNAP enrollment. A sustained 1 percentage point increase in the unemployment rate leads to an 18 percent increase in SNAP enrollment.
Next, we compare predicted changes in the SNAP enrollment rate based upon these regression estimates with actual changes in the SNAP enrollment rate. Variation in unemployment rates can explain most of the variation in SNAP enrollment during the 1992-2000 welfare reform period and the 2007-2011 Great Recession period, but not during the 2000-2007 period. We use this observation to motivate our analysis in Section 4 of the impact of policy changes on SNAP enrollment in three different time periods: Welfare Reform, Bush-Era Modernization, and the Great Recession.

In the early 1990’s, states began experimenting with their cash assistance policies, culminating in the passage of federal welfare reform in 1996. Cash assistance receipt declined dramatically, from 14.0 million individuals in 1994 to 5.6 million in 2000; SNAP receipt among families with children, as well as among adults who were newly subjected to SNAP time limits by federal welfare reform, declined concurrently. We demonstrate that states with bigger declines in cash assistance receipt had bigger declines in SNAP receipt among families with children. We further show that the change in SNAP enrollment for families with single mothers over this period can be decomposed into two equally important factors. First, there was a decrease in the number of eligible individuals because of rising incomes. Second, among eligible individuals, there was an increase in the fraction of individuals with significant earnings, and there has historically been a much lower take-up rate of SNAP benefits among people who are working.

As mentioned above, SNAP take up increased from 54 percent to 69 percent between 2001 and 2006. We show that increased unemployment can explain only a small portion of this increase, motivating a closer examination of policy changes during this period. Beginning in 2001, with encouragement from the US Department of Agriculture (USDA), states implemented a series of policy changes designed to improve access to SNAP for working families. States relaxed vehicle ownership rules, redesigned income reporting requirements, and promoted phone interviews in lieu of face-to-face interviews for establishing and maintaining eligibility. We examine the relationship between these policies
changes and change in SNAP enrollment at the state level and find that these policy changes can explain one-half of the increase of enrollment during this period. In addition, we find evidence of a “bounce-back” from welfare reform – states with bigger declines in cash assistance in the 1990’s experienced bigger increases in SNAP receipt several years later.

During the 2007-2011 Great Recession period, we find that local area unemployment can explain 73 percent of the increase in SNAP enrollment. We also examine in detail the eligibility expansions and policy changes which may also have increased SNAP enrollment during the recession years. We find that states’ adoption of relaxed income and asset limits (“Broad Based Categorical Eligibility”) accounts for 8 percent of the increase in enrollment over this period. Another feature of SNAP is that program rules for Able-Bodied Adults Without Dependents (ABAWDs) are temporarily relaxed in places with high unemployment. Expanded eligibility for ABAWDs during the recession can explain 10 percent of the increase in enrollment. Finally, the temporary increase in SNAP benefits in the Recovery Act may have raised take-up, although we are unable to quantify its impact. We conclude, therefore, that most of the rise in SNAP enrollment in the recession era was the result of SNAP’s automatic stabilizer features.

Section 5 collects results from the prior two sections to explain aggregate trends in SNAP enrollment from 1992 to 2011. Section 6 concludes.

2 Program Overview

2.1 Program Description

SNAP helps low-income households buy food. A household unit is people who “purchase and prepare food together.” Eligibility is typically determined by three tests:

- a gross income test – household income must be less than 130 percent of the poverty line (in FY2015, 130 percent of poverty is $1,265/month for
one person and $2,584/month for four people).

- a net income test – household income minus deductions must be less than 100 percent of the poverty line. There is a standard deduction of $155 for households with 1 to 3 members (with higher amounts for larger households), a 20 percent earned income deduction, a medical expense deduction for households with elderly or disabled members, a child care deduction, and a deduction for households with very high shelter costs.

- an asset test – assets must be less than $2,250, excluding the recipient’s home and retirement accounts. All states also exclude at least a portion of the value of the household’s primary vehicle when determining assets.

Households with a disabled person or a member whose age is 60 or above need to pass only the net income test (not gross income), and face a less stringent asset threshold of $3,250. Able-Bodied Adults Without Dependents who are working less than half time or do not meet certain work requirements are limited to receiving benefits for 3-months out of each 36-month period.

Program applicants must participate in an interview and provide documentation of legal residency, income, and expenses. Then, recipients need to complete a recertification on a recurring basis every 6 to 24 months.

Households receive an electronic benefit transfer card, which can be used to purchase food at supermarkets, grocery stores, and convenience stores. About 84 percent of benefits are spent at supermarkets (Castner and Henke (2011)). A household’s benefit is equal to the maximum benefit, minus 30 percent of its net income. In FY2013, the maximum monthly benefit was $189 for one person (mean $148) and $632 for four people (mean $480).

States administer the program, determining eligibility and issuing benefits. The cost of benefits is paid entirely by the federal government, through USDA. Administrative costs are split between the state and federal government. Each year, about 50,000 active cases are randomly selected for audits through the
Quality Control (QC) system, and the results are used to calculate a state’s payment error rate. In FY2013, the official national overpayment error rate was 2.6 percent, and the underpayment error rate was 0.6 percent. States with persistently high error rates incur financial penalties. The QC samples are representative of the national SNAP caseload and are used to produce annual public use micro data files. We make use of these data in some of our analyses below.

Economists have done substantial research on the impacts of SNAP on recipients. The most important feature of SNAP is that benefit levels are set below likely food expenditure needs, meaning that the benefits should be equivalent to cash transfers from a theoretical perspective. Empirically, Whitmore (2002) studies two experiments from the early 1990s and finds that most households treat SNAP benefits and cash equivalently. A recent series of papers by Hilary Hoynes, Diane Whitmore Schanzenbach, and coauthors uses the county-level rollout of SNAP to study the program’s long-term impacts. Almond et al. (2011) find that program exposure raised birth weights, and Hoynes and Schanzenbach (2009) find that the program raised food expenditures, but only by an amount equal to the marginal propensity to consume out of incremental income. Program recipients face significant cash constraints, with lower caloric intake at the end of the monthly benefit cycle (Shapiro (2005)). Hastings and Washington (2010) show that supermarket prices respond modestly to changes in demand by benefit recipients; apparently, the price responses are small because recipients shop alongside non-recipients.

3 Unemployment and SNAP Receipt

3.1 Analysis Using County Unemployment Rates

We begin our analysis by estimating the relationship between local unemployment and SNAP receipt using county-level data from 1990 through 2011. While an extensive literature analyzes the effect of labor market conditions
on SNAP enrollment at the state level, we are the first to our knowledge to examine this relationship at the county level.\footnote{For state-level analysis, see Currie and Grogger (2001); Klerman and Danielson (2011); Mabli et al. (2009); Mabli and Ferrerosa (2010); Ratcliffe et al. (2008); Ziliak et al. (2003).}

For this analysis, we assembled annual county-level data from July of each year on unemployment from the Bureau of Labor Statistics (BLS) and on SNAP enrollment from the Food and Nutrition Service (FNS).\footnote{Details on construction of this sample are in Appendix A.2 and summary statistics are in Appendix Table 1. Not all states report county-level enrollment (data are available for 80-85 percent of SNAP enrollment at the county level).} The BLS constructs its estimates of county-level unemployment by combining state-level data from the CPS household survey with county-level counts of UI claimants. While the county-level approach provides a much larger sample size and, therefore, the potential for significantly more precise estimates of the relationship between local unemployment and SNAP receipt, there is likely to be substantial measurement error in the county-level unemployment estimates, which could result in attenuation bias. We use two complementary strategies to address the measurement error. First, we provide OLS estimates that use multiple measures of the unemployment rate (state and county, with two lags of each). By including multiple lags and two levels of aggregation, we reduce the measurement error associated with any particular CPS survey and any particular administrative count of UI receipt. Second, we provide IV estimates using a Bartik instrument for changes in the county unemployment rate. The IV estimates are our preferred specification because they address measurement error in the dependent variable and eliminate the bias that could potentially occur if SNAP policy changes simultaneously raise SNAP enrollment and create disincentives for employment.

Specifically, we estimate the following OLS model:

\[
\log SNAP_{ijt} = \alpha + \left( \begin{array}{ccc}
0 & 1 & 2
\end{array} \right) \left( \begin{array}{c}
U_{jt} \\
U_{jt-1} \\
U_{jt-2}
\end{array} \right) + \left( \begin{array}{cc}
0 & 1 \\
1 & 2
\end{array} \right) \left( \begin{array}{c}
U_{ijt} \\
U_{ijt-1} \\
U_{ijt-2}
\end{array} \right) + \eta_t + \varphi_t + \varepsilon_{ijt}
\]  

\( (1) \)
where $SNAP_{ijt}$ is the number of SNAP recipients, $U_{jt}$ is the unemployment rate in state $j$ in year $t$, $U_{ijt}$ is the unemployment rate for county $i$, $\eta_i$ is a county fixed effect and $\varphi_t$ is a year fixed effect. The results are reported in Table 1. In our first specification, we weight each county equally and find that the sum of all $\hat{\beta}$ and $\hat{\gamma}$ estimates is 0.10, meaning that in a state in which every county experiences a persistent one percentage point increase in the unemployment rate, the model predicts an increase in SNAP enrollment reaching 10 percent after three years. When we weight each county by its population (column 2), the effect of unemployment is even larger, producing a 12 percent cumulative increase in enrollment.

One striking feature of these estimates is that lags of unemployment are quantitatively important, indicating that unemployment has highly persistent impacts on SNAP enrollment. Some commentators have raised concerns that SNAP receipt remained high even after the unemployment rate peaked in June 2009 (Furchtgott-Roth (2012)). In fact, our estimates indicate that persistently-elevated SNAP receipt in the aftermath of a recession is the norm.

We provide robustness checks to our OLS specification in Appendix Table 2. First, we report estimates from a specification without year fixed effects $\varphi_t$ (columns 1 and 2). Unsurprisingly, when the national unemployment rate is higher, SNAP enrollment rises as well, and so this specification yields larger coefficients. Second, we use the share of the population receiving SNAP as the dependent variable (columns 3 and 4) and find results that are similar in magnitude to those shown in Table 1.

As a further robustness check, appendix Table 3 replicates Table 1 using the nonemployment rate rather than the unemployment rate. Using a broader measure of unemployment that incorporates discouraged workers could provide a tighter link between economic distress and SNAP enrollment. However, county-level data on the number of discouraged workers is not available, and finds a similar pattern of results. We prefer the unemployment-based results to

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6Ziliak et al. (2003) also find a persistent impact of unemployment on SNAP enrollment.
the nonemployment-based results for two reasons: first, changes in the nonemployment rate may reflect retirement patterns driven by local demographics, and second, Bartik shocks based on national industrial trends may raise the nonemployment rate without raising SNAP receipt if the people affected have outside options like retirement and college enrollment which are unlikely to involve SNAP receipt.

As noted above, measurement error could be a serious issue with the county unemployment data. Intuitively, when the unemployment rate is difficult to measure, it will be harder to detect statistically a relationship between unemployment and SNAP receipt. In addition to a priori concerns about the BLS county estimates, there are two pieces of evidence in our data that suggest a role for measurement error. First, measurement error in unemployment is likely to be larger for counties with small populations, and we find that weighting each county by its population leads to larger point estimates. Second, if we knew the true county-level unemployment rate, and there were no spillover effects from nearby counties, then the coefficients on state-level unemployment should be zero. In fact, we find that they are even larger than the county coefficients.

To address the measurement error in unemployment, we use a Bartik-style instrumental variable approach based on industry share. We examine changes over a 3-year horizon because, in our OLS regressions, we found that one- and two-year lags of the unemployment rates had a statistically significant impact on enrollment.\footnote{National industry trends have too much serial correlation to allow us to separately instrument for single years of unemployment in the original lag specification.} For each county, we calculate the change from year $t - 3$ to year $t$ in employment in county $i$ due to national industrial trends as:

\[
\log(Emp_{it}) - \log(Emp_{i,t-3}) = \sum_k (\log(Emp_{kt}) - \log(Emp_{k,t-3})) w_{ik,t-3} \tag{2}
\]

where $k$ indexes 3-digit NAICS industries, $\log(Emp_{kt}) - \log(Emp_{k,t-3})$ is the three-year national change in employment in industry $k$, and $w_{ik,t-3}$ is
the share of the county employed in sector $k$ in year $t - 3$. Changes in this county-level measure are highly predictive of changes in the unemployment rate. In Figure 2, we stratify predicted changes in county employment, $\log(Emp_{it}) - \log(Emp_{i,t-3})$, into twenty equally-sized bins, conditional on year and county fixed effects. In the top panel, we plot the conditional means for the change in the unemployment rate for each of these twenty bins. Predicted employment growth of 1 percent leads to an unemployment rate which is about 0.16 percentage points lower, with an F-statistic of 66.

In the bottom panel, we plot the change in SNAP enrollment versus the change in predicted unemployment for each of the twenty bins. Increased unemployment due to national industrial trends is strongly associated with increased SNAP enrollment. We show two stage least squares estimates in column 3 of Table 1:

\[
\Delta U_{it} = \alpha_1 + \kappa \Delta \log(Emp_{it}) + \kappa_i + \varphi_t + \varepsilon_{it} \tag{3}
\]
\[
\Delta \log SNAP_{it} = \alpha_2 + \pi \Delta U_{it} + \kappa_i + \varphi_t + \lambda_{it} \tag{4}
\]

We estimate that an increase of one percentage point in the unemployment rate over a 3-year period is associated with an 18 percent increase in SNAP enrollment over the same time horizon. Recall that the OLS estimate was 10-12 percent. This pattern of results is consistent with measurement error leading to attenuation bias in the OLS results.

These regressions estimate the causal impact of having a higher local unemployment rate on SNAP enrollment. An increase in the local unemployment rate will increase SNAP enrollment by increasing the number of eligible households and their degree of economic need. It may also alter local SNAP implementation policies – an increase in client to caseworker ratios may lengthen processing time, making it harder to enroll, or governments may change administrative procedures in ways that make it easier to enroll. The combined effect of all of these channels is the parameter of interest for our research question – understanding whether the path of SNAP enrollment within a given time
period is in line with historical patterns. Our estimate does not, however, isolate the causal impact of unemployment or area-level economic distress on enrollment holding local program implementation policies fixed.

3.2 Predicting SNAP Enrollment with Unemployment Alone

Figure 3 displays actual changes in SNAP enrollment as a share of the US population for each year from 1992 through 2011 along with predicted changes given the actual pattern of unemployment rates and our Bartik IV model coefficient estimates. For each county year, we predict the annual change in enrollment from the prior year:

$$\Delta SNAP_{it}^{\text{Unemp}} = \left( \hat{\pi} \frac{\Delta u_{it,t-3}}{3} \right) SNAP_{it}$$

(5)

where $\hat{\pi}$ is the coefficient from equation 4 and $\Delta u_{it,t-3}$ is the change from three years prior in the county unemployment rate, divided by three to generate a predicted annual change. To predict the change in the national SNAP enrollment rate relative to a base year, we sum over all the counties:

$$\frac{\Delta SNAP}{\text{pop}} \equiv \sum_{t=\text{pre}}^{\text{post}} \frac{1}{\text{pop}_t} \sum_i \Delta SNAP_{it}^{\text{Unemp}}$$

(6)

The figure highlights three different time periods and presents the cumulative change in the SNAP enrollment rate measured from the beginning of each time period. During the 1992 to 2000 welfare reform period, changes in unemployment explain a large fraction of the change in SNAP enrollment, but actual enrollment was lower than the unemployment-based model predicts. From 2000 to 2007, there were large increases in SNAP enrollment, and unemployment rates explain only a small portion of the increase. During the 2007-2011 Great Recession period, rising unemployment can explain most, but not all, of the increase in SNAP enrollment. The next section of the paper examines policy changes in each of these three time periods to understand the extent to
which the policy changes can explain the gap between the actual changes in SNAP enrollment and the changes predicted given the path of unemployment.

4 Policy Changes and SNAP Receipt

In this section, we analyze three sets of policy changes that had the potential to affect SNAP enrollment: welfare reform, state-level adoption of SNAP policy options, and Great Recession era expansions of SNAP eligibility.

4.1 Welfare Reform

From 1993 to 2000, the number of cash assistance recipients in the US fell by 58 percent. An unusually strong labor market and expansions of the Earned Income Tax Credit led single mothers to transition from cash assistance receipt to work (Meyer and Rosenbaum (2001)). Welfare reform played an important role as well: the first major waivers for changes in state welfare policy were given in 1992. By the time President Clinton signed the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) in 1996, 37 states had already received waivers.

SNAP receipt also plummeted during this period, falling by 36 percent. A portion of the drop is unremarkable. Some single mothers making the transition from welfare to work ended up with income above the SNAP eligibility limits, and PRWORA eliminated SNAP eligibility for some legal immigrants and able-bodied childless adults. What is remarkable is that take-up of SNAP among eligible households fell from 75 percent to 54 percent.

State-level evidence points to a link between the intensity of welfare reform and the decline in SNAP receipt.\(^8\) Because the timing of welfare reform varied across states, we define \(t(peak)\) as the year in which a state \(j\)

\(^8\)We estimate this relationship at the state level rather than the county level because cash assistance receipt is not available at the county level.
reached its maximum number of cash assistance recipients. For 41 states, this peak occurred between 1992 and 1994. We measure all of our variables as the change from the peak year to five years later \((\Delta X_{j,t(peak)}+5 \equiv X_{j,t(peak)}+5 - X_{j,t(peak)})\). We measure the intensity of welfare reform as the change in the log of the number of cash assistance recipients from the peak to five years later \((\Delta \log\text{Cash}_{j,t(peak)}+5)\). The top panel of Figure 4 plots the relationship between the intensity of welfare reform and the change in SNAP receipt. For every, 10 log point decrease in cash assistance there is a 2.9 log point decrease in SNAP receipt with a standard error of 1.1. To evaluate the relationship between welfare reform and SNAP receipt controlling for the business cycle, we regress

\[
\Delta \log\text{SNAP}_{j,t(peak)}+5 = \alpha + \beta \Delta \log\text{Cash}_{j,t(peak)}+5 + \Delta U_{j,t(peak)}+5 + \varepsilon_j \tag{7}
\]

where \(U\) is the unemployment rate and SNAP is enrollment for families headed by single mothers. We find a similarly strong, statistically significant correlation: a 10 log point decrease in cash assistance receipt is associated with a 2.6 log point decrease in SNAP receipt and a standard error of 1.0.⁹ This suggests that at the state level, the intensity of welfare reform was correlated with changes in SNAP receipt. We do not believe that this relationship reflects merely changes in state economic conditions for two reasons: (1) we have controlled for the change in the unemployment rate and (2) when we regress changes in cash assistance caseloads on changes in SNAP receipt for childless adults and seniors – populations that were less affected by state-level welfare reform activities – we find a smaller and statistically insignificant coefficient.

There are several potential explanations for why take-up of SNAP by eligible households declined so significantly during the welfare reform period. First, narrative accounts of welfare reform implementation suggest that when

⁹We drop Idaho, which is an extreme outlier in its change in cash assistance. An alternative specification uses a common time period, of 1994 to 1999. Here, we find a coefficient of 0.12, which is statistically significant at a 10 percent level. We find this specification less attractive because it does not account for heterogeneity in when states began changing their welfare programs, as discussed above.
people lost eligibility for cash assistance they often did not realize (and welfare offices made little effort to tell them) that they remained eligible for SNAP (Government Accountability Office (1999)). Second, the stigma associated with receiving benefits may have increased because of anti-welfare sentiment. Third, the shift in the composition of the SNAP-eligible population to include more households with labor earnings may have played a role. In particular, SNAP take up among working single mothers has always been lower than take-up among those without jobs. We calculate using the QC files that as cash assistance recipients transitioned to work, the share of SNAP recipients with children reporting earned income rose from 30 percent to 45 percent.

To distinguish among these explanations, we use the March CPS together with the QC files to study SNAP enrollment by single mothers with children in 1993 and 2000 (we also include results for 2011 to motivate the discussion in Section 4.2 of policy efforts to increase take-up during the 2000s). First, we divide the sample of single mother headed families in the CPS by whether or not family income was below 130 percent of poverty each year – indicative of whether the family was likely to be eligible for SNAP. We then sub-divide the likely-eligible sample into three groups indexed by $k$: “Cash Assistance”, “No Cash, Working”, or “No Cash, Not Working”. We define a family as “working” if the family has annual earnings equal to at least 25 percent of the annual poverty line and as “receiving cash assistance” if the family reports assistance equal to at least 10 percent of the annual poverty line. The bottom left panel of Figure 4 shows that the number of people in families receiving cash assistance declined by approximately 4.9 million between 1993 and 2000. Approximately 2.8 million fewer people in single mother households had incomes above the 130 percent of poverty threshold by 2000 and are not shown in the figure. In addition, there was an increase in the number of single mothers who were working, as well as an increase in the number who are neither working nor receiving cash assistance.

Next, we calculate the SNAP “take-up ratio” as the ratio of enrolled to
eligibles for each of the three groups in the bottom right panel of Figure 4. These ratios are not bounded from above by 1 since the numerator and denominator come from different datasets and cash assistance is underreported in the CPS. The ratio is highest for the Cash Assistance group and lowest for the Working group. What is striking in these figures is the stability of the ratios between 1993 and 2000. These data suggest that take-up rose a bit among cash assistance families and fell a bit among non-cash working families, but that, overall, there was little change in take-up within categories. It appears, therefore, that declining take-up during the welfare reform period was primarily the result of people shifting out of the high take-up cash assistance status and into the lower take-up working status.

More formally, we can decompose the change in SNAP receipt by single mother families during this period into the changes in the number of eligibles for SNAP (income < 130% of poverty) evaluated at the overall take-up rate for 1993 and changes in take-up ratio among eligibles households, multiplied by the number of eligibles in 2000.

\[
SNAP_{2000} - SNAP_{1993} = \Delta NumElig_{2000,1993} \times TakeUp_{1993} + \Delta TakeUp_{2000,1993} \times NumElig_{2000}
\]

Decomposed in eq'n 9

In addition, the change in the take-up rate, can be further decomposed to distinguish between the role of reallocation across cells \( k \) ("Cash Assistance", "No Cash, Working", and "No Cash, Not Working") with different take-up

10There are two ways to measure the take-up ratio: the ratio of CPS recipients to CPS eligibles and the ratio of QC recipients to CPS eligibles. The CPS enrollment measure is attractive because the take-up ratio is less than one, but unattractive because SNAP receipt is underreported in the CPS. The QC enrollment measure is attractive because its recipient count is based on administrative data, but it is unattractive because the accounting period for the QC files is monthly, whereas the eligibility count from the CPS is based on annual interview data.

11See Data Appendix A.4 for details on how we handle this and other data issues.

12These decompositions do not require the take-up ratios to be less than one, only that cell shares sum to 1 (\( \sum_k Share_k = 1 \))
ratios and the role of within-cell changes in take-up ratios.

\[
\Delta \text{TakeUp}_{2000,1993} = \sum_k \Delta \text{Share}_{2000,1993}^k \times \text{TakeUp}_{1993}^k + \Delta \text{TakeUp}_{2000,1993}^k \times \text{Share}_{2000}^k
\]

(9)

Appendix Table 4 shows the results of this decomposition. The first column shows our preferred QC-based estimates. Overall, of the 4.9 million decrease in SNAP enrollment among single mother families, a bit more than half (2.84 million) was the result of reductions in eligibility (an increase in the number of families with income above 130 percent of poverty). Almost 60 percent (2.74 million) was the result of the shift, among eligible families, from the high take-up category of only receiving cash assistance to the two lower-take up categories of work only and neither work nor cash assistance. Changes in within-cell take up of SNAP actually raised enrollment, holding everything else constant (which is why the percentage accounted for in the two other categories exceeds 100 percent) The results in column 2 with the CPS-based measure of SNAP receipt are similar. In terms of the theories outlined in this section, we find this evidence to be most consistent with the theory that it was the shift of so many families from welfare to work that led to the decline in SNAP take up. While increased welfare-related stigma and administrative ordeals may have been part of the reason that so many families shifted from welfare to work during this period, there does not appear to have been an increase in SNAP-specific stigma or administrative ordeals that reduced SNAP enrollment on top of the changes that induced families to transition from welfare to work.

### 4.2 Econometric Evidence on State Policy Adoption

The decline in SNAP take-up prompted the Bush administration to give states several new policy options to make it easier to combine work and SNAP receipt. In 2001, Department of Agriculture Undersecretary Eric Bost testified before Congress:
Concerns have grown that the program’s administrative burden and complexity are hampering its performance in the post-welfare reform environment. There is growing recognition that the complexity of program requirements – often the result of desires to target benefits more precisely – may cause error and deter participation among people eligible for benefits. These burdens are particularly significant for the working families that comprise an increasing portion of the Food Stamp caseload. Caseworkers are often expected to anticipate changes in their income and expenses – a difficult and error-prone task, especially for working poor households whose incomes fluctuate... (Bost (2001))

Most of these policy changes were implemented by giving states waivers from program rules.

In Figure 5, we show maps for the number of policy options implemented for various years, as reported in the SNAP Policy Database. From 2001 to 2007, most states adopted at least two of the policies described below. The states adopting the largest number of policies by 2007 – Washington, Texas, Massachusetts, Pennsylvania, and South Carolina – are not clustered in any single geographic region of the country, and are a mix of Republican and Democratic-leaning states, suggesting that political ideology was not an overriding factor in these policy choices.

Three particularly important changes were made to income reporting, recertification periods, and interview structure that may have raised the take-up rate:

- Simplified Reporting – Under default program rules in 2001, SNAP recipients were required to report any change in income. USDA first gave states waivers requiring the reporting of only significant income changes (e.g. a $100 change in monthly income). This culminated in simplified reporting, where SNAP recipients were required to report income changes

Appendix Table 5 shows the number of policies adopted as of 2001, 2007 and 2011. These data are available at http://www.ers.usda.gov/data-products/snap-policy-database.aspx
between six-month recertification dates only if the income changes made them ineligible for benefits. By 2007, 47 states had adopted simplified reporting.

- Recertification Lengths – After welfare reform, many states had implemented recertifications of three months or shorter, meaning that people had to re-state their income and expenses to the state very frequently. Recertifications likely have the biggest impact on people whose life circumstances change frequently, such as people marginally attached to the labor force. Longer intervals between recertifications for people with earnings reduce the cost of participating in the program. Kabbani and Wilde (2003) and Ribar et al. (2008) study the impact of recertification intervals on SNAP take-up. In 2001, 25 states were using certification intervals of three months or less for many people with earnings, but by 2007, all 50 states and DC had stopped using such short intervals.

- Interview Format – Under default program rules in 2001, SNAP applicants were required to do a face-to-face interview to establish eligibility and for every recertification, unless the household had demonstrated difficulty with completing such an interview. Over time, USDA gave states waivers allowing phone interviews, first for recertification, and then later for initial certifications. By 2007, 22 states had received a waiver of the face-to-face requirement for recertifications.

Other innovations during this period include the establishment of call centers (20 states by 2007), online applications (14 states by 2007), and the Supplemental Security Income Combined Application Project (SSI CAP), which eased enrollment procedures for SSI recipients (12 states by 2007).14

In addition, there were rule changes which may have raised enrollment by expanding eligibility, but should not directly have affected take-up:

14Dickert-Conlin et al. (2011) analyze the effect of radio ads and Schwabish (2012) analyzes the effect of online applications.
• Vehicle Exemptions – Under default program rules in 2001, the value of a family’s vehicles above an exemption counted towards the asset test. For example, the exemption threshold was $4,650 in 2003. Over time, states were given flexibility to revise their vehicle policies. By 2007, 46 states exempted at least one vehicle completely from the asset test.

• Broad-Based Categorical Eligibility (BBCE)\textsuperscript{15} – We describe BBCE in detail in Section 4.3. By 2007, 13 states had implemented some form of BBCE.

We regress the percent of the state population enrolled in SNAP on each of the state-level policies described above. Empirically, it is difficult to isolate the effect of each policy simultaneously with statistical precision, so we analyze each policy separately using indicator variables. With $j$ indexing states, $l$ indexing policies and $t$ indexing years, we use the specification:

$$\frac{100 \times SNAP}{Pop_{jt}} = \alpha + \delta Policy_{jlt} + U_{jt} + \eta_j + \varphi_t + \sigma_{jlt}$$ \hspace{1cm} (10)$$

with $U_{jt}$ as unemployment in state $j$ and year $t$, $\eta_j$ as a state fixed effect and $\varphi_t$ as a year fixed effect. We also use an alternative specification with the take-up rate, rather than the enrollment rate, as the dependent variable in equation 10. If states adopted policies randomly, then $\delta$ would identify the causal effect of policy adoption on enrollment. Conversations with program administrators have led us to believe that the most important factors in adoption were not structural factors such as a state’s unemployment rate or the political orientation of its governor, but idiosyncratic factors such as whether it was implementing a new database system or otherwise redesigning human services delivery, whether it was making changes to respond to a recently high error rate (because policy adoption typically led to lower error rates), and whether the state needed approval from the state legislature to make changes to its

\textsuperscript{15}“Broad-Based Categorical Eligibility” is used to distinguish this new policy from a long-standing “Categorical Eligibility” policy, which made people already receiving cash assistance automatically eligible for SNAP.
SNAP program. For the period from 1996 to 2008, a state’s unemployment rate appears to have been an unimportant factor in policy adoption.\footnote{A regression of PoliciesAdopted\textsubscript{jt} = α + βU\textsubscript{jt} + η\textsubscript{j} + ϕ\textsubscript{t} + σ\textsubscript{jt} yields a statistically insignificant coefficient of 0.025. This coefficient is larger during the Great Recession, as discussed below.}

We report estimated coefficients in Table 2. We find that BBCE, simplified reporting, and ending short recertifications have a significant and positive effect on enrollment.\footnote{An extensive literature estimates the effect of state SNAP policies on enrollment rates. Most papers find insignificant coefficients for most policies. Klerman and Danielson (2011), Mabli and Ferrerosa (2010), and Mabli et al. (2009) report that a state’s adoption of BBCE had a statistically significant impact on enrollment raising it by 6 percent and simplified reporting raised enrollment by about a statistically significant 4 percent. These estimates are slightly smaller than the coefficients reported here.} Next, we construct an omnibus adoption measure as the mean of all eight policy indicators, ranging from 0 to 1:

\[
\text{Policy}_{jt} = \frac{1}{8} \sum_{l} \text{Policy}_{ljt}
\]

We re-estimate equation 10 for the index. For this specification, we have sufficient precision to also include a lag of the policy index, which is desirable because it is possible that a policy introduced in year \( t \) would not have its full impact until the following year.

\[
\frac{100 \times SNAP}{Pop} = α + \delta_1 \text{Policy}_{jt} + \delta_2 \text{Policy}_{j,t-1} + U_{jt} + η_j + ϕ_t + σ_{jt}
\]
policy index (column 2), the coefficients imply that policies implemented in the prior year are more important than policies implemented in the current year, and the cumulative impact of adopting all eight policies rises to 2.6 percentage points, by the end of year $t$, from a sample mean of 9.0 percent.

In interpreting these results, three caveats are in order. First, even though policies and enrollment vary at the state-year level, there is significant measurement error in identifying the exact date of adoption of some of these policies.\footnote{For example, Trippe and Gillooly (2010) and Government Accountability Office (2012) disagree on the date of BBCE adoption for 7 states.} This means that our estimates are likely to be lower bounds on the true effects of these policies. Second, the top panel of Figure 4 shows that states that implemented welfare reform most aggressively and had the largest declines in cash assistance during the 1990s, had the largest bounce backs in SNAP enrollment after 2000. It is possible that states implementing new policies were also doing other activities to encourage take-up – for example outreach efforts. If so, then the policy impacts we estimate might not be solely the result of the measured policies. They could also be the result of other unmeasured policies implemented at the same time. Thus, we interpret our findings in this section as establishing that deliberate policy actions designed to increase take-up among SNAP-eligible families did in fact increase SNAP enrollment. However, we do not believe we are on strong ground in parsing out the relative importance of particular policies.

### 4.3 SNAP Policies in the Great Recession

Next, we examine the role of policies which expanded SNAP eligibility in the Great Recession. We focus in particular on two policies: increased state-level adoption of Broad-Based Categorical Eligibility (BBCE) and temporary waivers on time limits for Able-Bodied Adults Without Dependents (ABAWDs). Unlike the policies analyzed in the previous section, people eligible under these policies can be counted directly using the SNAP QC micro data, which are
a random sample of 50,000 SNAP cases released on annual basis. We count
the number of people eligible under each policy in 2007 and again in 2011.
Some of the increase in enrollment reflects increased take-up of SNAP among
people who were eligible even before the policy expansions, and some is the
results of the policy expansions. The identifying assumption we use to mea-
sure the portion that is the result of the policy expansions is that absent any
rule changes, enrollment for a given policy (BBCE or ABAWDs) would have
grown at the same rate as enrollment for those eligible under standard rules.
Let $SNAP_{lt}$ be the number of people enrolled under policy $l$ in year $t$, with $0$
denoting people enrolled under the standard rules: The contribution of policy
$l$ to enrollment growth from 2007 to year $t$ is calculated as:

$$
\Delta SNAP_{lt} = SNAP_{lt} - SNAP_{lt, 2007} \frac{SNAP_{0,t}}{SNAP_{0,2007}}
$$

(13)

The results are summarized in Table 4.

BBCE is a state policy option introduced in 2001. Under default SNAP
program rules, eligibility involves a gross income test, a net income test, and
an asset test as described in Section 2. BBCE allowed states to eliminate the
net income and asset tests, and also to raise the threshold for the gross income
test to up to 200 percent of poverty. While this policy sounds like a dramatic
expansion of eligibility, a careful examination of SNAP program rules reveals
that this is not the case. A household’s SNAP benefit is the maximum benefit
minus 30 percent of net income, even under BBCE. So even if the net income
eligibility test is waived, a household with significant net income will receive
no SNAP benefits. For example, in 2013, a household with four members and
net income at 100 percent of poverty would receive a monthly benefit of $92,
but a household with net income of 116 percent of poverty or higher would not
receive any benefits. This benefit calculation rule sharply limited the scope of
the eligibility expansion; the group most affected is those with substantially
higher gross incomes than net incomes, such as fathers paying child support.

USDA administrators issued a memo in September 2009 (Shahin (2009))
encouraging states to start using BBCE, and by 2011, 41 states had adopted BBCE. Using the QC files, we estimate that in 2011, 1.7 million people (3.9 percent of total enrollment) lived in households whose income was too high to be SNAP-eligible under normal program rules and who therefore were enrolled only because of BBCE. As explained above, we construct a counterfactual by assuming that enrollment for people with excess income would have grown at the same rate between 2007 and 2011 as enrollment of people eligible under standard rules. Under this assumption, new adoption of BBCE raised enrollment of people with excess income by 1.0 million. In other words, we estimate that of the 1.7 million individuals eligible because of BBCE in 2011, 700,000 were eligible based on pre-2007 state adoption of BBCE and 1,000,000 were eligible because of recession-era adoption.

BBCE also allowed states to raise or eliminate asset limits. Because caseworkers do not record assets in BBCE states, we cannot count enrollment with excess assets using the QC files. In 2011, Idaho and Michigan reinstated asset limits of $5,000 and caseloads fell by 1 percent in Michigan and less than 1 percent in Idaho (Government Accountability Office (2012)). Based on this evidence, we estimate that adoption of BBCE during the recession raised enrollment of people with excess assets by 560,000 (details are in the Data Appendix)

Welfare reform (PRWORA) subjected ABAWDs who are working less than half time or not meeting employment-training requirements to a 3-month time limit on SNAP benefits during any 36-month period. However, the legislation established a waiver of time limits in places with elevated unemployment. Without time limits, more people are eligible, and there is greater incentive to apply, given the potential for a longer duration of receipt. Conceptually, because state eligibility for ABAWD waivers mechanically expands and shrinks with the unemployment rate, these waivers have a lot in common with conventional automatic stabilizers, even though they require a state decision to apply for the waivers for them to go into effect.

In 2007, about one-third of the SNAP enrollment was in places with a
waiver. As the country headed into recession, nearly all places became eligible for waivers. In 2011, we estimate that 4.3 million SNAP recipients (9.5 percent of total enrollment) were potential ABAWDs using the QC files. If enrollment for this group had instead grown at the same rate as enrollment of people eligible under standard rules, there would be about 2.4 million potential ABAWDs receiving SNAP. Under this assumption, the recession-induced waivers raised enrollment by 1.9 million people.

Finally, the Recovery Act temporarily raised the maximum SNAP benefit by 13.6 percent. The Recovery Act’s benefit change increased the incentive to enroll and remain enrolled and may therefore have raised take-up among the already eligible. It is difficult to quantify the impact of this change because SNAP benefits are set at the federal level. However, a series of papers estimating the take-up elasticity for unemployment insurance, another program which serves people with temporary economic need, finds values between 0.19 and 0.59.\(^\text{19}\) Applying this range to the 18 percent increase in average household SNAP benefits implies an increase in enrollment of 3 percent to 11 percent.

5 Explaining Aggregate Trends in SNAP Receipt

At the end of Section 3, we presented Figure 3 which showed that variation in unemployment rates could explain most of the variation in SNAP take-up during the 1992-2000 welfare reform period and the 2007-2011 Great Recession period, but not during the 2000-2007 period. In this section, we combine our estimates of unemployment impacts with our estimates of policy impacts to provide an overall accounting of changes in SNAP enrollment in each period. We also compare our results to those in two other recent papers that have

\(^{19}\)McCall (1995) uses the CPS Displaced Worker Survey to estimate that a 10 percent increase in UI benefits raises benefit expenditure through take-up by 1.9 percent-3.0 percent. Anderson and Meyer (1997) use administrative data from six state UI programs to estimate an elasticity between 0.39 and 0.59.
addressed some of the same issues.

We do not make an attempt to quantitatively combine our welfare reform results with our unemployment results because we do not think that there is a convincing way to separate the portion of the increase in single mother labor supply that was the result of welfare reform and changes in EITC policy from the portion that was the result of the strong economy during the 1990s. It is worth noting, however, that the overprediction of SNAP enrollment during the welfare reform period shown in Figure 3 is roughly commensurate with our back-of-the-envelope guess at welfare reform’s impact on SNAP enrollment. Appendix Table 4 shows that there was a reduction in SNAP enrollment of 4.9 million people in single parent families between 1993 and 2000. Meyer and Rosenbaum (2001) attribute about 80 percent of the increase in labor supply among single mothers during this period to policy changes and about 20 percent to declining unemployment. This would imply that about 4.0 million of the 4.9 million decline in SNAP enrollment in single mother headed families was attributable to policy – accounting for essentially all of the gap in Figure 3 between the decline in SNAP enrollment predicted by the employment regressions and the observed decline in enrollment.

5.1 County-Level Unemployment and State Policy Options – 1992-2011

We begin by combining our county-level estimates of the relationship between unemployment and SNAP enrollment with our state-level estimates of the relationship between policies and SNAP enrollment. We assume that the state-level policy changes have an equal impact across all counties within a state. We predict the change in enrollment rates in each county \( i \) on the basis of the index of policy adoption in state \( j \) defined in equation 11, multiplied by the estimated coefficients from equation 12:
\[
\frac{\Delta \hat{SNAP}^{Policy}_{pop}}{\text{post,pre}} = \hat{\delta}_1 \Delta Policy_{jt} + \hat{\delta}_2 \Delta Policy_{jt-1}
\] (14)

We combine this with our prediction of \(\Delta SNAP_{ijt}^{Unemp}\) from equation 5. Because the policy prediction is of the change in the enrollment rate while the unemployment prediction is of the change in enrollment levels, we multiply the county enrollment rate change predictions by the county populations so that both components are in the same units. Then we sum over all of the counties. Finally we divide by the U.S. population to produce a national enrollment rate prediction:

\[
\frac{\Delta \hat{SNAP}_{pop}}{\text{post,pre}} = \sum_{t=\text{pre}}^{\text{post}} \sum_j \left( \frac{\Delta \hat{SNAP}^{Policy}_{ijt}}{\text{pop}} + \Delta SNAP_{ijt}^{Unemp} \right)
\] (15)

The top panel of Figure 6 shows the results of this exercise. From 1992 to 1994, the SNAP enrollment rate rose as the economy weakened, but not as much as our unemployment model expects. From 1994 to 2000, SNAP enrollment fell as unemployment declined, and the fall in SNAP enrollment was greater than our model predicts. There were only minor changes in SNAP policies during this period, and as discussed above, welfare reform appears to explain why SNAP enrollment fell even faster than what would be expected from the path of unemployment alone.

During the 2000 to 2007 period, SNAP enrollment rose substantially and by much more than can be explained by the rise in unemployment during this period. This was the period in which states were most aggressively adopting SNAP policies to expand take-up. Indeed the mean for the summary policy index rose by 0.43 from 2000 to 2007. Multiplying our coefficients by each state’s policy adoption and population and summing across states, this implies an increase in enrollment of 1.3 percentage points, or about one-half of the increase in the enrollment during this period. Given the measurement error
regarding the timing of implementation, these estimates are likely to be a lower bound on the impact of state-level policy changes on SNAP take-up during this period. From 2007 to 2011, enrollment rose rapidly and most of the increase can be explained by the rise in unemployment during the recession. As the top panel of Figure 6 shows, there was also further adoption by states of policies to encourage SNAP take-up that can also explain a portion of the increase during this period. Because most of the specific policies that states adopted during this period are ones where we can observe their impact directly in the micro QC data, we perform a more detailed decomposition for this period in the next section.

5.2 Detailed Analysis of the Great Recession

The Great Recession coincided with a dramatic increase in SNAP receipt – from 26.6 million recipients in July 2007 to 45.3 million recipients in July 2011.\textsuperscript{20} Hanson and Oliveira (2012) used national time series data to examine the correlation between the unemployment rate and SNAP receipt, and concluded that the increase in SNAP participation during the recent recession was “consistent with the increase during previous periods of economic decline.” In contrast, Mulligan (2012) focuses on policy changes, noting “[m]illions of households received safety net benefits in 2010 that would not have been eligible for benefits in 2007 even if their circumstances had been the same in the two years, because the rules for receiving safety net benefits had changed.” Mulligan calculates that the BBCE and other eligibility changes are responsible for “66 percent of the growth of SNAP household participation in excess of family (125 percent) poverty growth between fiscal years 2007 and 2010.” Our results enable us to distinguish between these competing views.

\textsuperscript{20}These estimates are the national monthly totals published by USDA. In Table 4, we report the average monthly caseload for Q3 in the QC files, which is 26.04 million recipients in 2007 and 45.14 million in 2011. Appendix D of Leftin et al. (2012) explains that the QC counts are slightly lower than the national monthly totals because they omit families receiving Disaster SNAP and cases which were found to be ineligible for SNAP.
The bottom panel of Figure 6 summarizes our enrollment results for un-
employment and eligibility expansions together. The first contributing term is $\Delta SNAP_{ijt}^{Unemp}$, already aggregated to the national level and analyzed in Section 5.1. The second contributing term $\Delta SNAP_{lt}$ comes from Section 4.3, which identified three different policies which expanded eligibility: excess income, excess assets and potential ABAWD status.

$$\frac{\Delta SNAP_{\text{pop}}}{\text{post,2007}} = \sum_{t=2008}^{\text{post}} \frac{1}{\text{pop}_t} \sum_{ij} \Delta SNAP_{ijt}^{Unemp} + \sum_l \Delta SNAP_{lt}$$ \hspace{1cm} (16)

SNAP enrollment rose by 19.1 million people from July 2007 to July 2011. The county unemployment regressions can explain 73 percent of this increase. We find that expanded adoption of BBCE raised enrollment by 1.57 million people, and automatic waivers of time limits raised enrollment by 1.87 million people, for a total of 3.44 million. So together, these two changes can account for 18 percent of the total increase in enrollment over this period. Thus in combination, our unemployment and policy analyses can explain 91 percent of the increase in SNAP enrollment. This analysis also indicates that the rise in enrollment was mostly the result of the program’s built-in automatic stabilizer features operating as usual in the midst of a very severe recession. Indeed, given that the ABAWD waivers (responsible for 10 percent of the increase) are explicitly designed to apply whenever unemployment is high, our analysis suggests that 83 percent of the increase was the result of business-cycle sensitive features of the program.

There are two additional pieces of evidence that support the conclusion that the rise in SNAP enrollment during the Great Recession was mostly the result of the program’s automatic stabilizer features operating as usual. First, when we estimate the relationship between SNAP receipt and unemployment limiting the sample to the pre-recession 1990-2007 period, we obtain somewhat larger coefficients and actually slightly over-predict the rise in SNAP enrollment that occurred during the Great Recession.

Second, family-level data show a tight link between long-term unemploy-
ment and SNAP receipt. Using data from the Survey of Income and Program Participation (SIPP), we estimate the fraction of time that a family’s labor force participants were unemployed over the past sixteen months. This distribution is shown in the top panel of Figure 7. Next, we compute the probability of SNAP receipt for families by time spent unemployed. The bottom panel of Figure 7 shows that the probability of SNAP receipt in 2007 is rising sharply by unemployment status, from 5 percent of people in families with no unemployment to about 60 percent of people in families with unemployment for sixteen consecutive months. Multiplying the share of the population in each unemployment duration category in 2011 by the SNAP enrollment rate for each unemployment category in 2007 and summing, we calculate a predicted SNAP enrollment rate of 12.0 percent. National SNAP receipt rose from 8.9 percent to 14.5 percent during the analysis period, so using family-level variation in unemployment rates alone, we can explain about half of the increase in SNAP receipt among the entire US population.

Why are these family-level estimates from the SIPP smaller than the county-based estimates developed in Section 3? Presumably, when a recession hits an entire region, it becomes more difficult to turn to neighbors, family, and friends for financial support. An extensive literature in economics (e.g. Townsend (1994)) documents that people rely on local networks to smooth idiosyncratic shocks, suggesting that the impacts of unemployment duration on SNAP enrollment will be larger when aggregate unemployment is higher. In addition, during the recession, economic distress could occur without measured unemployment, if a worker remained employed but had his or her hours or wage-level reduced. Indeed, we calculate using the SIPP that 27 percent of the aggregate increase in SNAP receipt from 2007 to 2011 occurs in families in which no member experienced an unemployment spell and at least one member was in the labor force. Given that many families without unemployment spells experienced increased economic hardship during the recession and that

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\(^{21}\)This sample includes all families, regardless of whether children are present. See Appendix A.5 for details on sample construction and how we adjust the SIPP estimates of SNAP receipt to account for underreporting.
the recession may have increased economic hardship even among those with a given unemployment duration, it is remarkable that half of the increase in SNAP enrollment can be accounted for simply by the family-level increase in unemployment durations.

5.3 Reconciliation with Literature

Mulligan (2012) estimates that post-2007 policy changes accounted for 20 percent of overall SNAP enrollment in 2010. Our comparable number is that these changes account for 7.5 percent of enrollment in 2011.

There are three categories of policy changes to consider: changes in how vehicles and retirement assets are treated in determining eligibility, waiving of time limits for ABAWDs, and expansions of BBCE. Mulligan (pages 79-81) assumes that state-level adoption of relaxed vehicle policies and other changes in asset policies in the 2008 Farm Bill raised SNAP participation during the recession by 12 percent. There are two issues with this estimate. First, the 12 percent figure is much larger than most estimates in the literature. Second, Mulligan assumes that this policy was adopted nationwide during the recession. In fact, the SNAP Policy Database shows that by 2007, 46 states had already adopted relaxed vehicle policies, and only 3 adopted these policies during the recession. Moreover, the 2008 Farm Bill’s changes in asset policies likely had a negligible impact on eligibility. The Bill excluded retirement ac-

\footnote{Table 3.4 in his book reports actual per capita spending in 2010 of $205 and spending of $164 if the program reverted to 2007 eligibility rules. This implies that holding benefits fixed, SNAP enrollment would be 20 percent lower without eligibility changes.}

\footnote{Mulligan cites Ratcliffe et al. (2007) as finding that exempting a vehicle from the asset test raises participation by 8-16 percent, and takes the midpoint of 12 percent as his estimate (see Ratcliffe et al. (2008) for the published version). Ratcliffe et al. (2007) use SIPP data in their analysis. Other papers have found much smaller point estimates. Another paper using the SIPP, Hanratty (2006), reports that exempting one vehicle changed enrollment by negative 5.5 percent to positive 7 percent. Estimates for the impact of vehicle exemptions using state-level administrative enrollment counts are: 0.8 percent-1.2 percent from Mabli et al. (2009) and 0.4 percent-0.9 percent from Klerman and Danielson (2011). In Table 2, we estimate with state-level data that exempting at least one vehicle raises enrollment by 0.1 percent.}
counts and 529s from the asset test and, as discussed in the Data Appendix, asset limits rarely bind on potential recipients. We therefore attribute no increase in SNAP receipt to these policies.24

In assessing the impact of waiving ABAWD time limits, Mulligan does a QC-based calculation that is quite similar to ours. He concludes that the waiver of time limits raised enrollment by 2.3 percent, which is smaller than our estimate of 4.1 percent.

Finally, Mulligan estimates that BBCE raised enrollment nationally by 5.7 percent, which is larger than our estimate of 3.5 percent. His estimate comes from noting that enrollment rose 9 percent faster among states that had adopted BBCE by 2010 relative to the ones that had not. This estimate is then multiplied by the enrollment share of BBCE-adopting states to get 5.7 percent. However, if state economic conditions affect the decision to adopt BBCE, then this estimate will conflate the impact of those conditions with the impact of the eligibility expansion. States with BBCE by 2010 had unemployment rates averaging 9.2 percent, while the unemployment rate in non-BBCE states averaged 7.6 percent. Thus, it seems quite possible that part of the differential SNAP enrollment by BBCE states was a reflection of their greater economic distress. In contrast, our estimates directly count the number of individuals who were eligible under the eligibility expansions but would not have been eligible in their absence. In Table 5, we provide a side-by-side comparison of our estimates and Mulligan’s which summarizes the discussion in this section. Overall, our estimate that policy changes account for 7.5 percent of enrollment during this period implies that they can explain about 18 percent of the increase in enrollment during the recession. In contrast, Mulligan’s estimates would imply that 48 percent of the increase in enrollment was the result of policy.

Another recent contribution on this topic comes from Bitler and Hoynes

24Even if we did use Mulligan’s 12 percent estimate and applied it to the 3 states which adopted vehicle policies during this period – Florida, Minnesota, and Wyoming – we would only expect a national increase in enrollment of 0.8 percent.
The paper examines how poverty, living arrangements, and a wide range of safety net programs responded during the Great Recession. The authors find that a one percentage point increase in the state unemployment rate raises SNAP caseloads by 3.4 percent and conclude “the safety net programs receiving the most attention through the Great Recession (Food Stamps and UI) exhibit adjustments very consistent with their behavior during previous historical cycles.” This 3.4 percent estimate is similar to other estimates of the relationship between SNAP enrollment and unemployment using annual state-level data such as Mabli and Ferrerosa (2010), but it is much smaller than our estimate that a sustained one percentage point increase in the unemployment rates raises SNAP enrollment by 18 percent. From trough to peak, the US unemployment rate rose by 5 percentage points during the recent recession, so their estimate would imply a 17 percent increase in enrollment. In fact, SNAP enrollment increased by 73 percent. In other words, the Bitler and Hoynes (2013) results imply that unemployment can only explain a small portion of the increase in SNAP enrollment in the Great Recession. As discussed above, a concern that annual state-level analyses might understate the actual relationship between unemployment and SNAP is what motivates our use of county-based unemployment data and a three-year time horizon. With this alternative model, it is not surprising that we find a larger impact of unemployment on SNAP receipt. Note that Bitler and Hoynes (2013)’s analysis is much broader than ours, covering a wide range of dependent variables, most of which are not systematically available at the county level. As a result, we view our results as complementary to theirs.

6 Conclusion

In this paper, we have shown that that there is a strong relationship between local economic conditions as measured by the unemployment rate and SNAP enrollment rates. In particular, a sustained 1 percent increase in unemployment leads to a 18 percent increase in SNAP enrollment. We also analyze the
relationship between policy changes and SNAP enrollment. We show that a strong economy and welfare reform contributed to falling enrollment in the second half of the 1990’s, and policy efforts to make the program more accessible to workers caused enrollment to rise between 2001 and 2007. During the Great Recession, SNAP enrollment rose from 27 million to 45 million people. We find that the increase in unemployment during the recession can explain 73 percent of this increase, temporary business-cycle sensitive rule changes for adults without children can explain 10 percent, and permanent state-level policy expansions can explain only 8 percent. Thus, most of the increase in SNAP enrollment during the Great Recession was the result of the program’s automatic stabilizer features.
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FIGURE 1 – SNAP Take-up Rate and Enrollment

Note: We use data on take-up rates and enrollment from Eslami et al. (2012). The take-up rate is the percentage of the eligible population receiving benefits. See Data Appendix A.1 for an explanation of how we adjust the take-up rates to produce a consistent time series.
Notes: We estimate the impact of unemployment on SNAP enrollment using a Bartik industry share instrument. We compute each county’s predicted 3-year employment change based on national employment trends across three-digit industries and the distribution of industry employment in each county. We winsorize these predicted changes at the 5th and 95th percentile and then stratify them into twenty equally-sized bins, conditional on year and county fixed effects. In the top panel, we plot conditional means for the change in the unemployment rate for each of these twenty bins. In the bottom panel, we plot conditional means for the change in SNAP enrollment in twenty bins. A one percentage point increase in unemployment due to national industrial trends leads to an 18 percent increase in SNAP enrollment.
FIGURE 3 – Projected Enrollment Changes Based on Unemployment

Notes: Figure 2 and Table 1 show the estimated impact of a sustained one percentage point increase in the unemployment rate on the share of the US population enrolled in SNAP. We multiply this coefficient by the change in the unemployment rate in each county to compute the projected change in SNAP enrollment in each county and then sum across all counties. See Section 3.2 for details.
FIGURE 4 – Welfare Reform and SNAP Enrollment

Notes: The top panel examines state-level variation in the intensity of welfare reform. $t_{\text{peak}}$ is the year in which a state had its maximum number of cash assistance recipients. The x-axis is the change in the number of welfare recipients (expressed in logs) from $t_{\text{peak}}$ to $t_{\text{peak}} + 5$. The y-axis is the change in the number of SNAP recipients (expressed in logs) in families with children, from the QC files. The bottom panels analyze changes in SNAP enrollment for individuals living in families headed by single mothers. In the bottom left panel, we count three different types of eligible individuals based on whether their families receive cash assistance and whether their families have earned income. In the bottom right panel, we compute “take up ratios” – the ratio of the number of people enrolled (measured in administrative data) to the number of eligibles (measured in the CPS). Because these statistics come from different sources, the ratio is sometimes larger than 1. See Section 4.1 for details.

Notes: This figure counts the number states adopting eight different state policy options: simplified reporting of income, longer intervals between eligibility interviews, phone-based interviews, call centers, online applications, easy enrollment for SSI recipients, vehicle exemptions from the asset test and Broad-Based Categorical Eligibility. See Section 4.2 for details.
Notes: The top panel combines the estimates for the impact of the unemployment rate on SNAP enrollment from Figure 3 with the estimates for the impact of state-level policy changes from Table 2. See Section 5.1 for details. During the Great Recession, many states adopted relaxed income and asset thresholds and elevated unemployment triggered waivers of time limits for Able Bodied Adults Without Dependents. The bottom panel shows a more in-depth analysis of this period using QC microdata summarized in Table 3. See Section 5.2 for details.
FIGURE 7 – Family-Level Effect of Unemployment on SNAP Enrollment

Notes: We analyze the impact of family-level unemployment on SNAP receipt using the SIPP. We estimate the fraction of time that a family’s labor force participants were unemployed over the past sixteen months. In the top panel, we plot the share of the US population in families with different amounts of time spent unemployed. Always-employed families are 63 percent of the population in 2007 and 54 percent in 2011. Families with no labor force participation are 14 percent in both 2007 and 2011. See Section 5.2 for discussion.
### TABLE 1 – County-Level SNAP Enrollment and Unemployment, 1990-2011

<table>
<thead>
<tr>
<th></th>
<th>(1) Log(Enrollment)</th>
<th>(2) Log(Enrollment)</th>
<th>(3) ΔLog(Enrollment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log(State Unemp)</td>
<td>0.061***</td>
<td>0.064***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.019)</td>
<td></td>
</tr>
<tr>
<td>Log(State Unemp_{t-1})</td>
<td>0.001</td>
<td>-0.032</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.019)</td>
<td></td>
</tr>
<tr>
<td>Log(State Unemp_{t-2})</td>
<td>0.007</td>
<td>0.046</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
<td>(0.041)</td>
<td></td>
</tr>
<tr>
<td>Log(County Unemp)</td>
<td>0.017***</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.011)</td>
<td></td>
</tr>
<tr>
<td>Log(County Unemp_{t-1})</td>
<td>0.008***</td>
<td>0.015***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>Log(County Unemp_{t-2})</td>
<td>0.007*</td>
<td>0.032***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>ΔLog(County Unemp_{t-3,t})</td>
<td></td>
<td></td>
<td>0.180***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.044)</td>
</tr>
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</table>

**Identification**
- OLS
- IV with Bartik

**Sum of Coefficients**
- .1
- .12
- .18

**Weights**
- Equal Population Equal

**County Fixed Effects**
- Yes Yes Yes

**Year Fixed Effects**
- Yes Yes Yes

**First Stage F-stat**
- N/A 66

**Sample**
- 1990-2011

**Observations**
- 54540
- 54540
- 49133

**Notes:** SNAP enrollment is available for about 2,700 counties each July. Standard errors clustered by state. * p<0.1, ** p<0.05, *** p<0.01
### TABLE 2 – Policy Changes, Take-up and Enrollment

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Percent of Pop on SNAP</th>
<th>Take-Up Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>9.0</td>
<td>65.2</td>
</tr>
</tbody>
</table>

(1) Broad-Based Categorical Eligibility  
(2) Exclude >= 1 Vehicle From Asset Test  
(i) Eligibility Index [(1)+(2)] / 2  
(3) SSI Combined Application Project  
(4) Face-to-Face Recert Interview Waiver  
(5) Online Application  
(ii) Enrollment Index [(3)+(4)+(5)] / 3  
(6) Simplified Reporting  
(7) Call Center  
(8) No 3-Month Earner Recerts  
(iii) Stay Enrolled Index [(6)+(7)+(8)] / 3

State Fixed Effects: Yes  
Year Fixed Effects: Yes

Sample: 1996-2010  
n: 765

Note: Each cell is a separate regression with a single policy variable, plus state and year fixed effects as well as a control for the contemporaneous unemployment rate. Policy data comes from each year’s July record in SNAP Policy Database. SNAP enrollment is for July. Take-up rate is the average of all values reported in State Participation Reports (Cunyngham et al. 2013 is the most recent report). States are weighted equally. Standard errors are clustered by state. * p<0.1, ** p<0.05, *** p<0.01
TABLE 3 – Policy Changes and Enrollment

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% of Pop Receiving SNAP</td>
<td>% of Pop Receiving SNAP</td>
</tr>
<tr>
<td>Policy Index t</td>
<td>1.93***</td>
<td>0.15</td>
</tr>
<tr>
<td></td>
<td>(0.50)</td>
<td>(0.47)</td>
</tr>
<tr>
<td>Policy Index t-1</td>
<td>2.45***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.61)</td>
<td></td>
</tr>
<tr>
<td>Unemployment Rate</td>
<td>0.56***</td>
<td>0.53***</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>State Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year Fixed Effects</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Observations</td>
<td>816</td>
<td>765</td>
</tr>
</tbody>
</table>

Notes: Policy index is sum of eight policy variables from Table 2, scaled from 0 to 1. SNAP enrollment is for July. Standard errors clustered by state. * p<0.1, ** p<0.05, *** p<0.01
## TABLE 4 – SNAP Enrollment and Eligibility Changes

<table>
<thead>
<tr>
<th>Enrollment (Millions of Recipients)</th>
<th>2007</th>
<th>2011</th>
<th>2011</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Enrollment</td>
<td>26.04</td>
<td>45.14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Eligible under Standard Rules</td>
<td>24.01</td>
<td>38.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) Relaxed Income and Asset Limits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income &gt; Standard Threshold</td>
<td>0.42</td>
<td>1.68</td>
<td>0.67</td>
<td>1.01</td>
</tr>
<tr>
<td>Assets &gt; Standard Threshold</td>
<td>0.09</td>
<td>0.71</td>
<td>0.15</td>
<td>0.56</td>
</tr>
<tr>
<td>(3) Waiver of Time Limits for</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Childless Adults</td>
<td>1.52</td>
<td>4.30</td>
<td>2.43</td>
<td>1.87</td>
</tr>
<tr>
<td>Total Enrollment Change, 2007-2011</td>
<td>19.10</td>
<td>3.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share Attributed to Eligibility Changes</td>
<td></td>
<td></td>
<td>0.18</td>
<td></td>
</tr>
</tbody>
</table>

Note: We calculate a no-eligibility-change counterfactual by assuming that enrollment for these groups grew at the same rate as enrollment for people eligible under standard rules. Policy-induced enrollment is the difference between 2011 actual enrollment and 2011 counterfactual enrollment. Two eligibility policies expanded notably from 2007 to 2011: Relaxed Income and Asset Limits In 2007, 13 states had adopted some version of Broad-Based Categorical Eligibility, and by 2011, 41 states had adopted it. Waiver of Time Limits for Able-Bodied Adults Without Dependents Under standard program rules, there is a 3-month time limit on SNAP receipt for this group if they are not working full time and not participating in an employment training program. Enrollment counts are average monthly caseload for Q3 in QC files. See Data Appendix for details.
### TABLE 5 – Comparison with Mulligan (2012), by Policy

<table>
<thead>
<tr>
<th>% of Enrollment due to Policy Changes</th>
<th>This Paper for 2011</th>
<th>Mulligan for 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relaxed Vehicle Policies</td>
<td>0.0%</td>
<td>12.0%</td>
</tr>
<tr>
<td>State BBCE Adoption</td>
<td>3.4%</td>
<td>5.7%</td>
</tr>
<tr>
<td>ABAWD Waivers</td>
<td>4.1%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Total</td>
<td>7.5%</td>
<td>20.0%</td>
</tr>
</tbody>
</table>

Note: This table provides estimates for percent of SNAP enrollment attributable to eligibility changes and provides comparable estimates from Mulligan (2012). Mulligan reports estimates for 2010, while we report estimates for 2011 in Table 4. We estimate no impact from relaxed vehicle rules during the Great Recession because, as shown in Appendix Table 5, most states had modified their rules by 2007. See Section 5.3 for details.
A Data Appendix – For Online Publication

A.1 SNAP Take-Up Rate Time-series

Eslami et al. (2012) of Mathematica Policy Research estimate the take-up rate as average monthly SNAP enrollment using administrative data, divided by the number of people estimated to be eligible using data on annual income from the March CPS, combined with adjustment procedures for a variety of program requirements including legal residency, asset tests, and work requirements. Cunyngham and Smith (2013) provide a detailed description of the methodology for 2010.

Mathematica does not publish a consistent time series for take-up and has changed its methodology at least five times. We splice together estimates from different years by assuming that the changes in methodology cause only an additive shift in the estimated take-up rate. Specifically:

- The first methodology change occurred in 1994. Under the old methodology, the take-up rate was 61.4 percent in 1994 and under the new methodology, it was 74.8 percent. For estimates prior to 1994, we compute \( \text{Take}_{t} = \text{Take}_{t}^{\text{old method}} + 74.8 - 61.4 \).

- Mathematica changed its methodology in 1999 and 2002, but those changes affected the estimated take-up rate by no more than half a percentage point, and we make no adjustment for these methodology changes.

- Mathematica changed its methodology again in 2010, Figure 1 of Eslami et al. (2012) shows a consistent timeseries where the take-up rate rose from 72.2 percent in 2009 to 80 percent in 2010.

- Mathematica changed their methodology again for 2011. This revision, like the 2010 revision led to a lower published take up rate. Under this most recent methodology, the take-up rate was estimated as 73.6 percent in 2010 and 78.9 percent in 2011. We estimate \( \text{Take}_{2011} = \text{Take}_{2010} + (78.9 - 73.6) = 85.3 \) percent.

A.2 Area-Level Data on Unemployment and SNAP

We link data from the Local Area Unemployment Statistics (LAUS) series published by the Bureau of Labor Statistics to administrative data on SNAP enrollment from the Food and Nutrition Service (FNS) at USDA.

SNAP Enrollment State SNAP offices report monthly enrollment to FNS at the project level each January and July. We use the July data from the fifty states plus DC. States have discretion over the geographic definition of “project.” Many states report enrollment at each SNAP office with a 7-digit id of which the first 5 digits
are a county FIPS code. We collapse the data to the county level using 5-digit FIPS codes. AK, CT, ME, MA, NH, OR, RI, UT, VT, WV, and WY never report county-level enrollment. NY and ID stop reporting county-level enrollment in January 1992. We drop all these states from the sample. Missouri stops county-level reporting in 2007, Nebraska stops in 1994, Montana stops in 2002, and Washington stops in 2003; for these states, we use county data in the years it is available.

We drop tribal geographies in Minnesota and Arizona. We drop 12 county-year pairs where enrollment exceeds county population, and another 16 county-year pairs where enrollment jumps to at least 40 percent of the population for one year and then immediately falls again.

In 1990, we have county-level data for 85 percent of SNAP enrollment in our cleaned sample, and by 2007, after some states have stopped reporting, we have county-level data for 80 percent of SNAP enrollment.

**Unemployment** LAUS estimates monthly state-level and county-level unemployment rates. The state-level estimates are controlled to match results from the Current Population Survey (CPS). Because the CPS samples relatively few households per state (from about 800 per month in Mississippi to about 4,300 per month in California), and the unemployment rate typically varies from around 5 percent to 10 percent, it is quite difficult to precisely estimate state unemployment rates, especially in small states. LAUS then uses administrative data on the place of residence of unemployment insurance recipients to allocate the CPS-based state unemployment estimates county-by-county. See [http://www.bls.gov/lau/launthd.htm](http://www.bls.gov/lau/launthd.htm) for details on estimation methodology. We use flat files from 1990-2012 posted at [ftp://ftp.bls.gov/pub/time.series/la/](ftp://ftp.bls.gov/pub/time.series/la/). For about 500 county geographies labeled with `series_id` “PA” or “PS”, LAUS reports a geographic identifier which is not a valid 5-digit county FIPS code. We use data from [http://www.bls.gov/lau/laucnty12.xls](http://www.bls.gov/lau/laucnty12.xls) to crosswalk these LAUS geographies to county FIPS codes. We observe July SNAP enrollment in year $t$, and we construct annual unemployment in year $t$ using data from the preceding 12 months (the average unemployment rate from July in year $t - 1$ to June in year $t$).

**Population** We use annual population estimates from the Census Bureau posted at [http://www.census.gov/support/USACdataDownloads.html](http://www.census.gov/support/USACdataDownloads.html)

**Merged County Data** We merge the county-level datasets using year and 5-digit FIPS codes. Every observation in the unemployment dataset also appears in the population dataset. There are 7 fips codes from FNS that do not match the county unemployment file; they account for 0.01 percent of enrollment. We have 47,940 observations between 1990 and 2007 with nonmissing, positive SNAP enrollment and a county-level estimate of the unemployment rate. Our analysis sample has 42,169 observations, because we require two lags of the local unemployment rate.
A.3 SNAP Quality Control Files

These data can be downloaded from http://hostm142.mathematica-mpr.com/fns/.

Below, we detail how we measure specific eligibility categories.

**BBCE Income** We classify a household as exceeding standard income limits due to BBCE if (1) they are not receiving pure cash assistance (because in that case they are already categorically eligible) and (2) they have net income > 100 percent of poverty. We also flag households with gross income > 130 percent of poverty if they do not have a senior or a disabled person. Our estimates are very similar to those reported by Government Accountability Office (2012) (Table 2) and Trippe and Gillooly (2010) (Table C4.2).

**BBCE Assets** Idaho and Michigan re-introduced asset limits of $5,000 in 2011, and about 1 percent of cases were closed due to excess assets (GAO 2012). Absent BBCE, the default rule is that people with liquid assets of $2,000 or more are ineligible for SNAP. Using the Survey of Consumer Finances, we estimate that asset limits of $2,000 would have caused caseloads to fall twice as much as a $5,000 limit. Based on this fact, we assume that people with excess assets account for 2 percent of the total caseload in BBCE states. In 2007, the 11 states without asset tests accounted for 18 percent of SNAP enrollment and in 2011, the 39 states without asset tests in 2011 accounted for 79 percent of total SNAP enrollment. (Although 13 states had instituted some form of BBCE in 2007 and 41 states in 2011, these counts include two states which relaxed income limits but not asset limits.) We calculate the total number of individuals affected as .02 x (.79-.18) x 45 million. This could be an overestimate if the true impact of the Idaho and Michigan policy changes analyzed by the GAO was less than 1 percent rather than equal to 1 percent. Because we lack micro data on these asset limit changes, in constructing an annual pattern of the impact of these changes for Figure 6 we assume that enrollment for cases with excess assets grew linearly from 2007 to 2011.

**Potential ABAWDs** We classify a person as a potential ABAWD if they are: ages 18-49, have no children in the household, are working less than 30 hours a week, and are not disabled. Following Leftin et al. (2012), we define a person as disabled if (1) they have SSI income, (2) the household has no elderly members and a medical deduction, or (3) the person is exempt from work registration due to disability, and has income from Social Security, veterans’ benefits, or workers’ comp. We classify these people as “potential” ABAWDs because many had enrolled within the previous three months, and likely had not exhausted their time limits. For example, 29 percent of potential ABAWDs in FY2011 had enrolled within the last three months.

A.4 Current Population Survey

Among income eligible families (families with income less than 130 percent of the poverty line), we estimate the number receiving cash assistance and the number who
are working. We then sub-divide the likely-eligible sample into four groups: “Receives Cash Assistance”, “No Cash Assistance and Working”, or “No Cash Assistance and Not Working”. We define a family as “working” if they have annual earnings equal to at least 25 percent of the annual poverty line and as “receiving cash assistance” if they report assistance equal to at least 10 percent of the annual poverty line. Cash assistance receipt is underreported in the CPS. Meyer et al. (2009) calculate dollar reporting rates of AFDC/TANF in the CPS and report the results in Table 2. As a rule of thumb, about half of underreporting comes from households who do not report receipt and half of underreporting comes from households who report receipt but underreport the dollar amount of the transfer. With $r_{jt}$ as the dollar reporting rate estimated in Meyer et al. (2009), we adjust upward the number of people receiving cash as $N_{\text{adjusted}} = \frac{N_{\text{raw}}}{(1 - \frac{1}{2}(1 - r_{jt}))}$. We adjust the number of people not receiving cash downward by the same amount in order to preserve a constant number of eligible families. Effectively, this assumes that there is no differential reporting of earnings in the CPS among cash assistance recipients as compared to non-recipients.

**A.5 Survey of Income and Program Participation**

We use the Survey of Income and Program Participation (SIPP) to analyze family-level unemployment and SNAP receipt in 2007 and 2011. The unit of observation is always a person, with cross-sectional person weights ($wpfinwgt$). We observe enrollment in cash assistance and SNAP at the individual level. We assign all individuals in the same family the same status for potential SNAP eligibility (family income < 130 percent of poverty), unemployment, and family earnings.

**A.5.1 Family-Level Data on Unemployment and SNAP**

We use waves 8-11 of the 2004 SIPP and waves 6-9 of the 2008 SIPP. We use family definitions which include subfamilies as part of the same unit ($rfid$) from month 4 of the final wave of the analysis sample.

*Unemployment* We construct a person-level measure of unemployment over the previous four waves. The SIPP records weekly labor force status for people age 15 or higher. Of people in this age group in wave 11 of the 2004 panel and wave 9 of the 2008 SIPP, a complete retrospective sixteen-month history is available for about 81 percent of people. We compute an individual’s unemployment status using all available months, including those individuals for whom data on some months is missing. We compute the unemployment rate as the number of weeks unemployed ($rmwklkg$), divided by the number of weeks the person was in the labor force ($rmwklkg + rmwkwb$). We aggregate this measure to the family level by taking a simple average of unemployment rates across family members.
SNAP Receipt We use self-reported SNAP receipt rcutyp27 (ignoring observations where SNAP receipt is allocated, a27amt) from the fourth reference month, which is the month preceding the interview. Meyer et al. (2009) document underreporting of transfer program receipt in household surveys. In wave 11 of the 2004 SIPP, which covers SNAP receipt from July to October 2007, 6.3 percent of people report receiving SNAP, while administrative data show that the average monthly caseload was 8.9 percent. In wave 9 of the 2008 SIPP, which covers SNAP receipt from April to July 2011, 9.8 percent of people report receiving SNAP, while administrative data show that the average monthly caseload was 14.5 percent. Meyer and Goerge (2011) link administrative data on SNAP receipt to the ACS and CPS. They find that the false negative rate (report no SNAP receipt in survey when admin records do show SNAP receipt) is much higher than the the false positive rate.

Formally, we want to know the relationship between unemployment duration \( U \) and SNAP receipt. If there are only false negatives, then \( \Pr(ReportSNAP|ReceiveSNAP) = 71\% \) in 2007 and 68 percent in 2011. To match administrative totals, we recode each person-level indicator of SNAP receipt to 1.41 in the 2007 sample and 1.48 in the 2011 sample. Formally, such a modification is equivalent to assuming \( \Pr(ReportSNAP|ReceiveSNAP, U) \) is equal for all \( U \). Intuitively, it says that people with long unemployment durations are as likely to underreport SNAP receipt as people with short unemployment durations. Meyer and Goerge (2011) estimate the relationship between unemployment status and the false negative rate (report no SNAP receipt when admin records do show SNAP receipt) in the CPS and ACS. In three out of four specifications they find no statistically significant relationship. In the fourth, they find that the false negative rate is higher for people who are unemployed; if this is true, then our method understates the strength of the relationship between unemployment and SNAP receipt.
APPENDIX TABLES

APPENDIX TABLE 1 – Summary Statistics for County Sample

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployment Rate</td>
<td>6.258</td>
<td>2.864</td>
</tr>
<tr>
<td>3-Year Δ Log Employment (Actual)</td>
<td>0.026</td>
<td>0.094</td>
</tr>
<tr>
<td>SNAP Enrollment</td>
<td>9,993.152</td>
<td>52,676.254</td>
</tr>
<tr>
<td>Share of Population Receiving SNAP</td>
<td>0.108</td>
<td>0.072</td>
</tr>
<tr>
<td>3-Year Δ Log Employment (Predicted)</td>
<td>0.025</td>
<td>0.047</td>
</tr>
</tbody>
</table>

Note: N=60,673. Sample is selected counties from 1990-2012.
## APPENDIX TABLE 2 – Unemployment and SNAP Enrollment

<table>
<thead>
<tr>
<th></th>
<th>Log(SNAP)</th>
<th>SNAP/Pop</th>
<th>Log(SNAP)</th>
<th>Log(SNAP)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>State Unemp&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.169*</td>
<td>0.198*</td>
<td>0.005*</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(0.012)</td>
<td>(0.002)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>State Unemp&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>-0.042*</td>
<td>-0.083*</td>
<td>-0.000</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.024)</td>
<td>(0.001)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>State Unemp&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>0.061*</td>
<td>0.057*</td>
<td>0.003</td>
<td>0.009*</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.024)</td>
<td>(0.002)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>County Unemp&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.011*</td>
<td>0.002</td>
<td>0.003*</td>
<td>0.004*</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.012)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>County Unemp&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.003</td>
<td>0.012*</td>
<td>0.001*</td>
<td>0.002*</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>County Unemp&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>-0.001</td>
<td>0.031*</td>
<td>-0.002*</td>
<td>-0.002*</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Coef Sum</td>
<td>.2</td>
<td>.217</td>
<td>0.0104</td>
<td>0.0103</td>
</tr>
<tr>
<td>E(Share SNAP)</td>
<td></td>
<td></td>
<td>.0982</td>
<td>.0825</td>
</tr>
<tr>
<td>Ratio Coef Sum to Share SNAP</td>
<td>.1059</td>
<td>.1248</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obs Level</td>
<td>County</td>
<td>County</td>
<td>County</td>
<td>County</td>
</tr>
<tr>
<td></td>
<td>Equal Pop</td>
<td>Equal Pop</td>
<td>Equal Pop</td>
<td>Equal Pop</td>
</tr>
<tr>
<td>Cluster SE Level</td>
<td>State</td>
<td>State</td>
<td>State</td>
<td>State</td>
</tr>
<tr>
<td>Area FE s</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE s</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Sample</td>
<td>1990-2011</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>54,540</td>
<td>54,540</td>
<td>54,540</td>
<td>54,540</td>
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</tbody>
</table>

Notes: SNAP enrollment is available for about 2,700 counties each July. * p<0.05
APPENDIX TABLE 3 – County-Level SNAP Enrollment and Nonemployment, 1990-2011

<table>
<thead>
<tr>
<th></th>
<th>(1) Log(Enrollment)</th>
<th>(2) Log(Enrollment)</th>
<th>(3) ΔLog(Enrollment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Nonemp&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.038**</td>
<td>0.043***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.014)</td>
<td></td>
</tr>
<tr>
<td>State Nonemp&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.021</td>
<td>0.040*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
<td>(0.021)</td>
<td></td>
</tr>
<tr>
<td>State Nonemp&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>-0.030*</td>
<td>-0.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.017)</td>
<td>(0.019)</td>
<td></td>
</tr>
<tr>
<td>County Nonemp&lt;sub&gt;t&lt;/sub&gt;</td>
<td>0.015***</td>
<td>0.015***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.003)</td>
<td></td>
</tr>
<tr>
<td>County Nonemp&lt;sub&gt;t-1&lt;/sub&gt;</td>
<td>0.004***</td>
<td>0.010***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.003)</td>
<td></td>
</tr>
<tr>
<td>County Nonemp&lt;sub&gt;t-2&lt;/sub&gt;</td>
<td>-0.007***</td>
<td>-0.015***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.004)</td>
<td></td>
</tr>
<tr>
<td>ΔCounty Nonemp&lt;sub&gt;t-3,t&lt;/sub&gt;</td>
<td></td>
<td></td>
<td>0.100***</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.020)</td>
</tr>
</tbody>
</table>

Identification: OLS OLS IV with Bartik
Sum of Coefficients: .04 .07 .1
Weights: Equal Population Equal
County Fixed Effects: Yes Yes Yes
Year Fixed Effects: Yes Yes Yes
First Stage F-stat: N/A N/A 129
Sample: 1990-2011
Observations: 52075 52075 49126

Notes: SNAP enrollment is available for about 2,700 counties each July. Standard errors clustered by state. * p<0.1, ** p<0.05, *** p<0.01
## APPENDIX TABLE 4 – SNAP Enrollment Decomposition, 1993-2000

<table>
<thead>
<tr>
<th>Sample: Families with Single Mothers</th>
<th>Enrollment (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eligibility Data Source</td>
<td>CPS</td>
</tr>
<tr>
<td>SNAP Enrollment Data Source</td>
<td>QC</td>
</tr>
<tr>
<td>Base enrollment of people in single-mother families, 1993</td>
<td>13.14</td>
</tr>
<tr>
<td>(1) Decreased eligibility (inc &gt; 130% pov) w/take-up fixed</td>
<td>-2.84</td>
</tr>
<tr>
<td>(2) Decreased take-up by eligibles (inc &lt;= 130% pov)</td>
<td>-2.05</td>
</tr>
<tr>
<td>(2a) Changing work and cash assistance patterns</td>
<td>-2.74</td>
</tr>
<tr>
<td>(2b) Changing take-up within cell</td>
<td>0.69</td>
</tr>
<tr>
<td>(1)+(2) Total change in SNAP enrollment</td>
<td>-4.90</td>
</tr>
</tbody>
</table>

Note: We use the March Current Population Survey (CPS) together with the SNAP Quality Control (QC) files to study SNAP enrollment by single mothers with children from 1993 through 2000. We develop a unique decomposition of enrollment changes by income eligibility, and among eligibles, by take-up rates separately for families working and families receiving cash assistance.

Eligibility Data: We estimate the number of eligible people as those in families with income less than 130% of poverty in the CPS. We define a family as working if it has earned income of at least 25% of the poverty line and as receiving cash assistance if it reports payments of at least 10% of the poverty line. We then sub-divide the likely-eligible sample into four groups: 'Work Only', 'Cash Assistance Only', 'Work and Cash', or 'Neither Work Nor Cash'.

SNAP Enrollment Data: We estimate the number of people enrolled in each of these four groups using QC data, and separately using CPS data. The QC data come from administrative sources, but use a monthly accounting concept. The CPS data on SNAP receipt cover the prior year, but suffer from underreporting.
<table>
<thead>
<tr>
<th>Policy</th>
<th>2001</th>
<th>2007</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad-Based Categorical Eligibility</td>
<td>7</td>
<td>13</td>
<td>41</td>
</tr>
<tr>
<td>Exclude At Least One Vehicle From Asset Test</td>
<td>9</td>
<td>46</td>
<td>49</td>
</tr>
<tr>
<td>SSI Combined Application Project</td>
<td>1</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Face-to-Face Recertification Interview Waiver</td>
<td>0</td>
<td>22</td>
<td>47</td>
</tr>
<tr>
<td>Online Application</td>
<td>0</td>
<td>14</td>
<td>30</td>
</tr>
<tr>
<td>Simplified Reporting</td>
<td>4</td>
<td>47</td>
<td>49</td>
</tr>
<tr>
<td>Call Center</td>
<td>7</td>
<td>21</td>
<td>32</td>
</tr>
<tr>
<td>Do Not Certify Earners Every 3 Months</td>
<td>26</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Summary Index Mean</td>
<td>.13</td>
<td>.55</td>
<td>.77</td>
</tr>
</tbody>
</table>

Source: SNAP Policy Database in July of each year for 50 states plus DC. Vehicle exemptions, simplified reporting, and call centers are missing in 2011, and we use the 2010 values. The summary index is the sum of all the policy indicators, divided by 8.