Exploring the Causes of State Variation in SNAP Administrative Costs

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Executive Summary

The cost per case of administering the Supplemental Nutrition Assistance Program (SNAP) varies widely across States and has been dropping over time. State administrative expenses (SAE) per case are generally lower in States that have adopted streamlining policies, according to statistical models of SAE across the 50 States and the District of Columbia. However, differences in State policies explain only a small portion of the overall variation. Some variation is explained by average wages of public workers and other measures of economic differences across States. Yet, substantial differences in SAE per case persist, even after adjustments for State policies, economic factors, and caseload characteristics.

To explore the causes of State variation in SAE per case, the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA) contracted with the Manhattan Strategy Group (MSG) and its subcontractor, the Urban Institute (together the MSG-Urban Team), to address the following research questions:

- How do differences in economic conditions across States and time impact variation in SNAP SAE?
- How does variation in SNAP caseload characteristics across States and time impact variation in SNAP SAE?
- How does variation in such State policies as eligibility systems, certification options, and modernization efforts impact variation in SNAP SAE?
- How much of the variation in SAE per case is explained by the statistical analyses, and what key factors explain SAE variation?
- What is the relationship between variation in SNAP SAE and payment accuracy, timeliness in application processing, and program access?

FNS has a strong interest in understanding this variation as USDA reimburses the States for 50 percent of most administrative costs.

SAE Variation Across States and Over Time

SNAP SAE per case varied nearly tenfold across States in Fiscal Year (FY) 2016, from $89 in Florida to $848 in Wyoming. Many States that had higher costs per case than other

States in FY 2016 also ranked high in other years. Even so, there has been a widespread decline in costs: the average SAE per case in FY 2016 was less than half the FY 1999 amount, after adjusting for inflation ($348 compared with $714), with costs per case dropping in all but two States.

Methods for Analyzing Causes of Variation

To determine the causes of variation in SAE per case, **the research team developed statistical models to explore the effect of State economic conditions, State caseload characteristics, and State policies on SAE per case** using a State and year fixed effects model as the main modeling approach. The preferred model examined five policies (Broad-Based Categorical Eligibility [BBCE], simplified reporting, waiver of face-to-face interviews, fingerprinting requirements, and length of certification period), three measures of State economic conditions (average wages of public welfare workers, State revenue per capita, and unemployment), and three measures of caseload characteristics (people per household, share of SNAP households with earnings, and share of SNAP households receiving Temporary Assistance for Needy Families [TANF]). Supplemental models tested a fuller range of policies, economic factors, and caseload characteristics.

Causes of Variation in SAE: Key Findings

Two of five policies examined in the preferred model—adoption of BBCE and simplified reporting—significantly lowered SAE per case, by about 7 percent each. Supplemental analyses showed that SAE per case also decreased as States moved up on an index measuring the adoption of other streamlining policies and modernization practices.[1]

[1] The SNAP policy index included six policies: exclusion of all vehicles from the asset test, operation of call centers, waiver of face-to-face interviews, use of online applications, operation of Combined Application Projects (CAPs), and fingerprinting requirements.

Economic differences across States explained some variation in SAE per case. Expenses were higher in States with higher average wages for public welfare workers; a 10 percent increase in wages was associated with a 5 percent increase in SAE per case.

In addition, SAE per case went down during economic downturns through the combination of rising caseloads, declining State revenues, and tight State budgets. A 1 percentage-point increase in the unemployment rate (lagged one year) led to a 5 percent reduction in SAE per case. Analyses show that unemployment affects SAE per case through its effect on caseload, not its effect on aggregate SAE. In addition, a 10 percent decline in State revenue per capita led to a 0.6 percent decline in SAE per case.

The characteristics of the SNAP caseload had relatively little effect on SAE per case. Though SAE per case decreased with declines in average household size, other demographic factors had less effect, and one observed relationship was not in the expected direction. Specifically, an increase in the share of SNAP households with earnings was associated with a decrease in SAE per case, even though cases with earners are widely believed to require more attention (e.g., for documenting earnings fluctuations). The Great Recession may help explain this otherwise puzzling result: caseloads increased dramatically, the share of SNAP recipients with earnings increased, and SAE per case fell, all at the same time.

Substantial differences in SAE across States remain that are not explained by the economic, demographic, and policy factors included in our analyses. Part of the remaining difference in SAE across States can be explained by unobserved factors that persisted throughout the FY 1999–FY 2016 study period. These factors may include differences in State costs of living (beyond the wage and price measures used in the analysis), State cultures, budgeting

practices, statutory and regulatory policies outside SNAP, and operational practices other than those captured in databases of SNAP policy options and modernization efforts.

In fact, the addition of State fixed effects explains about 72 percent of the remaining variation in SAE cost per case, according to a statistical analysis examining the effects of adding additional predictors to the preferred model.[2] Adding the three economic variables explained only 12 percent of remaining variation, and differences in SNAP policies and SNAP caseload characteristics explained even less (4 percent for each set of factors).

County-administered states spent 24 percent more on SAE per case than other States, after controlling for economic, demographic, and policy differences. We are unable to determine whether the higher SAE per case in county-administered States was a product of county administration per se or of other time-invariant characteristics of the 10 county-administered States. It was not possible to identify the effect of being a county-administered State, because no State moved in or out of county-administered status between FY 1996 and FY 2016.[3]

SAE and Program Performance Goals: Exploratory Analyses

Finally, we began exploring whether States that spend more on SAE per case have better program performance, including improved program access, payment accuracy, and timeliness in application processing. Descriptive analyses found no meaningful relationship between SAE per case and payment accuracy or timeliness of application processing. The exploratory results did suggest that higher State access (as measured by participation rates) was associated with lower costs per case. However, all three results should be considered preliminary, because of

[2] This was done by estimating partial R-squares, or the proportion of variation in SAE per case that cannot be explained in a reduced model, but can be explained by the addition of a specified set of variables.
[3] This is an example of the more general challenge that in a State fixed effects model, it is not possible to examine variables that show no variation within any State over the observed period.

uncertainty as to the direction of the relationship and significant data limitations (e.g., the timeliness data were only available for FY 2010–FY 2015). Future research is needed to determine whether SAE per case is associated with program performance.

Conclusion

This research project set out to improve understanding of the factors explaining the wide variation in SNAP SAE per case across States and the changes in SAE over time. An underlying motivation was to learn the extent to which costs are controllable by the State agency administering the SNAP program.

Our analyses suggest that adoption of SNAP streamlining policies is generally associated with reductions in SAE per case. However, reductions of 3 to 7 percent (i.e., the magnitude of change predicted with each SNAP policy examined) are small given the range of spending differences across States: some States spend 5 to 10 times as much per case as others. While there was some evidence that adoption of multiple streamlining policies could reduce SAE costs per case, even a bundle of policies made much less difference than economic characteristics and State fixed effects.

Chapter 1. Introduction and Background

SNAP is among the most important components of America's safety net. It is the "largest program in the domestic hunger safety net" (USDA FNS 2018). Its monthly benefits help millions of low-income individuals and families purchase food at authorized grocery stores and other locations. Unlike other social programs, SNAP is available to anyone who meets the eligibility criteria, regardless of age or disability status; the program provides food benefits to a broad range of individuals and families with income below poverty-based income eligibility guidelines.

Because SNAP eligibility is means-tested, caseloads typically rise during recessions and fall during economic expansions. In the Great Recession of the late 2000s, SNAP played a significant role in keeping people out of poverty (Trisi 2013). Between FY 2007 and FY 2012, the SNAP caseload increased 76 percent (Zedlewski and Huber 2012), reaching more than 47 million beneficiaries in FY 2013 (USDA FNS 2017). In FY 2016, the program provided benefits to an average monthly caseload of 44.2 million people living in 21.8 million households.

SNAP is jointly administered by the Federal government and the States. Within regulatory limits, State agencies can select policy options to adapt SNAP administration to their needs. These policy options include the length of time for which households are certified, the type of reporting requirements, the use of online applications and call centers, treatment of vehicles and other assets, and whether to use a combined application with Supplemental Security Income (SSI). States may also choose to administer SNAP at the State or county level. While most States administer SNAP at the State level, 10 operate county-administered programs. One question motivating this study is whether State policy options and operational choices affect SNAP administrative costs.

The Federal government pays for SNAP benefits in full and reimburses 50 percent of most SAE. In FY 2016, the Federal portion of SNAP SAE was over $3.7 billion of the total $7.8 billion. These expenses vary greatly across the States, a pattern that has long been a concern of FNS and the USDA Office of Inspector General (OIG). As a recent illustration of this variation, SNAP SAE per case varied nearly tenfold in FY 2016, from $89 in Florida to $848 in Wyoming.

In addition to variation between States, there has been variation over time, including a widespread decline in costs in recent years. The average SAE case has dropped from $714 in FY 1999 to $348 in FY 2016 (both figures reported in 2016 dollars).

To explore the causes of State variation in SAE per case, FNS contracted with MSG and its subcontractor, the Urban Institute (the MSG-Urban Team) to use existing data and information to conduct statistical analyses addressing the following research questions:

- How do differences in economic conditions across States and time impact variation in SNAP SAE?
- How does variation in SNAP caseload characteristics across States and time impact variation in SNAP SAE?
- How does variation in such State policies as eligibility systems, certification options, and modernization efforts impact variation in SNAP SAE?
- How much of the variation in SAE per case is explained by the statistical analyses, and what key factors explain SAE variation?
- What is the relationship between variation in SNAP SAE and payment accuracy, timeliness in application processing, and program access?

This report presents the results of statistical models examining these questions and is organized as follows. The remainder of this introductory chapter summarizes the prior research that helped guide our analysis. Chapter 2 defines and describes SAE per case, the key dependent variable that is the focus of the report. Chapter 3 discusses our methods and modeling approach, outlining how the factors identified in the first three research objectives (i.e., State economic conditions, SNAP caseload characteristics, and SNAP policy options) may affect SAE per case and providing data sources and descriptive statistics for these explanatory variables. Findings are

presented in Chapter 4 (key findings organized by research question) and Chapter 5 (supplemental analyses). Chapter 6 investigates the final research question, conducting a preliminary analysis of the relationship between SNAP SAE and program performance goals (specifically, payment accuracy, timeliness in application processing, and program access). Chapter 7 concludes by summarizing key takeaways from the study.

Rationale for Study and Prior Research on Administrative Costs

Prior work shows that the State program environment affects SAE certification costs. Factors such as prevailing wages and predicted workload for case management are associated with certification costs for SNAP, and predicted workload is associated with such factors as unemployment rates and SNAP caseload characteristics (Hamilton et al. 1989). Nonetheless, there is an increasing demand for rigorous assessment of factors driving the variation in SAE. Logan and Klerman (2008) proposed five options for further research on the topic, with all but one requiring additional data collection.

More recently, a 2016 USDA OIG report expressed concerns that SNAP SAE vary widely both within and across States and that factors driving the variation in SAE are poorly understood. The OIG report highlighted that county-administered States have particularly high costs and urged FNS to examine the factors driving variation in SNAP SAE.

In this report, we adopt Logan and Klerman's (2008) first proposed method for evaluating the factors driving this variation, which includes constructing a panel dataset of variables that are readily available for all States and performing regressions with State and year fixed effects. Our dataset includes State-reported SNAP administrative cost data combined with various extant data sources, such as the Census Bureau and the Bureau of Labor Statistics. This design was proposed as a cost-effective and expeditious research approach to improve understanding about the factors that influence SNAP SAE. The results could inform FNS efforts

to contain costs by disseminating and promoting SNAP administration practices associated with lower SAE.

We review the relevant literature on this topic in four sections. First, we review findings related to the first three research objectives: State economic conditions, State caseload characteristics, and State policy options. Then we discuss studies that focus on the relationship between SAE and program performance goals.

State Economic Conditions

There is consistent evidence that State economic conditions are associated with administrative costs of welfare programs. As previously noted, Hamilton et al. (1989) found that State wages and unemployment rates were both associated with SNAP SAE. A study by the Lewin Group and the Nelson E. Rockefeller Institute of Government (2004) demonstrated that poorer States (i.e., those with lower fiscal capacity as measured by per capita income) spend less on social programs than richer States. Examining the 2001 recession, McGuire and Merriman (2007) and Finegold et al. (2003) showed how States attempt to reduce administrative expenses during recessions to avoid service cuts in the face of increasing caseloads. A study of efforts to modernize delivery of SNAP, TANF, and Medicaid during and after the Great Recession (Isaacs, Katz, and Amin 2016) found that State administrators felt great pressure to streamline administrative processes as caseloads were rising while agency and staff budgets were being cut.

Collectively, these studies indicate the importance of examining State fiscal conditions and economic factors such as unemployment when analyzing variation in SNAP SAE. They also suggest that the Great Recession should have had a significant impact on administrative expenses per case because of the combined effect of lower administrative costs and higher caseloads.

Caseload Characteristics

The caseload characteristics of SNAP participants have been shown to be an important factor in the determination of SNAP administrative costs. Hamilton et al. (1989) found that more volatile households (i.e., those with earned income, those with non-program unearned income such as alimony, and/or those not headed by elderly) contributed to increases in the workload of SNAP workers. In addition, the share of SNAP cases receiving cash assistance under the Aid to Families with Dependent Children (AFDC) program is negatively associated with SNAP certification costs because AFDC covered most costs on those cases. However, this cost sharing agreement has changed since the 1990s.[4] Logan and Klerman (2008) also emphasize the importance of examining how much time eligibility workers spend on each type of case.

There is also evidence that household composition affects the likelihood that a SNAP case will churn—that is, temporarily close and re-open. States with SNAP populations with younger heads of household, more members, no elderly people, and no people with disabilities are more likely to exhibit churn, and there are significant administrative costs associated with case churning (Mills et al. 2014).

State Policy Options

Studies of SNAP and other social service programs suggest that States may be able to implement specific policies to reduce program administrative expenses. For example, the Government Accountability Office (US GAO 2006) assessed levels and trends in administrative costs in seven Federal programs and identified opportunities to reduce these costs while maintaining program effectiveness and integrity. The GAO's report suggested that the Federal government can help reduce administrative expenses by simplifying policies and facilitating

[4] This change is one reason for starting our data analysis in FY 1999.

technological improvements. Another comparative study suggested that the detailed eligibility and documentation requirements of the SNAP program contribute to its higher administrative costs compared with programs such as the Earned Income Tax Credit and the National School Lunch program (Isaacs 2008). Reforms under the 2002 Farm Bill, such as loosening of asset tests and adoption of simplified reporting, were highlighted as ways to reduce administrative costs. Program administrators and field staff in four States reported reductions in staff workload after implementing simplified reporting (Tripp et al. 2004).

Modernization also can affect administrative costs. Isaacs, Katz, and Amin (2016) found that using electronic data for verification and cross-enrollment reduced processing time for SNAP cases, though it was difficult to determine if it reduced aggregate SAE per case.

Relationship Between SAE and Program Performance Measures

Studies of SNAP reveal a complex relationship between SAE, program performance measures, SNAP policies, and other factors. Much of this literature focuses on payment accuracy and program access (participation rates), with little attention to timeliness of benefit delivery.

Logan, Kling, and Rhodes (2008) found that increased spending on SAE per case, adjusted for state wages, was associated with declines in error rates, though this was less true after 1996. This finding extends the authors' earlier research, which also revealed an inverse relationship between SNAP SAE costs and error rates (Logan, Rhodes, and Sabia 2006). Both studies found the food stamp error rate was lower when States reported expending more effort on certifications, after controlling for other State characteristics.

Logan, Kling, and Rhodes (2008) also found a relationship between caseload and error rates. Generally, error rates increase as caseloads increase; the two measures often decline in

tandem as well. The authors attribute this to the delay that often exists between significant changes in caseloads and States' adjustments to staff levels.

SNAP policies also affect payment error rates and program access. Mills, Laliberty, and Rodger (2004) found that certification policies affect program access and payment accuracy: more frequent recertification reduces participation rates (i.e., access) and appears to increase error rates. Fink and Carlson (2005) estimated that simplified reporting noticeably reduced payment error rates. In a cross-program study, Isaacs (2008) highlighted the tradeoffs between aspects of social service program administration, documenting that programs with lower administrative expenses (measured in costs per benefit dollar issued and costs per recipient unit) have higher error rates but greater program access. Simplified eligibility requirements could simultaneously reduce error rates and administrative expenses.

In tandem, these studies suggest the complexity of disentangling the joint relationship between SAE, program access, and payment accuracy. Consequently, our analysis is exploratory and only examines the individual relationships between SNAP SAE and participation rates, error rates, and timeliness, respectively.

Chapter 2. Examining SNAP SAE

Administrative costs for SNAP vary dramatically, with the highest-cost State spending nearly 10 times more than the lowest-cost State in FY 2016 ($848 per case in Wyoming compared with $89 per case in Florida). Moreover, there has been a widespread decline in SAE per case over the past 18 years. In this chapter, we explore patterns in SAE across States and time more deeply through descriptive statistics, after an introduction on data sources.

Defining and Measuring SAE

States use Financial Status Report SF-425/FNS-778[5] to report SAE and claim Federal reimbursement. Allowable costs fall into more than two dozen categories of activities. The Federal government reimburses 50 percent of most SAE, but 100 percent of certain activities (e.g., certain Employment and Training [E&T] costs) and between 50 and 100 percent for others (e.g., an enhanced match for Automated Data Processing [ADP] development and fraud control in certain years). FNS aggregates quarterly data into Federal fiscal year reports.

We examined annual observations of total SAE (Federal and State) for the 50 States and the District of Columbia over 18 years from FY 1999 to FY 2016. We excluded data from earlier years because of a major change in cost accounting for SAE during the 1990s that altered how costs for households receiving both SNAP and cash assistance are allocated.[6] To facilitate comparison across large and small States, many of our analyses focus on SAE per case, defined

[5] Before FY 2012, SAE expenses were reported on SF-269. Form SF-425/FNS-778 differs slightly from Form SF-269, but, as detailed in Appendix Exhibit A.1, we developed a consistent definition of SAE across the two forms, in total and by functional category.

[6] Initially, the costs of collecting income and resource information needed for both programs were charged to the Aid to Families with Dependent Children (AFDC) program, with SNAP (or the Food Stamp Program as it was called then), paying only for items required only for SNAP purposes (Hamilton et al. 1989). In the 1990s, States began allocating costs across programs, a practice called "benefiting program accounting," under guidance from the Office of Management and Budget. The shift from the AFDC to the TANF program in 1996 adds further complexity. We focus on the years beginning with FY 1999, after all States implemented benefiting program accounting.

as total annual SAE costs divided by the caseload (the average monthly number of households receiving SNAP benefits). We also adjusted all costs and other monetary variables to 2016 dollars.[7] Finally, for certain supplemental analyses, we grouped costs into seven major functions:

1) Certification-related, that is, those costs associated with determining household eligibility, both at the time of initial application and at each recertification;
2) Issuance, which relates to issuance of paper coupons in the past and Electronic Benefit Transfer (EBT) cards now;
3) Automated Data Processing (ADP) operations;
4) ADP development;
5) Employment and Training (E&T) programs and workfare programs;
6) Fraud control; and
7) Miscellaneous, including quality control, fair hearings, and management evaluation.

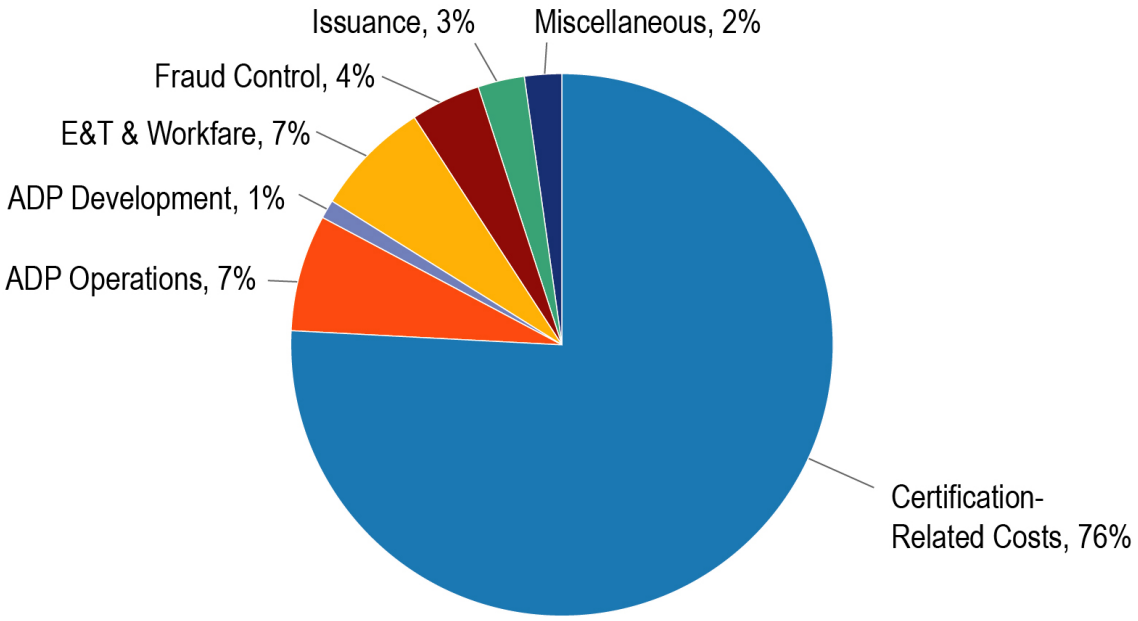
We excluded from SAE those costs reported as Nutrition Education in reports from FY 1999 to FY 2010, because these costs were not counted as SAE in FYs 2011 to 2016. Thus, we excluded Nutrition Education in all years to maintain a common definition of SAE.

More than three-fourths (76 percent) of SNAP SAE in FY 2016 was for certification-related costs. Another 7 percent was spent on ADP operations and 7 percent on E&T and workfare programs. The remaining SAE categories were each less than 4 percent (Exhibit 2.1).[8]

[7] We use the GDP deflator to adjust costs. Although costs are reported by Federal fiscal year (which runs from October to September), most explanatory variables are reported by calendar year, and we use the GDP deflator by calendar year.

[8] We also show the correlations across these components of total SNAP SAE in Appendix Exhibit A.2. As expected, total costs are highly correlated with certification costs (the correlation is 0.99), but the other cost components also tend to move in the same direction, with all correlations positive and greater than 0.30. Appendix Exhibit A.3 shows the correlations across the components of certification-related costs.

Exhibit 2.1. SNAP SAE per Case by Component, FY 2016



Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388.

Most of these cost categories combine several smaller cost activity categories, as detailed in Appendix A. Most notably, the certification-related category included not only reported certification (70 percent of total SAE in 2016), but also costs reported as new investment, outreach, Systematic Alien Verification for Entitlements (SAVE) Program, unspecified other, and, in certain years, supplemental funding provided through Department of Defense (DoD) appropriations.[9]

[9] We classified "outreach" funds as closely related to certification costs, as well as the "new investment" or "reinvestment" that States make as an alternative to paying sanctions when they have high error rates and expenditures on the SAVE Program. Together, outreach, reinvestment, and SAVE accounted for 1 percent of SAE in 2016. "Unspecified other" were included with certification costs, following the approach used by Logan and Klerman (2008), who noted that certification reporting categories are not consistently measured across States. That is, some States include in unspecified costs the types of costs other States report as certification costs. Unspecified other costs accounted for 6 percent of all SAE in 2016. Supplemental appropriations for SNAP SAE in 2010 and 2011 were provided in the DoD Appropriations Act of 2010. Because the language specified that the additional funds were to "help speed up the processing of applications," these funds also were classified as certification-related costs in those two years.

Data Challenges

SNAP SAE per case, the key outcome of interest, is driven by two factors: total SAE and average monthly caseloads. When interpreting trends, it is important to recognize that rising caseloads can lead to lower costs per case. Of particular relevance for this study, the SNAP caseload rose 77 percent nationwide between June 2007 and June 2012, with all States seeing large increases in caseload during and after the Great Recession (Isaacs and Healy 2012). Most State budgets were constrained (as the same economic conditions that drive rising caseloads also tend to contract State revenues), resulting in significant declines in SAE per case. Moreover, all States except Vermont are constitutionally or statutorily required to have a balanced budget, preventing them from engaging in deficit spending.

Another caveat is that expenditure reports do not always fully capture true programmatic costs, and reporting of costs can vary across States and over time. As mentioned in footnote 9, some States may report costs under "unspecified other" that other States allocate across specific categories, such as certification costs. States also use various methods to estimate how to allocate billing across SNAP, Medicaid, and other programs for shared activities (i.e., employees who work on both SNAP and Medicaid cases), and these cost allocation methods can shift over time. Finally, there are some data anomalies, where the sum of costs across categories differs somewhat from reported total costs.

The MSG-Urban Team tried to address these data challenges. When considering the relationship between potential explanatory factors and SAE per case, we considered whether the explanatory variable was more likely to drive costs (the numerator) or the number of cases (the denominator); we also tested alternative models that examined total SAE, rather than SAE per case. As noted previously, we limited our analysis to FY 1999 and subsequent years to limit the

effect of changes in cost allocations between SNAP and the Temporary Assistance for Needy Families (TANF) program. Our analysis also focused primarily on total SAE, rather than the various components of costs, to reduce concerns about cross-State differences in cost allocations across activities.

Trends in SNAP SAE per Case

Nationally, SAE per case has fallen dramatically from $714 in FY 1999 to $358 in FY 2016, with a high of $766 in FY 2001 and a low of $317 in FY 2013 (Exhibit 2.2). This trend is driven by the fact that caseloads rose much more rapidly than costs over this period. Total national SNAP SAE has risen gradually over time, from $5.5 billion to $7.8 billion between 1999 and 2016, after adjusting for inflation. The annual increase was generally small and positive (0 to 4 percent), although costs increased 5–6 percent in four years and fell 1–2 percent in three years. SNAP caseloads have increased even more rapidly, with increases of 10 percent or more in FYs 2002–2004 and increases of 20 percent or more in FYs 2009–2010 (Exhibit 2.3).

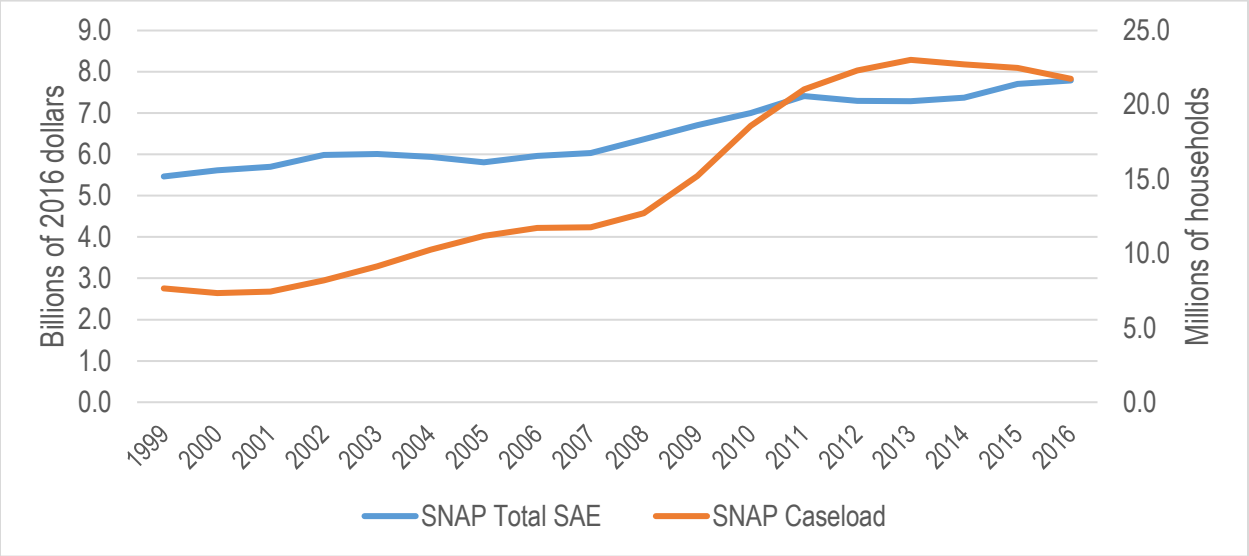
Exhibit 2.2. National Trends in Total SNAP SAE, SNAP Caseload, and SNAP SAE per Case

Fiscal Year	Total SNAP SAE	SNAP Caseload	SNAP SAE per Case	Total SNAP SAE	SNAP Caseload	SNAP SAE per Case
	(in billions of 2016 dollars)	(in millions of households)	(in 2016 dollars)	% change	% change	% change
1999	5.5	7.7	714			
2000	5.6	7.3	765	3%	-4%	7%
2001	5.7	7.4	766	2%	1%	0%
2002	6.0	8.2	732	5%	10%	-5%
2003	6.0	9.1	657	0%	12%	-10%
2004	5.9	10.3	578	-1%	12%	-12%
2005	5.8	11.2	519	-2%	9%	-10%
2006	6.0	11.7	509	3%	5%	-2%
2007	6.0	11.8	513	1%	0%	1%
2008	6.4	12.7	501	6%	8%	-2%
2009	6.7	15.2	441	5%	20%	-12%
2010	7.0	18.6	376	4%	22%	-15%
2011	7.4	21.0	352	6%	13%	-6%

Fiscal Year	Total SNAP SAE (in billions of 2016 dollars)	SNAP Caseload (in millions of households)	SNAP SAE per Case (in 2016 dollars)	Total SNAP SAE % change	SNAP Caseload % change	SNAP SAE per Case % change
2012	7.3	22.3	327	-2%	6%	-7%
2013	7.3	23.0	317	0%	3%	-3%
2014	7.4	22.7	325	1%	-1%	3%
2015	7.7	22.5	343	4%	-1%	5%
2016	7.8	21.7	358	1%	-3%	5%

Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388

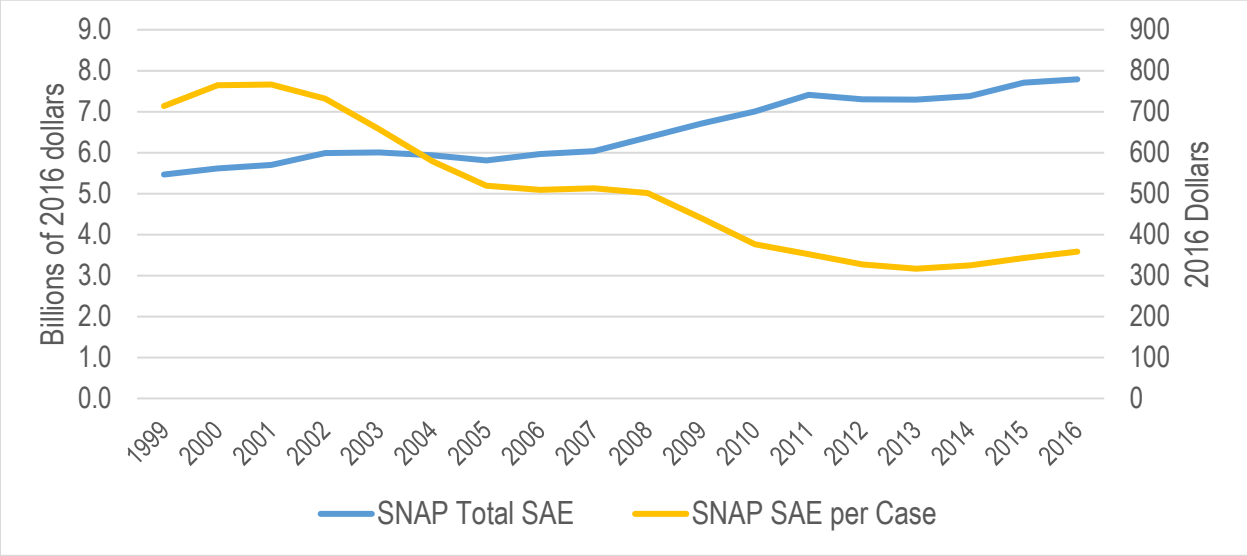
Exhibit 2.3. National Trends in Total SNAP SAE and Caseloads, FY 1999–FY 2016



Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388

We thus saw a generally inverse relationship between total SAE and SAE per case during most of this 18-year period, as depicted in Exhibit 2.4.

Exhibit 2.4. National Trends in Total SNAP SAE and SNAP SAE per Case, FY 1999–FY 2016



Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388

We also saw an increase in the percentage of total SNAP SAE devoted to certification-related activities (Exhibit 2.5). It averaged 69 to 70 percent from FY 1999 to FY 2009 and has climbed since then, reaching 76 percent in FY 2016. The reasons for this increase are not clear.

Exhibit 2.5. Total SNAP SAE per Case, FY 1999–FY 2016 (in 2016 Dollars)

Fiscal Year	Total	Certification-Related	Other	Percent Certification
1999	714	493	220	69%
2000	765	535	230	70%
2001	766	538	228	70%
2002	732	506	225	69%
2003	657	452	205	69%
2004	578	402	177	69%
2005	519	357	162	69%
2006	509	355	155	70%
2007	513	358	155	70%
2008	501	352	149	70%
2009	441	307	134	70%
2010	376	269	107	71%
2011	352	256	96	73%
2012	327	236	91	72%

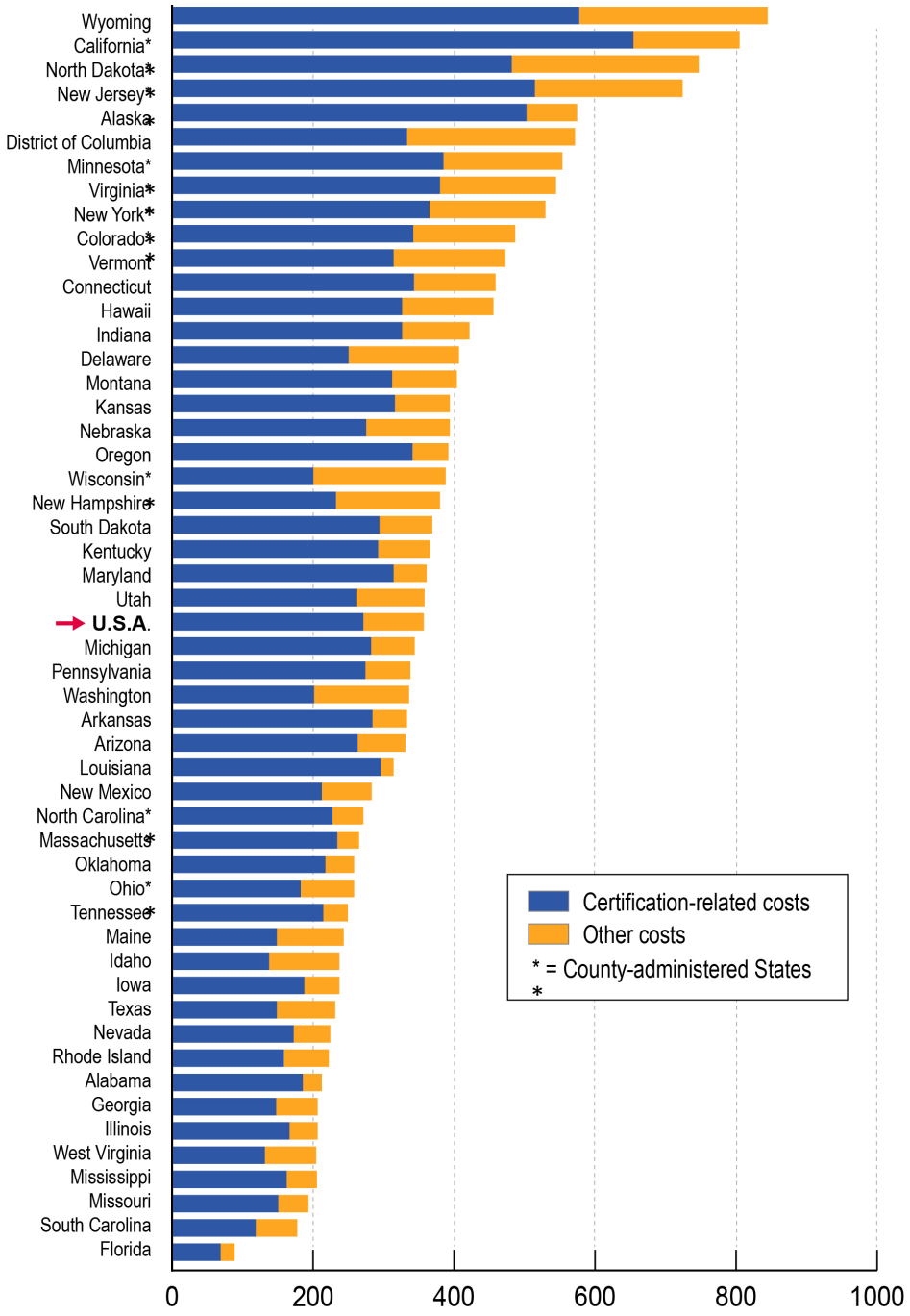
Fiscal Year	Total	Certification-Related	Other	Percent Certification
2013	317	232	84	73%
2014	325	240	85	74%
2015	343	254	89	74%
2016	358	272	86	76%

Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388

State Variation in SNAP SAE per Case

Next, we examine State variation in SAE per case. As shown in Exhibit 2.6, SNAP SAE per case varied tenfold in FY 2016, from $89 in Florida to $848 in Wyoming. Ignoring the outliers (the four highest States and one lowest State), there still was a threefold difference between the $178 per case in South Carolina and the $575 per case in Alaska. Both certification-related costs and other costs per case varied considerably across States. Also, the share of total costs per case classified as certification related ranged from 52 percent (Wisconsin) to 94 percent (Louisiana). Some of this latter variation may represent cross-State inconsistency in how costs are allocated across different functions.

Exhibit 2.6. SNAP SAE per Case, FY 2016 (in 2016 Dollars)



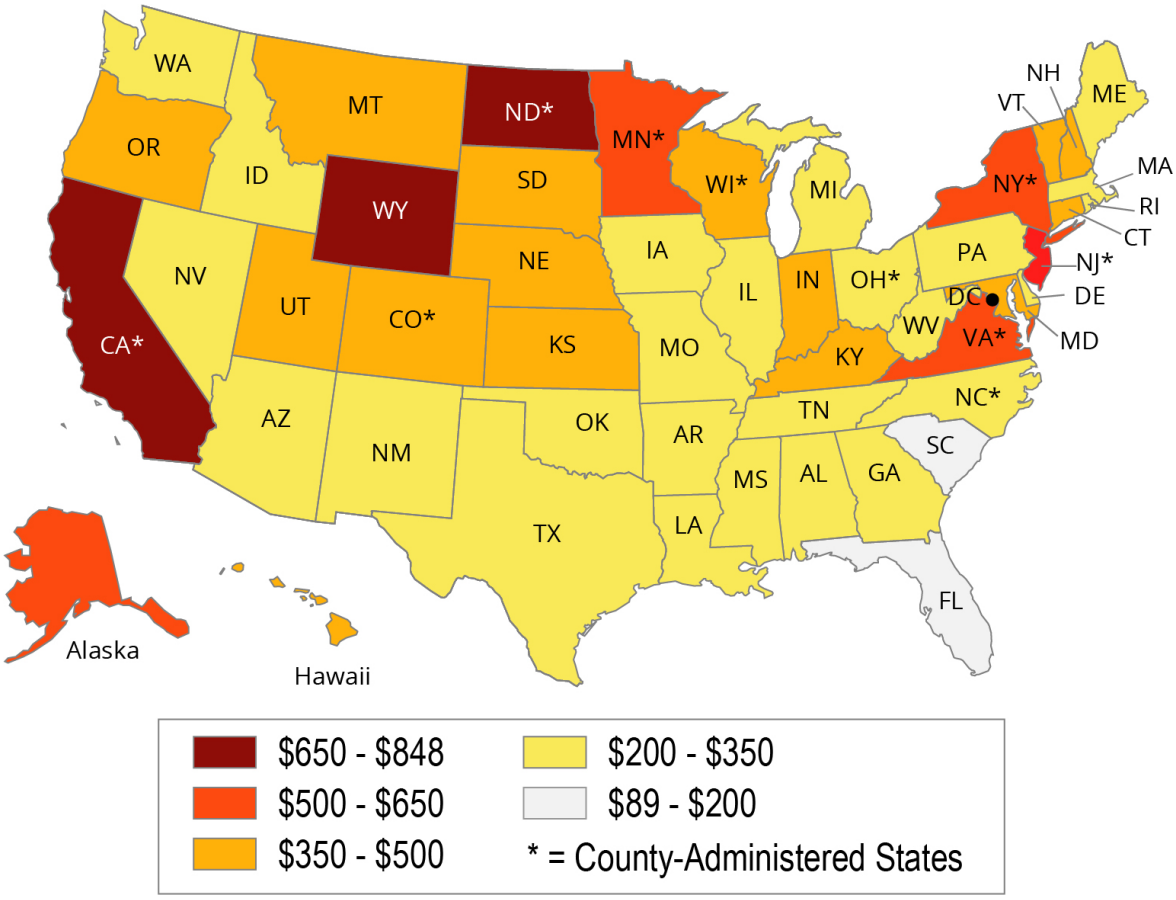
Source: FNS, Form SF-425/FNS-778 and Form FNS-388

We also note the preponderance of county-administered States among higher-cost States. When ranked from highest to lowest cost per case, seven of the 10 highest cost States were county-

administered States; the two lowest-cost county-administered States were ranked numbers 17 and 20. (County-administered States are designated with an asterisk in Exhibit 2.6.)

There was some tendency for lower costs in the southern part of the United States, but otherwise we found no strong geographic patterns (Exhibit 2.7).

Exhibit 2.7. SNAP SAE per Case, by State, FY 2016



Source: FNS, Form SF-425/FNS-778 and Form FNS-388

The patterns in SAE per case seen in FY 2016 are not unique. Other years also have seen a wide range in costs. However, the spread between the lowest and highest States grew, from fivefold in 1999–2006 to twelvefold in 2015 and tenfold in 2016. The growing dispersion in

costs over time can also be seen in the coefficient of variation, which has increased from 32 percent to 45 percent between FY 1999 and FY 2016.[10]

An examination of patterns by State and time revealed a widespread pattern of declining SAE per case. All but two States saw a decline between FY 1999 and FY 2016, ranging from 86 percent in Florida to 7 percent in Hawaii (Exhibit 2.8). North Dakota and Wyoming had higher SAE per case in 2016 than they did in 1999 (by 8 and 16 percent, respectively).

Exhibit 2.8. SNAP SAE per Case by State, Select Years (in 2016 Dollars)

State	FY 1999	FY 2004	FY 2009	FY 2016	Change from FY 1999 to FY 2016	
					$ change	% change
Alabama	448	329	260	214	-235	-52%
Alaska	1,283	1,138	934	575	-708	-55%
Arizona	563	327	240	332	-230	-41%
Arkansas	536	402	357	334	-201	-38%
California*	954	1,296	1,002	808	-146	-15%
Colorado*	546	597	619	488	-58	-11%
Connecticut	587	462	448	461	-126	-22%
Delaware	1,333	788	690	408	-926	-69%
District of Columbia	699	731	584	573	-126	-18%
Florida	648	384	203	89	-559	-86%
Georgia	651	411	250	208	-443	-68%
Hawaii	493	537	551	457	-36	-7%
Idaho	961	594	423	239	-722	-75%
Illinois	705	454	374	208	-498	-71%
Indiana	626	423	404	424	-202	-32%
Iowa	542	502	364	238	-304	-56%
Kansas	529	520	357	395	-134	-25%
Kentucky	483	329	308	368	-115	-24%
Louisiana	506	395	431	316	-190	-38%
Maine	333	259	248	244	-89	-27%
Maryland	785	728	486	362	-423	-54%
Massachusetts	730	522	285	266	-464	-64%
Michigan	704	511	375	346	-359	-51%

[10] The coefficient of variation is a standardized measure used to describe the dispersion of a distribution independent of the absolute values of the observations; it is calculated as the ratio of the standard deviation to the mean.

State	FY 1999	FY 2004	FY 2009	FY 2016	Change from FY 1999 to FY 2016	
					$ change	% change
Minnesota*	964	720	681	555	-410	-42%
Mississippi	690	410	275	206	-484	-70%
Missouri	542	284	275	194	-348	-64%
Montana	599	485	502	405	-194	-32%
Nebraska	709	730	509	395	-314	-44%
Nevada	782	576	354	225	-556	-71%
New Hampshire	753	521	349	381	-372	-49%
New Jersey*	1,143	1,223	928	726	-418	-37%
New Mexico	535	590	515	284	-251	-47%
New York*	818	926	682	531	-287	-35%
North Carolina*	546	433	315	273	-274	-50%
North Dakota*	692	645	546	749	57	8%
Ohio*	756	670	389	258	-498	-66%
Oklahoma	617	486	452	260	-357	-58%
Oregon	715	466	394	394	-322	-45%
Pennsylvania	740	733	526	339	-401	-54%
Rhode Island	515	463	335	223	-292	-57%
South Carolina	432	242	129	178	-253	-59%
South Dakota	736	603	477	370	-366	-50%
Tennessee	376	228	234	250	-126	-34%
Texas	761	424	372	231	-530	-70%
Utah	767	965	710	359	-408	-53%
Vermont	643	773	593	474	-169	-26%
Virginia*	1,004	820	645	546	-458	-46%
Washington	991	458	280	337	-654	-66%
West Virginia	266	287	212	206	-61	-23%
Wisconsin*	1,074	627	345	389	-685	-64%
Wyoming	733	734	890	848	115	16%

Note: * = County-administered
Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388

We also see that many States with high costs in FY 2016 ranked high in other years. For example, Alaska, California, New Jersey, New York, and Virginia were among the highest 10 States in SNAP SAE per case in FY 1999, FY 2004, FY 2009, and FY 2016 (Exhibit 2.9). However, we do see some States changing in ranking. For example, Idaho fell from a high-cost

to a low-cost State between FY 1999 and FY 2016, whereas North Dakota and Wyoming rose from mid-cost to high-cost States.[11]

Exhibit 2.9. States Ranked by SNAP SAE per Case, Select Years

State	FY 1999	FY 2004	FY 2009	FY 2016	Change in Rank, FY 1999 to FY 2016
Alabama	47	45	44	44	3
Alaska	**2**	**3**	**2**	**5**	-3
Arizona	35	46	47	30	5
Arkansas	40	41	33	29	11
California*	**9**	**1**	**1**	**2**	7
Colorado*	37	19	**10**	**10**	27
Connecticut	34	33	22	12	22
Delaware	**1**	**7**	**6**	15	-14
District of Columbia	25	11	12	**6**	19
Florida	29	43	50	51	-22
Georgia	28	39	45	45	-17
Hawaii	45	23	13	13	32
Idaho	**8**	20	24	39	-31
Illinois	23	35	29	46	-23
Indiana	31	38	25	14	17
Iowa	38	28	31	40	-2
Kansas	42	26	32	17	25
Kentucky	46	44	39	23	23
Louisiana	44	42	23	31	13
Maine	50	49	46	38	12
Maryland	11	13	19	24	-13
Massachusetts	20	24	40	34	-14
Michigan	24	27	28	26	-2
Minnesota*	**7**	14	**8**	**7**	0
Mississippi	27	40	42	48	-21
Missouri	39	48	43	49	-10
Montana	33	30	18	16	17
Nebraska	22	12	17	18	4
Nevada	12	22	34	42	-30
New Hampshire	16	25	35	21	-5
New Jersey*	**3**	**2**	**3**	**4**	-1

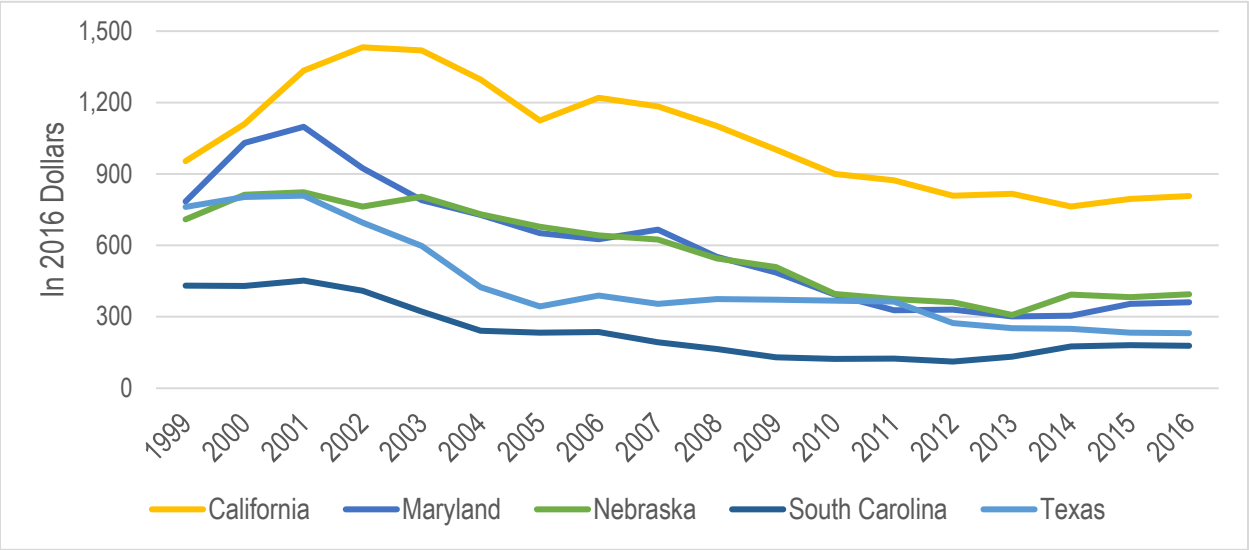
[11] North Dakota and Wyoming had lower caseloads than other states in 2016, perhaps contributing to their high cost per case. Yet they also had low caseloads in 1999, when they were mid-cost states.

State	FY 1999	FY 2004	FY 2009	FY 2016	Change in Rank, FY 1999 to FY 2016
New Mexico	41	21	16	32	9
New York*	**10**	**5**	**7**	**9**	1
North Carolina*	36	36	38	33	3
North Dakota*	26	16	14	**3**	23
Ohio*	15	15	27	36	-21
Oklahoma	32	29	21	35	-3
Oregon	21	31	26	19	2
Pennsylvania	17	**10**	15	27	-10
Rhode Island	43	32	37	43	0
South Carolina	48	50	51	50	-2
South Dakota	18	18	20	22	-4
Tennessee	49	51	48	37	12
Texas	14	37	30	41	-27
Utah	13	**4**	**5**	25	-12
Vermont	30	**8**	11	11	19
Virginia*	**5**	**6**	**9**	**8**	-3
Washington	**6**	34	41	28	-22
West Virginia	51	47	49	47	4
Wisconsin*	**4**	17	36	20	-16
Wyoming	19	**9**	**4**	**1**	18

Notes: States are ranked from 1 (highest) to 51 (lowest).
State ranks in bold are among the 10 highest in cost per case in that year.
* = County-administered
Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388

Finally, we present trend lines for five States (Exhibit 2.10), selected to include a range in SAE per case in 1999, including high (e.g., California) and low (e.g., South Carolina). The States also vary in population size and geographic region. These trend lines show that while the overall trend in SAE per case was downward, particularly during and following the Great Recession, each State's trend line follows its own course. The question is whether this variation in SAE per case is driven by observable factors. We examine some factors that may explain this variation in Chapter 3.

Exhibit 2.10. Trends in SAE per Case, Select States, FY 1999–FY 2016



Source: FNS, Form SF-269, Form SF-425/FNS-778, and Form FNS-388

Chapter 3. Approach to Modeling Variation in SNAP SAE

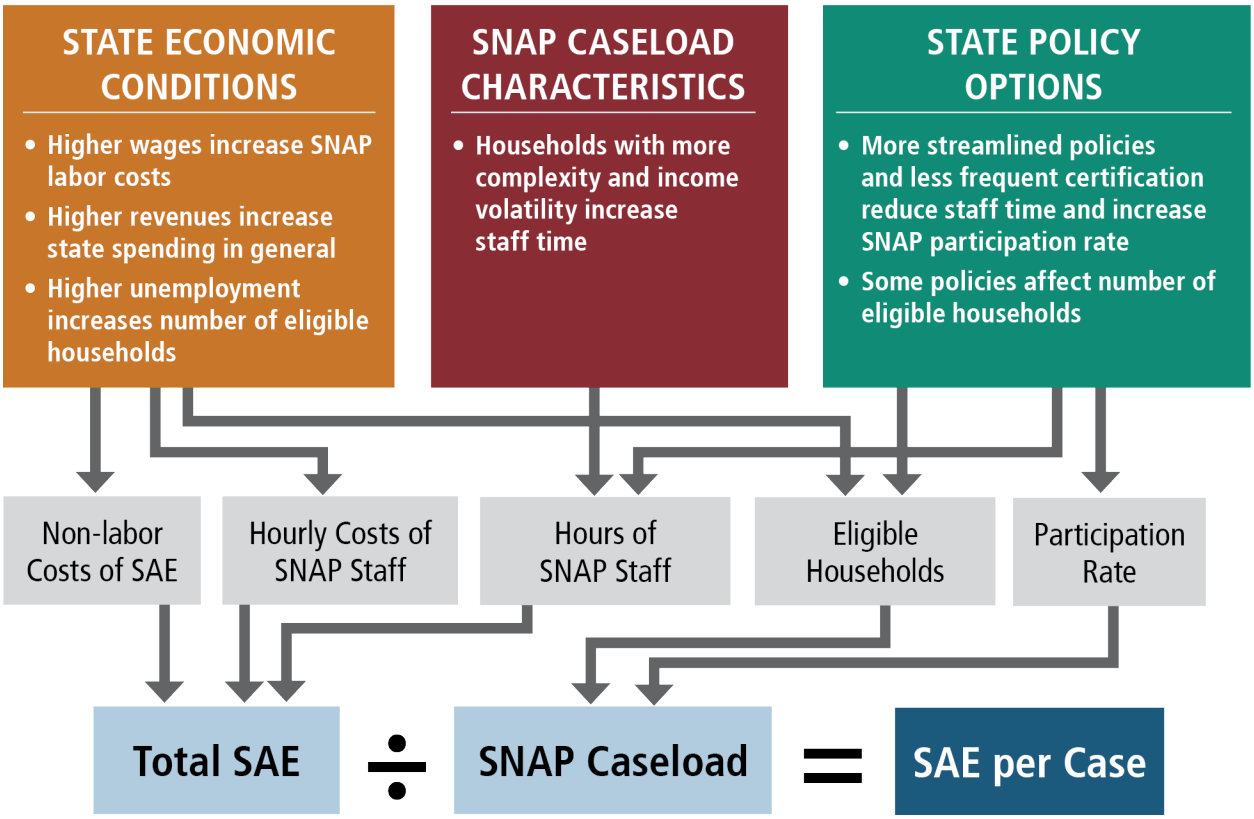
Various economic, demographic, and policy differences may explain why some States spend more than others on SNAP SAE and why SAE per case varies over time. This chapter provides a conceptual framework of how different factors may contribute to the observed trends and variation in SNAP SAE per case. It also reviews the full set of explanatory variables used in our statistical models, describing the data sources and descriptive statistics for these variables. The chapter concludes by describing our modeling approach and the primary statistical models used in our analyses.

We focus here on the analysis of variation in SNAP SAE per case. In Chapter 6, we discuss our approach and exploratory findings for the final research question: what is the relationship between SAE and three key program parameters—program access, payment accuracy, and timeliness of application processing?

Conceptual Framework

As shown in Exhibit 3.1, SAE per case is driven by its two major components: total SAE in a State and the State's SNAP caseload. In turn, total SAE may be viewed as driven by labor costs (i.e., time of SNAP staff and hourly cost of their labor) and non-labor costs, while SNAP caseloads are driven by the eligible population in a State and the participation rate among eligible households. Our conceptual framework highlights how these various components of SAE per case may be affected by three sets of factors: (1) differences in State economic conditions, including wages; (2) differences in characteristics of SNAP caseloads; and (3) variation in State policy options. Exploring these three sets of factors comprises three central research questions of this study.

Exhibit 3.1. Exploring the Causes of Variation in SNAP SAE per Case



State Economic Conditions

We expect that SAE per case will be higher in States and years with higher wages of public welfare workers,[12] consumer prices, and GDP levels. First, States with higher wages and prices are likely to spend more on SAE because of the higher costs of acquiring labor and other goods such as ADP systems, rent, and utilities. Much of SAE is driven by the labor costs of State welfare workers meeting with clients, reviewing applications, and determining eligibility. Second, in good economic times, with higher GDP and higher revenue per capita, States will have more funds available to pay for the State share of SAE, and thus can support higher SAE.

[12] "Public welfare workers" is a Census Bureau term that includes workers in income maintenance, social services, and other functions of public welfare agencies.

Conversely, during hard economic times, when States are struggling to maintain balanced budgets despite falling revenues, State agencies administering SNAP may be subject to hiring and pay freezes, along with cuts in agency budgets.[13] Furthermore, during recessions, more unemployed workers and other needy households meet the income and asset eligibility criteria for SNAP benefits, and this higher eligible population leads to higher caseloads. When caseloads are higher, SAE per case is lower, because some administrative costs are fixed and changes in marginal costs (i.e., changes in the number of caseworkers) do not occur as quickly—if at all—as changes in caseload.

The relationship between unemployment and SAE per case illustrates an important point. As shown in Exhibit 3.1, increases in labor costs and non-labor costs are expected to increase SAE per case through their effects on total SAE, while changes in unemployment decrease SAE per case through their effects on SNAP caseload.

SNAP Caseload Characteristics

Some SNAP households are expected to be costlier to process because they require more caseworker time. In general, households with stable incomes (i.e., elderly households with a fixed income) require less interaction with caseworkers than households with fluctuating incomes (i.e., households with earnings). Households with more members are also assumed to be more complex and costly; some information is collected and documented per person, and therefore caseworkers have to spend more time on cases with more people.

[13] Revenue per capita is classified here as an economic variable, which rises and falls with State GDP (and with prices for taxable resources such as oil). Revenues are of course also driven by State fiscal policy (i.e., tax rates). Changes in revenue are expected to have similar effects on SAE per case whether driven by economic factors or changes in government policy.

State Policy Options

Under the SNAP statute and regulations, State agencies can adopt various policy options to streamline program administration and align policies with other programs. Many of these policies simplify program administration and are thus expected to reduce staff time spent on processing SNAP applications and recertifications. For example, under simplified reporting, clients do not need to report changes in circumstances as frequently, reducing workload for SNAP caseworkers. Under Broad-Based Categorical Eligibility (BBCE), most States eliminate the SNAP asset test and thus the need to collect and document information on assets.[14] Modernization initiatives, such as online applications, call centers, and waivers of the requirement to conduct face-to-face interviews, are also expected to reduce staff time after an initial startup period. We also expect that States with longer certification periods spend less staff time on recertification processing and thus have lower SAE. Reductions in staff hours may affect SAE through the number of SNAP workers hired and/or the hours of overtime for existing workers.

As shown in Exhibit 3.1, we expect that simplifying program administration may increase SNAP participation rates (and thus caseload, all other things equal). Some policies may also increase the size of the eligible population (i.e., elimination of asset tests). All these mechanisms—a reduction in SAE or an increase in caseload—would reduce SAE per case. We also considered that major changes in other programs (notably the State acceptance of Medicaid expansion under the Affordable Care Act [ACA]), may affect SAE, given that many offices jointly administer SNAP, Medicaid, TANF, and other benefit programs. During the Medicaid expansion, increases in Medicaid workload relative to SNAP workload may have increased the

[14] In most cases (91 percent of time), States with BBCE eliminate the asset test under BBCE.

allocation of costs charged to FNS without an overall change in the number of eligibility workers (as some observers believe may have occurred in Illinois between 2010 and 2014; Isaacs, Katz, and Amin 2016).

Other Factors

This conceptual model does not capture all possible interactions among the variables of interest. For example, one could imagine an arrow between State economic conditions and SNAP caseload characteristics, because the composition of the caseload changes during economic recessions (i.e., more households with earnings). Also, one could imagine that SAE per case can influence participation rates, as will be discussed further in Chapter 6. Finally, other factors may influence SAE per case beyond the three primary sets shown in Exhibit 3.1, most notably, county-administration of SNAP and implementation of the 2002 and 2008 Farm Bills.

As shown in Chapter 2, SAE per case is generally higher in the 10 States where SNAP is operated at the county level. The USDA OIG and others have expressed concern that this may reflect that counties have less incentive for controlling costs, because they pay only a limited percentage of the costs for administering the program (USDA OIG 2016). For example, in California, most SAE costs are paid as follows: 15 percent by county, 35 percent by State, and 50 percent by Federal government. There also may be some duplication of effort between county and State personnel in county-administered States, adding to costs per case.

Another hypothesis is that implementation of the 2002 and 2008[15] Farm Bills may have changed SNAP performance incentives, such that State agencies might have distributed their categorical administrative expenses across programs differently after implementation. The 2002 Farm Bill revised how the USDA imposes sanctions for payment errors and corrected perverse

[15] Changes introduced in the Farm Bill of 2014 were not included because of the limited years of available data following their implementation.

incentives that were thought to focus State attention unduly on reducing payment errors rather than on expanding participant access. Specifically, the 2002 Farm Bill implemented incentives in the form of bonuses for successes in payment accuracy, case and procedural error rate, application processing timeliness, and program access as measured by an index. These changes enabled States to continue lowering their payment errors while encouraging participant access (Rosenbaum 2015).

The 2008 bill enhanced benefits and loosened some eligibility standards for SNAP. In particular, the bill increased the minimum amount of income to be disregarded when benefits are calculated, increased and indexed the minimum monthly benefit guarantee, disregarded all income spent on dependent care when calculating benefits, and loosened the eligibility rules relating to assets (Johnson et al. 2008).

Research Questions and Explanatory Variables

As shown in Exhibit 3.2, the specific research questions about the causes of SAE variation fall into four broad categories: State economic conditions, characteristics of SNAP caseloads, State policy options, and other. We identified appropriate variable(s) to use in our statistical models to analyze each research question (if data were available), and we outlined the hypothesized relationship between each variable and total SNAP SAE. From the significant number of potential explanatory variables, we selected the most promising by assessing their conceptual relevance, their data availability, and how highly correlated potential explanatory variables were with one another.[16]

[16] When two or more potential explanatory variables are highly correlated with each other, or collinear, it is difficult to identify the influence of each variable on the dependent variable.

Exhibit 3.2. Research Questions, Variables, and Expected Relationships

Research Questions	Variables	Expected Relationships
State Economic Conditions		
How much of the variation in SNAP SAE can be explained by differences in State worker wages and the availability of workers?	• Average public worker wages • State cost of living	• Higher public worker wages → Higher SAE • Higher cost of living →Higher SAE
How much of the variation in SNAP SAE can be explained by general labor market forces?	• Unemployment or labor force participation rates • Average wages for all occupations	• Higher unemployment → Higher caseload → Lower SAE per case Tighter labor market → Lower caseload → Higher SAE per case
Is there evidence that State economic conditions or State budget constraints affect SNAP SAE?	• Revenue per capita	• Lower revenues per capita → Lower SAE
Characteristics of SNAP Caseloads		
How are SNAP household economic characteristics related to SNAP SAE?	• Share of households with earnings • Share of households with other income support (AFDC/TANF)	• More earnings → More fluctuation → Higher SAE • More AFDC/TANF → Lower SAE because programs share costs.
How are SNAP household demographic and economic characteristics related to SNAP SAE?	• Share of households with elderly residents • Share of households with people with disabilities • Share of households with non-citizens	• More elderly → More stable → Lower SAE • More people with disabilities → More stable → Lower SAE • Citizenship status → Unclear relationship
Is the variation in the number of SNAP households in urban, suburban, and rural areas across States associated with variation in SNAP SAE?	• Share of SNAP households in rural areas	• More rural → Unclear relationship
State Policies		
What is the relationship between SNAP SAE and BBCE?	• Whether State has adopted BBCE	• Use of BBCE → Lower SAE
What is the relationship of SNAP SAE to the type of reporting system used by States?	• Whether State uses simplified reporting	• States with simplified reporting → Lower SAE
What is the relationship between SNAP SAE and the frequency of certification and recertification overall and by case type?	• Average certification period for households with earnings • Average certification period for households without earnings and without elderly residents	• Longer certification period → Lower SAE
What is the relationship between SNAP modernization efforts across States and SNAP SAE?	• Use of call centers • EBT issuance • Waiver of face-to-face interviews • Use of online application	• Call centers → Lower SAE • EBT issuance → Lower SAE • Waiver of face-to-face interviews → Lower SAE • Use of online applications → Lower SAE
What is the relationship between SNAP SAE and able-bodied adults without dependents (ABAWDs) time-limit waivers?	• Whether State has Statewide waiver of ABAWD time limits • Whether State has partial waiver of ABAWD time limits	• Waiver of ABAWD time limits→ Lower SAE

Research Questions	Variables	Expected Relationships
Do State choices between using SNAP caseworker program specialists or caseworker generalists dealing with multiple programs contribute to variation in SNAP SAE?	• Data and measures not available	• N/A
What is the relationship of SNAP SAE to the type of eligibility systems, including age of system and level of automation, used by States?	• Data and measures not available	• N/A
What is the relationship between SNAP SAE and mandatory E&T?	• Insufficient data for analysis	• N/A
What is the relationship between SNAP SAE and various waivers?	• Whether State operates CAP for streamlined application for SSI recipients	• Use of CAP → Lower SAE
What is the relationship between SNAP SAE and other policy options?	• Whether State excludes all vehicles in a household from the SNAP asset test • Whether State requires fingerprinting	• Fewer requirements for vehicles → Lower SAE • Use of fingerprinting requirement → Higher SAE
What additional factors help explain cost variation?	• Implementation of Medicaid expansion under ACA	• Unclear
Other Research Questions Related to Causes of SAE variation		
How does operation of county-administered SNAP versus State-administered SNAP impact SAE per case?	• Whether State SNAP is county-administered or State-administered	• County-administered → Higher SAE
How much of the variation in SNAP SAE is explained by the model? How stable are the results? What are the key factors?	• All variables above	• N/A
What share of variation in SNAP SAE is explained by policy and management practices (i.e., factors under the control of the SNAP administrator)? What share is explained by economic, geographic, and political conditions (i.e., factors not under the control of the SNAP administrator)?	• All variables above	• N/A

Data Sources for Explanatory Variables

From various non-FNS data sources, we gathered information for the 50 States and the District of Columbia between the years 1999 and 2016. We summarize the data sources below and provide the full list of variables, source URL(s), and steps needed to acquire the data in Appendix D.

Data on State economic conditions come from the Census Bureau, the Bureau of Labor Statistics, the U.S. Department of Housing and Urban Development, and the University of Kentucky's Center for Poverty Research, as well as Washington, DC's Office of the Chief Financial Officer (for revenue data for the District of Columbia). Data on characteristics of SNAP caseloads were primarily drawn from the SNAP Quality Control database, which is administered by Mathematica Policy Research. However, the average number of people per SNAP household was drawn from Form FNS-388.

The SNAP Policy Database, constructed by the USDA's Economic Research Service, was the primary source of data on State policy options, including modernization efforts. Data on ABAWD time limit waivers by State were based on FNS Program Development Division records provided by FNS (personal communication, Bob Dalrymple, October 16, 2018). We also used the Kaiser Family Foundation to determine which States expanded Medicaid under the ACA.

Data Limitations

Because of data limitations, our model does not include additional policies of interest to FNS. For example, there was not sufficient longitudinal data tracking whether E&T programs were mandatory or voluntary. We also were not able to find data measuring the level of automation in a State (i.e., beyond a rough code of having an online application system), the age of automated eligibility systems, case management practices (i.e., generalist or specialist caseworkers, or the use of software to manage flow of workload), or cost-allocation procedures. Either there were no data or the available data were not sufficiently reliable across the full 1999–2016 period and the 50 States and the District of Columbia to support inclusion in the analysis.

Descriptive Statistics for Explanatory Variables

Many of the economic and demographic variables showed substantial variation, as shown in Exhibit 3.3, which summarizes descriptive statistics for the explanatory variables used to model SNAP SAE. For example, we find that the unemployment rate varied from 2.3 percent (in Virginia in 2000) to 13.7 percent (in Michigan in 2009). In addition, the share of SNAP households with earnings varied from 8.2 percent (in the District of Columbia in 2008 and 2009) to 46.2 percent (in Iowa in 2013). Even the average number of people in a SNAP household (2.2 overall) ranged from 1.7 (in Rhode Island in 2016) to nearly 3.0 (in Alaska in 1999).

Some State policies in our model were widespread in the 1999–2016 period (e.g., adoption of simplified reporting and the exclusion of vehicles from the SNAP asset test), while others were rare (e.g., mandated fingerprinting for SNAP applicants). Still other policies, such as the use of call centers, waivers of face-to-face interviews at initial certification, and online applications, appear more evenly split within the observations of States and years that compose our panel dataset.[17]

Exhibit 3.3. Summary Statistics for Explanatory Variables 1999–2016

Research Question	Variable	Mean	Std. Deviation	Maximum	Minimum
State Economic Conditions	Average monthly wages (welfare workers)	$3,840	$739	$6,606	$2,005
	State revenue per capita	$7.55	$9.66	$269.86	$0.74
	Lagged State unemployment rate	5.70%	2.00%	13.7%	2.3%
	Average annual wages (all occupations)	$45,501	$6,875	$82,950	$34,462
	Housing price index	197.54	48.43	481.1	83.6

[17] We show the correlations across the State Economic Conditions, Characteristics of SNAP Caseloads, and State Policies variables in Appendix Exhibits A.4, A.5, and A.6, respectively.

Research Question	Variable	Mean	Std. Deviation	Maximum	Minimum
	Change in unemployment rate from prior year	0.02%	1.06%	5.7%	-2.7%
Characteristics of SNAP Caseloads	People per household	2.22	0.22	2.97	1.70
	Share of SNAP households with earnings	29.7%	6.5%	46.2%	8.2%
	Share of SNAP households receiving TANF[18]	12.1%	10.0%	70.8%	0%
	Share of SNAP households with elderly or people with disabilities	41.3%	8.9%	63.9%	4.2%
	Share of SNAP households in rural areas[19]	18.1%	18.8%	100%	0%
	Share of SNAP households with at least one non-citizen eligible for SNAP	4.2%	3.7%	17.7%	0%
State Policies	State uses BBCE (0=no, 1=yes)	0.43	0.496	1	0
	State uses simplified reporting (0,1)	0.742	.438	1	0
	Average certification period (in months) for nonearning, nonelderly SNAP units	10.7	2.9	19.3	4.9
	Average certification period (in months) for SNAP units with earnings	8.7	3.0	14.3	3.3
	State requires fingerprinting of SNAP applicants (0,1)	0.070	0.255	1	0
	State granted waiver of face-to-face interviews at initial certification (0,1)	0.397	0.489	1	0

[18] The existence of the Minnesota Family Independence Program and the way that QC reviewers code TANF income in that State helps explain why 0 percent are reported with TANF income.
[19] Please see Appendix D for a detailed discussion of the limitations of the measure for rural households.

Research Question	Variable	Mean	Std. Deviation	Maximum	Minimum
	State operates CAP (0,1)	0.216	0.412	1	0
	State excludes all vehicles in the household from the SNAP asset test (0,1)	0.611	0.488	1	0
	State operates call centers (0,1)	0.428	0.495	1	0
	State has online application option (0,1)	0.392	0.489	1	0
	State has Statewide waiver of ABAWDs time limits (0,1)	34.9%	47.7%	1	0
	State has partial waiver of ABAWDs time limits (0,1)	47.4%	50.0%	1	0
	State offers transitional SNAP benefits to families leaving TANF (0,10)	0.284	0.451	1	0
	States with Medicaid Expansion under ACA (0,1)	0.937	0.292	1	0
Other	County-administered State (0,1)	0.196	0.397	1	0

Note: The mean is the average across all observations in the dataset. The economic variables are reported by calendar year, except state revenue per capita, which is reported by state fiscal year. Other variables are reported by federal fiscal year, except Medicaid expansion, which is reported by calendar year.
Source: Authors' tabulations, based on various datasets. See Appendix D for more details.

Modeling Approach

To determine how State economic conditions, caseload characteristics, and policies affect SAE per case, we used a State and year fixed effects model as the main modeling approach.

$$Y_{st} = \beta_1 X_{st} + \gamma_s + \delta_t + \varepsilon_{st} \quad \text{(Equation 3.1)}$$

where:

Y_{st} = SAE per case in State s and year t

X_{st} = explanatory variables in State s and year t, including:

- State economic conditions, including wages
- Characteristics of SNAP caseloads
- State policy options, including eligibility systems, certification options, use of call centers, and other variables capturing modernization efforts

γ_s = State fixed effects

δ_t = year fixed effects

ε_{st} = error term

State fixed effects account for differences in unobservable determinants of SAE per case that are constant within States over the years. Year fixed effects account for nationwide changes in SNAP and macroeconomic conditions during the period of analysis (e.g., the Great Recession). The coefficients of interest are denoted with β_1, which is a set of estimates, each of which is the marginal effect of a given variable (X_{st}) on the outcome Y_{st}. Robust standard errors are clustered at the State level in all estimations.

We use a State fixed effects model to explore the relationship between potential explanatory factors and SNAP SAE per case. Multiple regression analysis often suffers from omitted variable bias. Fixed effect modeling offers the possibility of eliminating omitted variables bias due to unobserved variables that are constant within a State over time.

For example, it is possible that California has greater SAE costs per case because of long-term stricter labor and land regulation (unobserved variables), not its SNAP policies. By using State fixed effects, we essentially compare SAE costs per case in California before and after the introduction of a new SNAP policy, netting out any State characteristic that is constant over

time. Using State fixed effects is a standard approach when evaluating State-level policy changes in a panel of States data framework (e.g., Zavodny 2000).[20]

We estimated four basic models. In each model, the dependent variable is total SAE per case, rescaled using logarithmic transformation, to normalize the skewed distribution of the cost data.[21] In our preferred model, SAE per case is regressed against three measures of State economic conditions (average wages of public welfare workers,[22] revenue per capita, and unemployment rate), three measures of caseload characteristics (number of people per household, share of SNAP households with earnings, and share of SNAP households receiving TANF), and five SNAP policies (BBCE, simplified reporting, waiver of face-to-face interviews, fingerprinting requirements, and length of certification period). We prefer this model because it is the simplest, explaining variation in SAE per case with a relatively small set of key variables.

We also examine an expanded model, because we want to look at a fuller set of SNAP policies and confirm whether additional economic and caseload factors allow us to explain more of the variation in SAE per case. The additional variables in the expanded model include exclusion of all vehicles from the SNAP asset test, operation of call centers, use of online applications, operation of CAPs, waiver of time limits on ABAWDs, offer of transitional SNAP benefits to families leaving TANF, and Medicaid expansion under ACA, as well as additional economic and caseload factors. To further explore the effect of simplifying policies on SAE per case, we also test a model that collapses six policy variables that were not found significant in

[20] Logan and Klerman (2008) recommended use of a State-year time series and State fixed effects as one research options in their report, *Feasibility of Assessing Causes of State Variation in Food Stamp Program Administrative Costs.*

[21] As explained in more detail in Appendix A, rescaling SAE per case using a logarithmic transformation has another advantage: its coefficients can be interpreted as the percentage change in SAE per case associated with changes in the explanatory variables.

[22] "Public welfare workers" is a term used by the Census Bureau in the Annual Survey of Public Employment and Payroll at the State and local levels. It includes workers in income maintenance, social services, and other functions of public welfare agencies.

the second model into a SNAP policy index. Finally, a fourth model shows estimates without State fixed effects, to show how State fixed effects change the estimates.

Modeling Approaches for Supplemental Analyses

Chapter 4 presents the key findings from the four primary statistical models, focusing on the preferred model. Chapter 5 examines the findings for four supplemental analyses: (1) county-administered States compared with State-administered States, (2) years following the implementation of the 2002 and 2008 Farm Bills, (3) components of SAE (e.g., certification-related costs), and (4) aggregate SAE instead of SAE per case. Below we briefly describe the modeling approach for each modeling variant.

County-Administered versus State-Administered

A key advantage of the fixed effects models is that the estimated effects of the observed explanatory variables may be seen as causing the variation in SNAP SAE. A drawback with fixed effect modeling, however, is that we cannot identify the effect of observable variables that are constant over time. Most notably, we cannot directly estimate the effect of becoming a county-administered State on SAE because no State changed the status of this variable during our period of analysis. What we can do is test whether key variables of interest have a different impact on SAE per case for county-administered States compared with State-administered States. That is, we run our preferred model separately on county-administered and State-administered States to determine whether the same factors affect SAE per case in these two sets of States.

2002 and 2008 Farm Bills

Similarly, we cannot identify the direct effect of the Farm Bills on SAE costs in our model because their implementation happened concomitantly with other nationwide changes relevant to the SNAP program, such as the Great Recession. However, these changes to the law

in 2002 and 2008 may have created new incentive structures for SAE spending and a potential structural change affecting our model. That is, the data from 1999–2002 and 2003–2008 may result in different parameter estimates for our explanatory variables than the data from 2009–2016. Accordingly, we tested whether the model results changed as a result of these Farm Bills by modeling the variables before and after 2002 and before and after 2008.

Alternate Specifications of the Dependent Variable

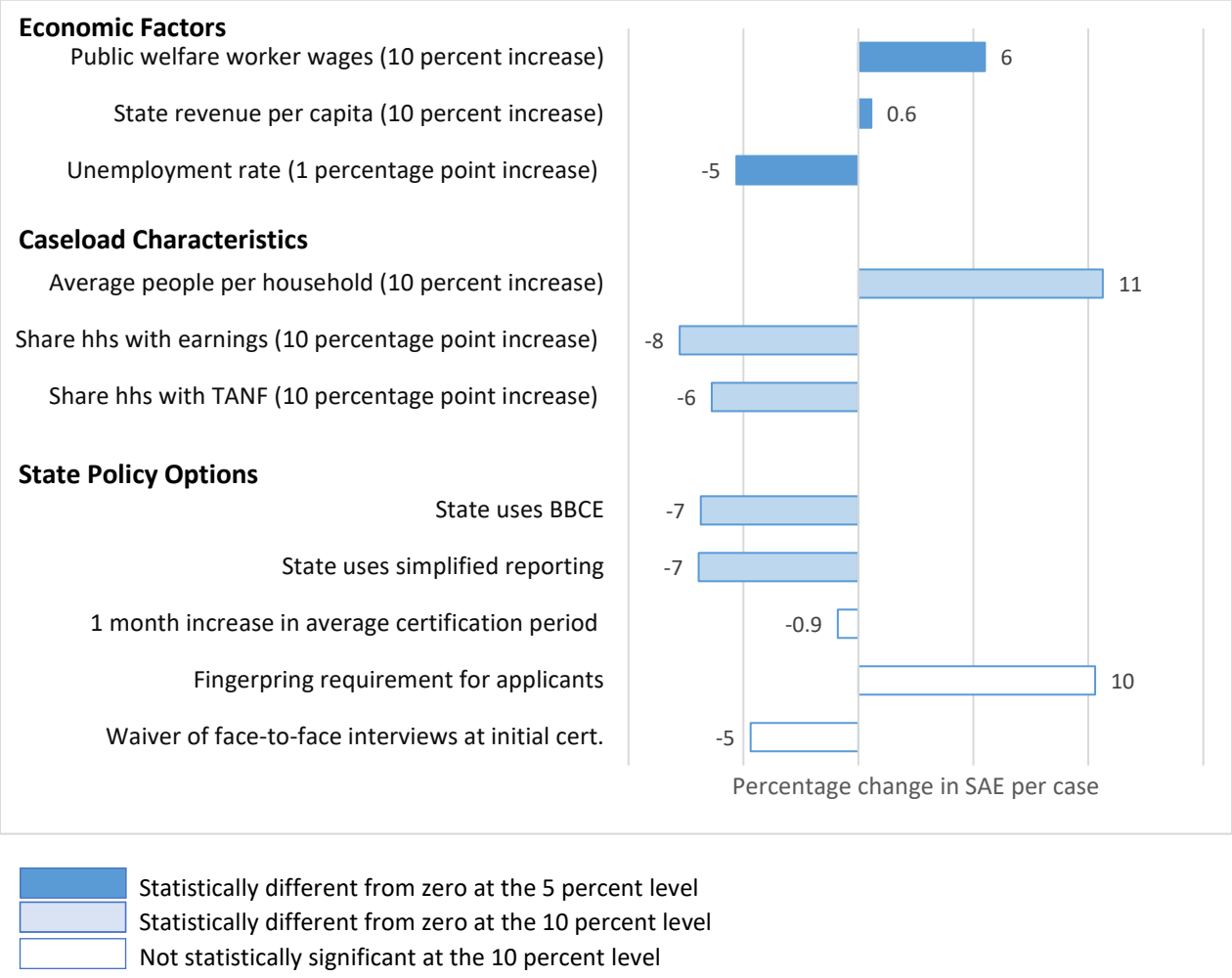
We also tested whether the factors explaining variation in SAE per case would have a stronger influence on certification-related costs per case. This plausible hypothesis is consistent with the emphasis in the conceptual framework on how SNAP policies and caseload characteristics may affect the time that caseworkers spend certifying and recertifying households for benefits. We also examined how well models could explain variation in other components of SAE. Finally, we tested a variant of the model where aggregate SAE, rather than SAE per case, was the dependent variable and where caseload is included as a control. (Both SAE and caseload are rescaled using logarithmic transformation.) We did this to better understand how economic, demographic, and policy variables affect SAE directly.

Chapter 4. Explaining State Variation in SNAP SAE per Case: Key Findings

Geographic variation in the wages of State public welfare workers and State economic conditions helps explain State differences in SAE per case, as expected. States that adopt streamlining policies generally experience reductions in SAE per case, though the magnitude of these reductions is modest. SNAP caseload characteristics also have a relatively small effect on observed variation in SAE per case. Our models show substantial differences in SAE per case that persist across the years and are not explained by the economic, demographic and policy factors included in our analysis.

We first describe key findings from the preferred model by research question (summarized in Exhibit 4.1), then we compare these results with findings from the expanded model, the SNAP policy index model, and the model without State fixed effects. We then discuss the relative importance of different factors and the implications of the large explanatory power of State fixed effects in our models.

Exhibit 4.1. The Effect of State Factors on SAE per Case—Preferred Model



State Economic Conditions

Economic differences across States explained some of the variation in SAE per case. All three economic variables in the preferred model—wages for public welfare workers, revenue per capita, and unemployment—have statistically significant effects on SAE per case.

First, SAE per case is higher in States with higher average wages of State public welfare workers. In our preferred model, a 10 percent increase in wages was associated with a 6 percent increase in costs (Exhibit 4.1). We also found that when State revenues were declining (i.e.,

recession years with tight budget constraints), SAE per case fell modestly: a 10 percent decrease in State revenue per capita was associated with a 0.6 percent decrease in SAE per case.

Finally, SAE per case fell in times of rising unemployment rates. Specifically, an increase in unemployment rates by 1 percentage point in one year led to a 5 percent reduction in SAE per case the following year. As shown in the conceptual framework, we expect that unemployment affects SAE per case through its effect on the caseload, rather than costs. Indeed, supplemental analyses show no statistically significant relationship between unemployment rates and total SAE when it is examined in place of SAE per case.[23]

Characteristics of SNAP Caseloads

The characteristics of the SNAP caseload had weaker effects on SAE per case than economic conditions. Findings were not as robust (relationships were statistically significant at only the 10 percent level), and some relationships were not in the expected direction. In particular, SAE per case fell when the share of SNAP households with earnings increased—a surprising finding discussed further below, where we compare findings across models.

SAE per case increased with increases in the average number of people in a household receiving SNAP, as expected. In addition, States with a higher share of SNAP households on TANF had lower SAE per case according to our models. A 10 percentage-point increase in the share of SNAP households on TANF was associated with a 6 percent decrease in costs. This may reflect that some administrative costs of SNAP households receiving TANF benefits are paid for by the TANF program.

[23] This supplemental analysis is discussed in Chapter 5 and shown in Exhibit A.8.

State Policy Options

States have made several simplifying changes in SNAP administrative procedures, often by using a State waiver or exercising a State policy option. Two policy options—adoption of BBCE and simplified reporting—affected SAE per case. The introduction of BBCE reduced SAE per case by about 7 percent. As part of BBCE, States are able to simplify eligibility determinations, often eliminating asset tests, and therefore are able to reduce the resources needed to review SNAP applications.[24] We also found that by adopting simplified reporting—that is, reducing requirements for reporting small household changes as they happen—States saved an average of 7 percent in SAE per case. Both effects were statistically significant at the 10 percent level of confidence.

Somewhat surprisingly, we did not find any statistically significant effect for average certification period on SAE per case. That is, lengthening certification periods did not appear to reduce SAE per case.[25] Similarly, a waiver of face-to-face interviews at initial certification did not reduce SAE per case. Adopting fingerprinting requirements also did not have a statistically significant effect on SAE per case; this may reflect that only five States were using this option over the observed period.

Comparison of Findings Across Four Basic Models

Most of the key findings are unchanged in models with a fuller set of explanatory variables (model 2) or an index of SNAP policies (model 3). Estimates from these models are shown in Exhibit 4.2, which also shows estimates for the preferred model (model 1) and the preferred model without State fixed effects (model 4).

[24] There is too much collinearity with BBCE and the overall asset test to include both in the models, though we did include the vehicle asset exclusion in the expanded model.
[25] We examined certification periods among households without earnings or elderly in the preferred model.

State Economic Conditions and SNAP Caseload Characteristics

An expanded set of explanatory variables does not explain much more of the variation in SAE per case (adjusted R-squared of .914 for the expanded model, compared with .903 for the preferred model).[26] The expanded model does show that price differences other than wages—measured using a housing price index—influence SAE per case.[27] Unemployment rates and wages of public welfare workers no longer have a significant effect on SAE per case in this model, likely reflecting the close correlation between these three economic measures (i.e., housing price index, average wages of all workers in the State, and change in unemployment rate).[28]

The relationships between State economic conditions and SAE per case appear even larger and more significant when not controlling for State fixed effects (see model 4). This raises the possibility that economic conditions have a greater effect on SAE per case than shown in our preferred model. Even so, we prefer to use the estimates in model 1, which capture unobserved differences between the States.

Exhibit 4.2. The Effect of State Factors on SAE per Case—Comparison across Models

Dependent Variable: Log of SAE per Case				
	Model			
Explanatory Variables	Preferred (1)	Expanded (2)	With SNAP Policy Index (3)	No State Fixed Effects (4)
State Economic Conditions				
Log (average wage welfare workers)	0.550	0.319	0.540	1.333
	(0.233)**	(0.196)	(0.223)**	(0.223)***
Log (State revenue per capita)	0.057	0.031	0.059	0.205
	(0.019)***	(0.019)*	(0.018)***	(0.057)***
Lagged State unemployment rate	-5.452	-1.712	-5.262	-8.796
	(1.161)***	(1.392)	(1.151)***	(1.858)***
Log average wages (all occupations)		0.710		

[26] The proportion explained by State fixed effects is only slightly lower in the expanded model than the preferred model, as shown in Exhibit 4.3.
[27] We would have preferred to use a more general measure of cost of living (i.e. Regional Price Parities) but could not locate these data over the full 1999–2016 period.
[28] See the correlation matrix (Exhibit A.4).

Dependent Variable: Log of SAE per Case				
	Model			
Explanatory Variables	Preferred (1)	Expanded (2)	With SNAP Policy Index (3)	No State Fixed Effects (4)
		(0.788)		
Log (average housing price)		0.299		
		(0.149)*		
Change in unemployment rate		-0.318		
		(1.178)		
Characteristics of SNAP Caseloads				
People per household	0.455	0.537	0.467	0.598
	(0.238)*	(0.235)**	(0.235)*	(0.232)**
Share SNAP households with earnings	-0.809	-0.639	-0.788	0.437
	(0.432)*	(0.398)	(0.429)*	(0.645)
Share SNAP households with TANF	-0.659	-0.328	-0.673	0.106
	(0.363)*	(0.306)	(0.372)*	(0.443)
Share elderly or disabilities		1.048		
		(0.437)**		
Share SNAP households in rural areas		-0.174		
		(0.162)		
Share SNAP households with at least one eligible non-citizen		-0.308		
		(1.003)		
State Policies				
State uses BBCE	-0.071	-0.068	-0.055	-0.129
	(0.041)*	(0.050)	(0.042)	(0.064)*
State uses simplified reporting	-0.072	-0.068	-0.075	-0.144
	(0.036)*	(0.034)**	(0.037)*	(0.072)**
Avg. cert. period for units without elderly or earnings (in months)	-0.009	-0.012	-0.008	-0.001
	(0.008)	(0.013)	(0.008)	(0.009)
Avg. cert. period for units with earnings (in months)		0.005		
		(0.010)		
Index of six other SNAP policies*			-0.034	
			(0.016)**	
State requires fingerprinting of SNAP applicants‡	0.098	0.138		0.149
	(0.094)	(0.086)		(0.172)
State waiver of face-to-face interviews at initial cert.‡	-0.048	-0.043		-0.043
	(0.039)	(0.039)		(0.048)
State operates CAP‡		-0.066		
		(0.059)		
State excludes all vehicles from the SNAP asset test‡		-0.008		
		(0.037)		

Dependent Variable: Log of SAE per Case				
	Model			
Explanatory Variables	Preferred (1)	Expanded (2)	With SNAP Policy Index (3)	No State Fixed Effects (4)
State operates call centers‡		-0.039		
		(0.033)		
State has online application option‡		0.017		
		(0.036)		
State offers transitional SNAP to families leaving TANF		-0.000		
		(0.047)		
Statewide ABAWD waiver		-0.001		
		(0.032)		
Partial ABAWD waiver		0.008		
		(0.030)		
States with Medicaid Expansion under ACA		0.065		
		(0.059)		
State Fixed Effects	**Yes**	**Yes**	**Yes**	**No**
Year Fixed Effects	**Yes**	**Yes**	**Yes**	**Yes**
Observations	**918**	**918**	**918**	**918**
Adjusted R-Squared	**0.903**	**0.913**	**0.904**	**0.671**

Notes: Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1 ǂ Variables included in the index of six other SNAP policies

The puzzling relationship between the share of SNAP households with earnings and SAE per case lost statistical significance as more explanatory variables entered the model, suggesting that the share of SNAP households with earnings is likely correlated with other State factors.[29] We believe this negative effect may reflect a change in the composition of the caseload during recessions, because we notice that States with a rising caseload also experience an increase in the share of SNAP households that have earnings. In fact, supplemental analyses show total SAE (though not SAE per case) increases when States serve a higher share of SNAP households with earnings.[30] The model without State fixed effects also shows a positive and non-significant relationship between the share of SNAP households with earnings and SAE per case.

[29] We have tested the robustness of this result by adding economic indicator controls to the model, such as poverty rate, 10th and 25th percentile of the wage distribution, share of employed workers who are part time, and share of workers who are part time for economic reasons. In all cases, we estimate a negative coefficient for the share of SNAP households with earnings.
[30] This supplemental analysis is discussed in Chapter 5 and shown in Exhibit A.8.

The expanded model shows another surprise: a strong, positive relationship between the share of households with elderly or disabled people and SAE per case. We had expected these cases to be less expensive to administer, because of their relative stability in income and household composition, even though calculations of medical deductions for these households can be time consuming.[31] The puzzling finding related to households with elderly or disabled recipients also may be related to changes in the composition of SNAP recipients during recessionary periods.

The share of SNAP caseload that is rural did not affect SAE per case, but this lack of relationship may reflect limitations and noise in the rural variable.[32] The share of households with non-citizens who are eligible for SNAP in a State also did not affect SAE per case (see second column of Exhibit 4.2).

State Policy Options

Five additional SNAP policies tested in the expanded model had no significant effect on SAE per case. These policies were State excludes all vehicles in the household from the SNAP asset test, State operates call centers, State has online application option, State operates CAP, and State has Statewide or partial waiver of able-bodied adults without dependents (ABAWD) time limits. In most cases, the coefficients were in the expected direction but insignificant.

Some of the lack of findings may reflect a wide range of policy implementation, not captured in simple binary (yes/no) variables. Consider, for example, the range of possibilities for States with online application options. In some States, the online application is fully integrated

[31] Results were similar when we examined two separate variables: "households with elderly" and "households with disabled." We used the single variable "households with elderly or disabled members" to reduce the number of variables and challenges posed by collinear variables. We excluded households with elderly and disabled people from the preferred model (model 1) because of (negative) collinearity between these households and households with earnings.

[32] The rural variable had many missing observations in the more recent part of our dataset, as detailed in Appendix D.

with automated eligibility system, while in other States, caseworkers must print out the online application and manually enter it into the eligibility system, at least in early years of implementation. Whereas the first example might save SAE, the second example is unlikely to, yet both would be coded as a "yes" for having an online application system.

In any event, the collective effect of adopting multiple SNAP streamlining policies was found to lower SAE per case, as shown in the SNAP policy index model (model 3). Adapting the approach used in Stacy, Tiehen, and Marquardt (2018), we created a policy index containing six[33] binary SNAP policy variables that are not significant but were expected to affect administrative costs:

SNAP Policy index = Eliminate vehicle assets + Operate call centers + Waive face-to-face interviews + Has online application + Operates CAP – Fingerprinting

The index of these six policies ranges from -1 to 5. Higher values indicate more streamlined SNAP administrative policies. Fingerprinting is the only option expected to increase SAE; the others are expected to reduce it.

Indeed, we found that while alone the six SNAP policy variables were not significant in explaining SAE cost per case variation, the combination of the policies was a powerful predictor of costs. The adoption of one extra SNAP streamlining policy was associated with a 3.4 percent reduction in SAE per case. This implies that adoption of two policies could lead to a reduction of 6.8 percent, and adoption of three policies could lead to a reduction of 10.2 percent, though some policies may have more impact than others.

[33] The SNAP policy index does not include policies related to waiver of time limits for ABAWDs. This is, in part, because data documenting the ABAWD time limits were not identified until after the analysis was completed and the draft report was written. We revised the report to incorporate these additional data in the expanded model, but not other models.

Finally, in the expanded model (model 2), we found that length of certification among households with earnings had no effect on SAE, similar to the earlier findings for certification period among households without earnings or elderly people.[34] Two other State policy variables, involving the Medicaid and TANF programs, also had no significant impact on SAE per case. Specifically, SNAP SAE were not significantly affected by the adoption of the Medicaid expansion or whether the State offered transitional SNAP benefits to families leaving the TANF program.

Relative Importance of Different Factors

To understand which set of variables better explains variation in SAE per case, we also estimated partial R-squares (Exhibit 4.3). The partial R-square, or coefficient of partial determination, is defined as the proportion of variation in SAE per case that can be explained by the addition of specified variables to a model, compared to a reduced model without those variables. As shown in exhibit 4.3, this coefficient was examined for each set of variables (i.e., economic conditions, caseload characteristics, policy options, State fixed effects, and year fixed effects) to provide insight into which sets were most useful in explaining variation.[35] In our preferred model, the most important partial R-square was given by State fixed effects: 0.722. In other words, the addition of State fixed effects explained 72 percent of the variation in SAE per case that was not explained by the rest of the preferred model.

Significant variation in costs was also explained by the economic conditions in a State. Adding these three economic variables explains an additional 12.3 percent of the variation in SAE per case in the model with State fixed effects and more than 40 percent in the model

[34] We also found no relationship between certification period and SAE per case under an alternate specification where we measured certification policies by examining shares of caseload (stratified by presence of elderly and earnings) by duration of certification period (i.e., 0–3 months, 4–6 months, 7–12 months, 13+ months).
[35] See Appendix A for more explanation of the partial R-square analysis.

without State fixed effects. The difference between these two estimates suggests that persistent differences in State economic conditions may be partially captured in the State fixed effects dummy, and so the influence of economic conditions may well be larger than suggested in the first model.

Differences in SNAP policies explain surprisingly little variation in SAE. The addition of the State policy variables explains only 4.2 percent of the variation in the preferred model and 8.7 percent in our expanded model. Similarly, the addition of characteristics of SNAP caseload variables to the model explained only 3.9 percent of variation in the model with State fixed effects and 7.8 percent in the expanded model (and 12.3 percent in the model with no State fixed effects).

Finally, the year fixed effects capture the nationwide decrease in SAE per case presented in Exhibit 2.4. The addition of year fixed effects explains 12.4 percent of the variation in the preferred model and a smaller percentage in the model without State fixed effects.[36]

Exhibit 4.3. Partial R-Squared Values by Explanatory Variable Category

Explanatory Variable Category	Preferred	Expanded	With SNAP Policy Index	No State Fixed Effects
State Economic Conditions	0.123	0.094	0.118	0.414
Characteristics of SNAP Caseload	0.039	0.077	0.041	0.124
State Policies	0.042	0.087	0.052	0.05
State Fixed Effects	0.722	0.700	0.729	-
Time Fixed Effects	0.124	0.109	0.107	0.045

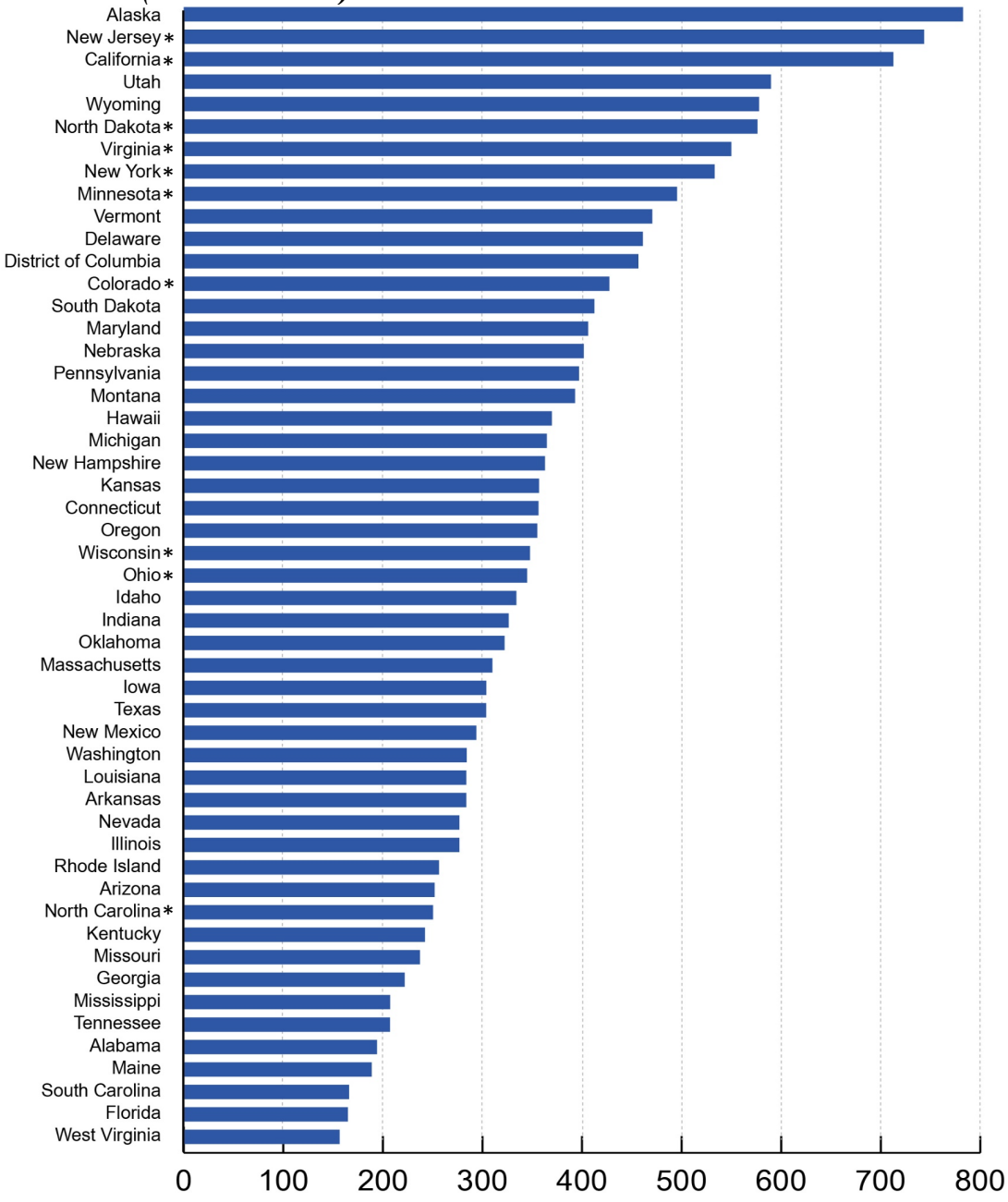
To illustrate the importance of State fixed effects in explaining variation in SAE, we generated simulated values of SAE in 2016, under the assumption that every State had identical economic conditions and caseload characteristics (set at the mean values for 2016) as well as

[36] The sum of all partial R-squares in the model can be above 1 if more than one set of variables has strong predictive power. See Appendix A for further explanation.

identical State policies. That is, we estimated what SNAP SAE costs would be in every State if public welfare workers were paid $3,904 per month, the share of SNAP households with earnings was 32 percent, and all other observable characteristics were typical of a State in 2016. We further assumed an average certification period of 12.4 months for households without earnings or elderly, and we assumed that the State adopted BBCE and simplified reporting (and other policies that were adopted by more than 50 percent of States in 2016), and did not require fingerprinting of SNAP applicants (or other policies that were adopted by less than 50 percent of States in 2016). Under these assumptions, the only source of variation of SAE per case across States is due to State fixed effects.

As shown in Exhibit 4.4, there still was a fivefold variation in SAE related to State fixed effects, with simulated values of SAE per case ranging from $156 in West Virginia to $782 in Alaska. This is less variation than in actual SAE per case in 2016 (which ranged from $89 to $848, as shown in Exhibit 2.6), but there is still wide variation. In other words, time-invariant characteristics of Alaska and West Virginia explain a significant portion of the difference in SNAP costs across these two States, consistent with our finding from the partial R-squared.

Exhibit 4.4. Simulated SNAP SAE per Case in FY2016 if All States Have the Same Observable Characteristics (in 2016 Dollars)



* = County-administered States

Note: These estimates assume all States have the same economic conditions and SNAP caseload characteristics as the average State in 2016; the estimates also assume States have the same certification periods and the same SNAP policy options. The remaining differences are due to State fixed effects.

Unobserved differences in State cost of living may explain some of the differences. For example, Alaska, New Jersey, and California (the three States at the top of Exhibit 4.4) generally

have higher costs of living than West Virginia, Florida, and South Carolina (the three States at the bottom of the exhibit). This suggests that differences in average public welfare worker wages do not fully capture relevant price differences.[37] There also could be persistent differences in State cultures, budgeting practices, statutory and regulatory policies outside SNAP, and operational practices other than those captured in databases of SNAP policy options and modernization efforts.

We considered, but rejected, the possibility that the large State fixed effects were primarily driven by differences between State-administered and county-administered States. If this were true, the addition of State fixed effects would explain much less variation among the sub-sample of State-administered States. Yet the addition of State fixed affects among the sub-sample of State-administered States explains 64.8 percent of the variation, not much less than the 72.2 percent across the full sample.[38] This leads us to believe that invariant conditions other than county administration generate most differences in SAE per case across States over time.

In the next chapter, we further discuss the results of the preferred model when run on separate samples of county-administered and State-administered States, as well as when run over different periods.

[37] While some of these price differences may be captured in the expanded model (which adds controls for housing prices and average wages in all occupations), State fixed effects in the expanded model are almost as large as in the preferred model, as shown in Exhibit 4.3.

[38] Similarly, the addition of State fixed affects among the sample of 10 County-administered States was large: 64.3 percent, estimated for the preferred model. This again highlights persistent State differences other than differences in county operations.

Chapter 5. Explaining State Variation in SNAP SAE: Supplemental Analyses

In this chapter, we examine additional model specifications and provide robustness checks for the main findings from Chapter 4. We explore whether coefficients of the model change across county-administered and State-administered States and after the implementation of the 2008 and 2012 Farm Bills. We also present model results for the various components of SAE per case and for total SAE.[39] Finally, we present a "leave-one-out" cross-validation analysis to test the sensitivity of our results to dropping any State from the sample.

County-Administered States

SNAP is run at the county level in California, Colorado, Minnesota, New Jersey, New York, North Carolina, North Dakota, Ohio, Virginia, and Wisconsin. These county-administered States have, on average, 49 percent higher SAE per case than State-administered States, based on descriptive statistics over 1999–2016. When controlling for differences in State economic conditions, SNAP caseload characteristics, State policy options, and regional fixed effects (based on the nine Census Bureau–designated divisions), this difference drops to 24 percent (see Appendix Exhibit A.7). Is this remaining 24 percent differential a result of county administration or of other idiosyncratic characteristics of county-administered States that generate higher SAE per case? For example, California and New York could have greater SAE per case because of their stricter labor and land regulation, not because they are county-administered States.

Unfortunately, we cannot answer this question with existing data. As discussed in Chapter 3, we are unable to include State fixed effects in our analysis of county administration

[39] In all these models, the dependent variable is rescaled using logarithmic transformation to normalize the skewed distribution of the cost data.

because county-administered indicators do not change within any State over the analysis period. Thus, we are unable identify the effect of being a county-administered State on SAE per case.[40]

What we can do, instead, is to test whether economic, demographic, and policy factors may have similar—or different—influences on SAE per case in county-administered States compared with State-administered States. That is, we estimated our preferred model for the two samples (county-administered States and State-administered States) separately and tested whether the coefficients of the two regressions differed statistically from each other.

The results, also presented in Appendix Exhibit A.7, show little difference in parameter estimates between the two sets of States. A few coefficients were significant among State-administered States but not significant among county-administered States, but this could reflect the larger sample size (41 State-administered States versus 10 county-administered States). Overall, we did not find evidence that SNAP policies or other variables had different effects on costs in county-administered States compared with State-administered States.[41]

Structural Changes of Parameters: 2002 and 2008 Farm Bills

To investigate whether the relationships estimated in Exhibit 4.2 have changed over time in response to the Farm Bills, we ran our preferred model over three time periods (1999–2002, 2003–2008, and 2009–2016) and used an F-statistic to test the null hypothesis that the coefficients of these three models are equal to each other (Exhibit 5.1). These periods of analysis were defined by periods before and after the implementation of a Farm Bill. We found that three

[40] The multivariate analysis in Appendix Exhibit A.7 controls for regional fixed effects (using the nine Census Bureau–designated divisions) and year fixed effects, but not State fixed effects.

[41] We also tested an alternate specification, where instead of splitting the sample, we used interaction terms with the county-administered indicator, again seeking to learn whether certain factors had different influence in county-administered than in State-administered States. The findings were mostly like those shown in Appendix Exhibit A.7 with factors having the same general effect in both sets of States. The only exception was that a longer certification period (measured for nonearning, nonelderly SNAP units) led to a greater reduction in SAE per case for county-administered States than for State-administered States.

variables had significantly different coefficients in at least one period. First, unemployment rates had less of an effect on SAE per case over time. The coefficient of this variable in the 2009–2016 period was significantly smaller than the coefficient in the other periods. It is unclear if this reflects differences due to the Farm Bill of 2008, or, as likely, the Great Recession. Similarly, the magnitude of the effect of State revenue per capita on SAE per case was lower in 2009–2016 than in earlier periods. Finally, increases in the share of SNAP households with TANF led to decreases in SAE per case in 2009 to 2016, whereas it did not have a significant effect in earlier periods or when observed over the entire time frame.

We did not find any significant difference in the effect of policy variables across time.[42] We could not estimate the effect of waiving face-to-face interviews at initial certification for 1999–2002 because no State had implemented the policy at that time.

Exhibit 5.1. The Effects of State Factors on SAE per Case, Over Three Periods

Dependent Variable: Log of SAE per Case				
Explanatory Variables	**1999–2002**	**2003–2008**	**2009–2016**	**Statistical Differences in Coefficients**
State Economic Conditions				
Log (average wage welfare workers)	0.458	0.288	0.144	
	(0.244)*	(0.192)	(0.197)	
Log (State revenue per capita)	0.219	0.219	0.026	***
	(0.104) **	(0.071) ***	(0.012) **	
Lagged State unemployment rate	-7.279	-4.029	-1.523	*
	(3.011) **	(1.895) **	(1.458)	
Characteristics of SNAP Caseloads				
Share SNAP households with earnings	-0.648	-0.892	-0.244	
	(0.714)	(0.441) **	(0.403)	
Share SNAP households with TANF	-0.988	0.076	-1.405	**
	(0.546)*	(0.284)	(0.483)***	
People per household	0.295	0.142	0.592	

[42] The fingerprinting policy, while not changing significantly over time, was shown to increase SAE per case within periods, whereas it has an insignificant effect on SAE when examined over the full period (Exhibit 4.2).

Dependent Variable: Log of SAE per Case				
Explanatory Variables	**1999–2002**	**2003–2008**	**2009–2016**	**Statistical Differences in Coefficients**
	(0.485)	(0.241)	(0.379)	
State Policies				
State uses BBCE	-0.031	0.037	-0.071	
	(0.043)	(0.036)	(0.043)	
Average certification period (in months) for nonearning, nonelderly SNAP units	0.013	-0.019	-0.011	
	(0.030)	(0.009)**	(0.009)	
State requires fingerprinting of SNAP applicants	0.847	0.135	0.149	
	(0.187)***	(0.035)***	(0.071)**	
State uses simplified reporting	-0.059	0.018	0.059	
	(0.038)	(0.036)	(0.099)	
State granted waiver of face-to-face interviews at initial certification		0.000	-0.048	
		(0.040)	(0.040)	
State Fixed Effects	**Yes**	**Yes**	**Yes**	
Year Fixed Effects	**Yes**	**Yes**	**Yes**	
Observations	**204**	**306**	**408**	
Adjusted R-Squared	**0.921**	**0.959**	**0.930**	

Notes: Robust standard errors clustered at the State level in parentheses.
The statistical differences in coefficients are based on an F-statistic test with the null hypothesis that the coefficients of these three models are equal to each other
*** p < .01, ** p < .05, * p < .1

Modeling Components of Costs

We tested whether the factors explaining variation in SAE per case affected certification-related costs per case, the largest component of total SAE, and the one most affected by changes in staff time. We again used the same explanatory variables as in our preferred model, because all these variables are expected to affect processing of SNAP applications and recertifications.

We also investigated the impact of a smaller set of variables—the State economic variables—on other components of SAE per case: issuance, fraud control, ADP operations, ADP development, E&T and workfare, and miscellaneous costs. For issuance costs only, we also

included a variable not included in the earlier models: the proportion of the dollar value of all SNAP benefits that are accounted for by EBT. We hypothesized that EBT issuance might cost less than issuance of paper coupons.

Certification-related costs per case are driven by the same factors as total SAE per case (Exhibit 5.2). Namely, certification-related cost per case increased with increases in average wage of State public welfare workers, State revenue per capita, and people per household and fell with increases in unemployment rates, share of SNAP households with earnings, and whether the State uses simplified reporting. Some other variables (e.g., adoption of BBCE) show similar patterns as for total SAE per case but are not statistically significant.

Contrary to our expectations, the models predicting certification-related costs were not stronger than those predicting total SAE (adjusted R-squared of 0.87). It is possible that certification-related costs may be reported with less cross-State consistency than total SAE.[43]

Some variation in certain other components of SAE per case (e.g., fraud control, miscellaneous) was explained by labor costs (i.e., the average wages of public welfare workers) and State budget constraints (i.e., revenue per capita) as shown in the other columns of Exhibit 5.2. Moreover, as unemployment rose, fraud control, issuance, and miscellaneous costs per case decreased. We interpreted this as meaning that the relatively fixed costs of issuance and fraud control go down on a per case basis during times of increased caseloads. Finally, we did not find that issuance costs decreased as the proportion of the dollar value of all SNAP benefits accounted for by EBT increased.

[43] We also tested the model against certification costs as reported by the States (not including the additional functional categories we included in our definition of certification-related costs); the results were similar.

Exhibit 5.2: The Effects of State Factors on Cost Components of SAE per Case

Dependent Variable: Log of SAE per Case								
Explanatory Variables	**Total**	**Certification-Related**	**Issuance**	**Fraud Control**	**ADP Operations**	**ADP Develop-ment**	**E&T and Workfare**	**Miscella-neous**
State Economic Conditions								
Log (average wage welfare workers)	0.550	0.660	-0.564	1.707	2.576	-0.700	1.373	0.932
	(0.233)**	(0.256)**	(0.559)	(0.632)***	(3.686)	(0.741)	(1.070)	(0.529)*
Log (State revenue per capita)	0.057	0.061	0.125	0.131	-0.078	0.069	-0.018	0.075
	(0.019)***	(0.024)**	(0.052)**	(0.087)	(0.203)	(0.050)	(0.085)	(0.036)**
Lagged State unemployment rate	-5.452	-4.514	-6.255	-7.706	4.311	-5.001	-8.758	-9.838
	(1.161)***	(1.286)***	(2.871)**	(4.268)*	(12.834)	(3.732)	(7.765)	(3.584)***
Characteristics of SNAP Caseloads								
Share SNAP households with earnings	-0.809	-0.918						
	(0.432)*	(0.449)**						
Share SNAP households with TANF	-0.659	-0.636						
	(0.363)*	(0.415)						
People per household	0.455	0.474						
	(0.238)*	(0.254)*						
State Policies								
State uses BBCE	-0.071	-0.072						
	(0.041)*	(0.046)						
Avg. cert. period for units without elderly or earnings (in months)	-0.009	-0.012						
	(0.008)	(0.009)						
State requires fingerprinting of SNAP applicants	0.098	0.097						

Dependent Variable: Log of SAE per Case								
Explanatory Variables	**Total**	**Certification-Related**	**Issuance**	**Fraud Control**	**ADP Operations**	**ADP Development**	**E&T and Workfare**	**Miscellaneous**
	(0.094)	(0.124)						
State uses simplified reporting	-0.072	-0.091						
	(0.036)*	(0.037)**						
State granted waiver of face-to-face interviews at initial certification	-0.048	-0.065						
	(0.039)	(0.038)*						
Proportion of the dollar value of all SNAP benefits accounted for by EBT			-0.046					
			(0.165)					
State Fixed Effects	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Year Fixed Effects	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Observations	**918**	**918**	**918**	**900**	**363**	**910**	**915**	**918**
Adjusted R-Squared	**.903**	**0.870**	**0.718**	**0.767**	**0.465**	**0.624**	**0.689**	**0.769**

Notes: Robust standard errors clustered at the State level in parentheses.
*** p < .01, ** p < .05, * p < .1

Modeling SAE Rather Than SAE per Case

As earlier noted, factors driving SAE per case might be influencing either total SAE (the numerator) or the number of cases in a State (the denominator). We therefore estimated an alternate model with total SAE as the dependent variable and caseload as a control variable (again using logarithmic transformations of these variables; see Appendix Exhibit A.8). Total SAE fell with reductions in State revenue per capita and with the introduction of BBCE, similar to results for SAE per case. However, many other factors driving SAE per case had little effect on total SAE. In particular, total SAE was not affected by unemployment rates; this fit with our assumption that unemployment rates drive SAE per case through their relationship with caseload. Another interesting difference was that total SAE increased as the share of the SNAP households with earnings rose, all else held constant, consistent with our conceptual framework but in contrast to the findings for SAE per case.

Outlier Sensitivity Analysis

Finally, we investigated whether any conclusions in Chapter 4 were driven by an outlier State. We did a "leave-one-out" cross-validation test, where we estimated our preferred model 51 different times, dropping one State from the sample in each estimate. We found that most coefficients do not change significantly when one State is dropped from the sample (see Appendix Exhibit A.9). This increases our confidence that results are not unduly influenced by one State. The only noticeable exception is the coefficient on States that require fingerprinting of SNAP applicants. When California is dropped from the sample, the coefficient increases from 0.098 and insignificant to 0.174 and significant at the 5 percent level. California is one of the few states that changed its fingerprinting requirement over the observed period (it dropped the requirement in FY 2013). Our interpretation is that the null effect for the full sample is driven by

California not experiencing a reduction in its SAE in FY 2013, when it dropped the fingerprinting requirement.

Chapter 6. SAE and Program Performance Measures: An Exploratory Analysis

We have established that some States spend much more than others on SAE per case and that a relatively small proportion of these differences is explained by variations in State economic differences, SNAP caseload characteristics, or State policy options. A next logical question is whether States that spend more on SAE per case are better at meeting important program goals. Specifically, is higher spending associated with improvements in any of the following three measures of program performance: program access (i.e., participation rates), payment accuracy (i.e., error rates), and timeliness in application processing?

Following discussion of the conceptual framework and data challenges, we present simple descriptive statistics showing the simple correlations between SAE per case and payment accuracy, timeliness in application processing, and program access. We then estimate multivariate models to assess whether the observed relationships between SAE per case and program performance persist after controlling for important differences in State economic, demographic, and policy environments. Our findings should be interpreted as exploratory, given data challenges and the complexity of the relationships among the performance measures, SAE per case, and other State factors.

Conceptual Framework

One hypothesis is that higher spending on SAE per case, including the hiring of qualified case workers in sufficient numbers to provide high-quality services to the SNAP population, will be positively associated with all three measures of program performance. On the other hand, States or years with large inefficiencies or external challenges (such as the rollout of a new ADP system that does not operate well initially) may experience a combination of high SAE per case and poor performance on other measures. In other words, the expected relationships are unclear.

Moreover, program access (i.e., participation rates), payment accuracy (i.e., error rates), and timeliness of applications relate to each other in complex ways. For example, speeding up application processing may produce higher error rates, as caseworkers work more quickly; or, it may reduce error rates because determining eligibility near the point of application can reduce opportunities for mistakes. Similarly, efforts to reduce error rates can lead to lower participation rates (i.e., if caseworkers ask for extensive documentation) or, sometimes, to higher participation rates (i.e., if policies are changed to reduce the need to track income to the nearest dollar).

Further, program performance is likely affected by some economic, demographic, and policy factors that influence SAE per case. For instance, during an economic recession, a sudden influx of new applications may overwhelm caseworkers, leading to delays in application processing and increases in error rates. At the same time, an economic recession can affect participation rates (if the participating population changes more or less rapidly than the eligible population). As another example, an increase in average household size may adversely affect error rates and timeliness of applications. For a policy example, waiving the face-to-face interview may increase program access and/or may increase error rates.

In sum, performance measures, State conditions, and SAE per case are interrelated in complex ways that may be hard to disentangle (Exhibit 6.1).

Exhibit 6.1. Research Questions, Variables, and Hypotheses on SAE per Case and Program Performance

Research Questions	Variables	Hypotheses
Program access, payment accuracy, and timeliness of application processing		
How do program goals of improving performance in payment accuracy, timeliness in application processing, and program access relate to State variation in SAE?	• Combined error rate • Timeliness of application processing • Participation rate	Factors are expected to be interrelated in a complex manner. Higher SAE may be associated with faster timeliness, higher program access, and improved program accuracy. Yet outside factors may negatively affect both SAE and performance.

Data for Measuring Program Performance

There also are serious data challenges to measuring program performance. FNS provides bonuses associated with program performance that likely boost the quality of the service provided to the population but could also generate incentives for States to misreport their performance. In addition, these three performance variables are only measured for limited times, making it harder to detect and analyze relationships. In particular, timeliness data are only available for 2010–2015.

The three performance measures were operationalized as follows:

- **Program access** was measured using the State participation rate, which estimates the percentage of people eligible for SNAP who actually use the program. FNS collected these rates using reported participation and empirical Bayes shrinkage estimates for eligibility. Data were provided for all States and years in the study period except 2016.
- **Payment accuracy** was based on the combined State error rate, which measures the overpayment and underpayment of SNAP benefits in each State. FNS provided data for this measure for all States from 1999 to 2014. Data for 2015 and 2016 are not available due to FNS's concerns over significant biases that impacted the measurement of error rates in many States during those years.
- **Timeliness** was measured using an application timeliness variable collected as part of FNS's quality control review process. It is calculated by dividing the number of cases that were processed in a timely manner by the number of cases subject to the timeliness measure. FNS considers a case processed in a timely manner if the household has an opportunity to participate in SNAP within seven

days of the application date for expedited service cases and within 30 days of the application date for regular processing cases. This measure is only available for 2010–2015.

Descriptive Statistics and Correlations

Program performance measures varied substantially. The average participation rate ranged from 35 percent in Nevada in 1999 to 100 percent in many States in the late 2000s. The average participation rate during the period was 71 percent. The average combined State error rate also varied considerably, from 0.3 percent in Texas in 2014 to 17.6 percent in Michigan in 1999; the overall average was 5.8 percent. Finally, the share of SNAP cases processed in a timely manner ranged from 56.7 to 99.6 percent.

Exhibit 6.2. Summary Statistics: State Participation Rate, Combined Error Rate, and Timeliness

Variable	Mean	Std. Dev.	Minimum	Maximum	Years Available
Participation rate	71.0%	14.7%	35.0%	100.0%	1999–2015
Combined State error rate	5.8	2.9	0.3	17.6	1999–2014
Timeliness	87.6%	8.1%	56.7%	99.6%	2010–2015

Note: The mean is the average across all observations in the dataset.
Source: FNS State SNAP Participation Rates; FNS SNAP Historical State Error Rates; FNS SNAP Timeliness data

Simple correlations suggest that the program participation rate and combined State error rate are related to SAE per case, and with each other, but timeliness is not associated with any of the other measures (Exhibit 6.3). Specifically, we found the following:

- a strong negative relationship between State participation rates and SAE per case (-0.67). In other words, SAE per case was lower in States and years with higher participation rates.

- a moderate positive correlation between combined State error rate and SAE per case (0.42). In other words, error rates were higher in States and years with higher SAE per case.
- a moderate negative correlation between participation rates and error rates (-0.35). This suggests there are trade-offs between focusing on payment accuracy and bringing eligible families onto SNAP.
- a very weak correlation between timeliness and SAE per case (-0.04). In other words, there was no statistical relationship between State spending on administration and their ability to process SNAP benefits on time. Correlations between timeliness and the other two performance measures were also low. However, one should interpret these results with caution as we observe only six years of the timeliness variable.

None of the simple correlations support the hypothesis that higher levels of SAE per case are associated with improved program performance. In the next section, we examine whether any of the relationships change after introducing controls, and we speculate on the potential mechanisms driving our results.

Exhibit 6.3. Correlations: Participation Rate, Combined Error Rate, and Timeliness

	Log (SNAP SAE per Case)	Participation Rate	Combined State Error Rate	Timeliness
Log (SNAP SAE per case)	1			
Participation rate	-0.6682	1		
Combined State error rate	0.4198	-0.3497	1	
Timeliness	-0.0395	0.0345	-0.0529	1

Source: FNS State SNAP Participation Rates; FNS SNAP Historical State Error Rates; FNS SNAP Timeliness data

Exploratory Findings

The negative relationship between SAE and participation rates remained robust in a model that estimated participation rates as a function of SAE per case and the same economic, demographic, and policy variables of our preferred model from the previous section. A 10 percent increase in costs was associated with a 1.7 percentage-point decline in participation rate.[44]

This result was somewhat surprising; one might expect that States spending more on their program should be able to serve a higher share of their eligible population. An increase in outreach spending, for example, would be expected to increase participation rates. There are some possible explanations for this negative relationship between SAE per case and State participation rate. First, outreach spending is a very small share of SAE (less than 1 percent), and many other categories of SAE spending may have little effect on participation. Second, participation rates may be driving SAE per case, rather than SAE per case driving participation rates. Everything else constant, an increase in participation rates and caseloads should lead to a decline in SAE per case, generating a negative relationship between participation rate and SAE per case. Finally, it is possible that States that are more efficient at spending their SNAP resources might also be more efficient at identifying the SNAP-eligible population that needs to be served by the program.

We also found that not just SAE per case, but also total SAE, had a negative association with participation rates (second column of Exhibit 6.4). This result suggests that caseload increases cannot fully explain the negative relationship between SAE per case and participation

[44] This result holds even when we drop California, which has high SNAP SAE per case and a low participation rate, from the sample. We also find a very similar association between SAE per case and participation rates when we split the sample into State-administered and county-administered States. We estimate coefficients of the Log (of SNAP SAE per case) of -0.171 and -0.173, respectively, for each of these samples of States.

rates. We hope future research can better explore the mechanism driving the relationship between SAE and State participation rates.

Exhibit 6.4. The Relationship Between Participation Rates, SAE, and State Factors

Dependent Variable: Participation Rate		
Explanatory Variables	**SAE per Case with Controls**	**Total SAE with Controls**
Log (SNAP SAE per case)	-0.171	
	(0.020)***	
Log (total SAE)		-0.044
		(0.019)**
Log (number of cases)		0.385
		(0.031)***
Log (average wage welfare workers)	0.047	0.115
	(0.061)	(0.047)**
Log (State revenue per capita)	0.001	0.005
	(0.008)	(0.007)
Lagged State unemployment rate	0.850	-0.391
	(0.583)	(0.489)
Share SNAP households with earnings	0.555	0.076
	(0.109)***	(0.096)
Share SNAP households with TANF	0.120	0.083
	(0.117)	(0.102)
People per household	-0.060	0.064
	(0.070)	(0.053)
State uses BBCE	-0.009	-0.005
	(0.014)	(0.010)
Average certification period (in months) for nonearning, nonelderly SNAP units	0.005	0.004
	(0.003)*	(0.002)**
State requires fingerprinting of SNAP applicants	-0.027	-0.019
	(0.026)	(0.020)
State uses simplified reporting	0.008	-0.001
	(0.011)	(0.010)
State granted waiver of face-to-face interviews at initial certification	-0.019	-0.017
	(0.014)	(0.008)**
State Fixed Effects	**Yes**	**Yes**
Year Fixed Effects	**Yes**	**Yes**
Observations	**867**	**867**
Adjusted R-Squared	**0.887**	**0.922**

Notes: Robust standard errors clustered at the State level in parentheses.
*** p < .01, ** p < .05, * p < .1

Although the simple correlation suggested that higher spending on SAE was associated with higher combined error rates, the relationship reverted to a negative and statistically significant relationship when using multivariate analysis. That is, there is some evidence that higher spending on administration may be associated with lower error rates, after controlling for other factors, but the relationship is statistically insignificant. Results are similar whether examining SAE per case or total SAE (see Exhibit 6.5).

Exhibit 6.5. The Relationship Between Combined State Error Rates, SAE, and State Factors

Dependent Variable: *Combined State Error Rates*		
Explanatory Variables	**SAE per Case with Controls**	**Total SAE with Controls**
Log (SNAP SAE per case)	-0.013	
	(0.935)	
Log (total SAE)		-0.096
		(0.962)
Log (number of cases)		-0.117
		(1.658)
Log (average wage welfare workers)	4.389	4.344
	(2.292)*	(2.350)*
Log (State revenue per capita)	2.363	2.363
	(0.639)***	(0.642)***
Lagged State unemployment rate	3.938	4.676
	(17.143)	(18.565)
Share SNAP households with earnings	4.331	4.588
	(4.530)	(4.947)
Share SNAP households with TANF	6.310	6.332
	(4.374)	(4.338)
People per household	2.650	2.590
	(2.893)	(2.819)
State uses BBCE	-0.034	-0.037
	(0.376)	(0.379)
Average certification period (in months) for nonearning, nonelderly SNAP units	0.041	0.042
	(0.071)	(0.070)
State requires fingerprinting of SNAP applicants	-0.178	-0.186
	(0.575)	(0.596)
State uses simplified reporting	-0.359	-0.354
	(0.492)	(0.487)
State granted waiver of face-to-face interviews at initial certification	-0.226	-0.226
	(0.271)	(0.270)
State Fixed Effects	**Yes**	**Yes**

Dependent Variable: *Combined State Error Rates*		
Explanatory Variables	**SAE per Case with Controls**	**Total SAE with Controls**
Year Fixed Effects	**Yes**	**Yes**
Observations	**816**	**816**
Adjusted R-Squared	**0.610**	**0.610**

Notes: Robust standard errors clustered at the State level in parentheses.
*** p < .01, ** p < .05, * p < .1

Finally, we estimated that the relationship between SAE costs and timeliness was almost zero (Exhibit 6.6). Even when we disaggregated SAE per case into total SAE and caseload (second column of Exhibit 6.6), neither variable was an important predictor of variation in timeliness across States over time.[45] However, keep in mind that this regression includes only six years of data. We hope future research can identify the determinants of timeliness when more data become available.

Exhibit 6.6. The Relationship Between Timeliness, SAE, and State Factors

Dependent Variable: Timeliness		
Explanatory Variables	**SAE per Case with Controls**	**Total SAE with Controls**
Log (SNAP SAE per case)	0.021	
	(0.032)	
Log (total SAE)		0.035
		(0.041)
Log (number of cases)		0.084
		(0.099)
Log (average wage welfare workers)	-0.017	-0.046
	(0.142)	(0.136)
Log (State revenue per capita)	-0.003	-0.001
	(0.013)	(0.013)
Lagged State unemployment rate	0.074	-0.109
	(0.688)	(0.712)
Share SNAP households with earnings	0.433	0.289
	(0.252)*	(0.249)
Share SNAP households with TANF	0.253	0.272
	(0.271)	(0.283)
People per household	-0.456	-0.329

[45] We also tested whether adding ADP development helped predict timeliness. We found a positive, but statistically insignificant, relationship between ADP development (lagged one year) and the percentage of cases processed in a timely manner (data not shown).

Dependent Variable: Timeliness		
Explanatory Variables	**SAE per Case with Controls**	**Total SAE with Controls**
	(0.165)***	(0.190)*
State uses BBCE	-0.007	-0.010
	(0.029)	(0.028)
Average certification period (in months) for nonearning, nonelderly SNAP units	0.002	0.003
	(0.005)	(0.005)
State requires fingerprinting of SNAP applicants	-0.021	-0.023
	(0.052)	(0.054)
State uses simplified reporting	0.022	0.021
	(0.031)	(0.035)
State granted waiver of face-to-face interviews at initial certification	-0.043	-0.038
	(0.030)	(0.029)
State Fixed Effects	**Yes**	**Yes**
Year Fixed Effects	**Yes**	**Yes**
Observations	**306**	**306**
Adjusted R-Squared	**0.654**	**0.657**

Notes: Robust standard errors clustered at the State level in parentheses.
*** p < .01, ** p < .05, * p < .1

Chapter 7. Conclusion

This research project set out to improve understanding of the factors explaining the wide variation in SNAP SAE per case across States and over time. An underlying motivation was to learn the extent to which costs are controllable by the State agency administering the SNAP program.

Our analyses suggest that adoption of streamlining policies in the SNAP program is generally associated with reductions in SAE per case. In particular, adoption of simplified reporting was associated with a 7 percent reduction in SAE per case, and adoption of BBCE yielded a similar reduction. Other policies did not have a statistically significant effect when tested individually. However, States that adopted a package of streamlining policies and modernization practices had lower costs than States that adopted fewer such policies. Analyses using a policy index[46] measuring the number of SNAP streamlining policies and modernization practices in each State suggest that each additional simplifying policy reduces costs by about 3.4 percent.

However, SNAP policy differences explain only a small amount of the total variation in SAE per case. A change in SAE per case of 3 to 7 percent is small given the range of spending differences: some States spend five to 10 times as much as others. Collectively, SNAP policy differences explained less than 5 percent of the total variation in SAE per case in the preferred model, according to estimates of partial R-squares.

The salaries of social service employees explain some of the remaining differences. A 10 percent increase in wages was associated with a 5 percent increase in SAE per case. SAE per

[46] The index included the following policies: exclusion of vehicles from the SNAP asset test, use of call centers, waiver of face-to-face interviews, online applications, operation of a CAP, and fingerprinting of SNAP applicants (the coding of the index assumes each of these policies reduces costs, except fingerprinting of SNAP applicants, which was assumed to increase costs).

case also fell during times of declining State revenues and tight budgets. In addition, as unemployment rates increased, costs per case decreased. Specifically, a 1 percentage-point increase in unemployment (lagged one year) was associated with a 5 percent reduction in SAE per case. Analyses show that unemployment affects SAE per case through its effect on caseload, not its effect on aggregate SAE.

Collectively, State wages and economic differences explain about 12 percent of the variation in costs in our preferred model and an even larger share in some other models. In addition, a relatively small share of variation is explained by SNAP caseload characteristics.

Ultimately, substantial differences in SAE across States remain after controlling for the economic, demographic, and policy factors in our analysis. The magnitude of these persistent differences across States was illustrated by a simulated analysis, which found that even if all States had the same State wages and economic conditions, the same SNAP caseload characteristics, and the same SNAP policies, states with the highest SAE in 2016 would still have costs five times higher per case than States with the lowest SAE in 2016.

While the study has improved our understanding of State variation in SAE, two important sets of questions remain unanswered. First, the statistical models used here do not allow us to identify the effect of observable variables that were constant over time. Most notably, we could not directly estimate the effect of becoming a county-administered State on SAE because no State changed the status of this variable during the period we analyzed. The question thus remains: does the higher SAE per case observed in county-administered States stem from this operational choice, or does it stem from idiosyncratic differences in the 10 States that operate county-administered programs? More generally, in addition to county administration, what other persistent differences between States contribute to the large State fixed effects in the models?

Second, what is the relationship between SAE per case and program performance? Exploratory analyses found no meaningful relationship between SAE per case and State error rates and timeliness of application processing. These same exploratory results did suggest that higher State participation rates were associated with lower costs per case. However, all three of these results were constrained by significant data limitations and uncertainty about the direction of the relationship. Future research is needed to determine whether SAE per case is associated with program performance.

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Appendix A: Additional Methodological Details

Constructing the Dependent Variable

Data for SNAP SAE were drawn from the Financial Status Report SF-269 (1999–2011) and SF-425/FNS-778 (2012–2016). Data were based on "total net reported outlays."[47] Most of our analyses examine total costs, but we also examined components of costs. Exhibit A.1 shows how we grouped the financial data into functional cost categories.

Exhibit A.1. Summarizing SNAP SAE as Reported on FNS Form SF-269 (FY 1999–2011) and Form SF-778/SF-425 (FY 2012–2016)

Functional Category	% of Total, 2016	SF-269	SF-FNS-778
Total SAE	100	Total	Total
Certification-Related Costs	76.0	Certification + Unspecified Other + Outreach + Reinvestment + SAVE	Certification + Unspecified Other + Outreach + New Investment + DoD Appropriations + SAVE
ADP Operations	7.1	ADP Ops	ADP Ops
ADP Development	0.7	ADP Dev 50% ADP Dev 63% ADP Dev 75%	ADP Dev
E&T and Workfare	6.5	E&T 100% grant E&T 50% admin E&T depend care E&T transport and other E&T ABAWDs Optional workfare	E&T 100% grant E&T 50% admin E&T depend care E&T transport and other E&T ABAWDs Optional workfare
Fraud Control	3.9	Fraud control 50% Fraud control 75%	Fraud control
Issuance	3.3	Coupon issuance EBT issuance (p.2) Issuance indirect (p.2) EBT start up (p. 3)	EBT issuance Issuance Indirect (p.2) EBT start up (p. 3)
Miscellaneous	2.4	Fair hearings + Quality Control + Management evaluation (ME)	Fair hearings + Quality Control + ME + 100% State exchange

[47] We explored combining the "Non-Federal Share of Outlays" and "Total Federal Share of Outlays and Unliquidated Obligations" as our measure of total SAE, as initially suggested by FNS. The potential advantage of this form of the data is that it includes obligations that have not yet been liquidated (i.e., contracts where the funds have been authorized but not yet spent down). However, for our historical data series, there is little benefit to having unliquidated obligations that date back in time; if they have not been liquidated by this point, they are most likely not a good measure of total costs. We thus dropped the attempt to capture unliquidated obligations and instead focused on "net reported outlays," explaining our reasons to FNS. Costs for 2016 (and to a lesser extent 2015) may slightly underestimate total costs, to the extent that some States still have unliquidated obligations that are not captured in the "net reported outlays" variable.

Nutrition Education, which was included in SAE reports from 1999 to 2010, but not from 2011 to 2016, was excluded in all years, to maintain a common definition of SAE. Also, "75 percent Indian administration," which is a new activity in the form for 2012–2016, was not included in any functional categories because when it was, the sum of the components exceeded total reported costs (and the excess amount was equal to funds reported for Indian administration).[48] We did not separately report on "indirect costs" because we understand they are already included in total SAE.

Interpretation of the Log-Transformed Regression Coefficients

We used log transformation to normalize the SAE data distribution, which was skewed heavily in dollar value. Likewise, we log-rescaled four explanatory variables: average wages of welfare workers, State revenue per capita, average wages (all occupations), and average housing price. Here is a discussion of the interpretation of regression models with transformed variables:

We assumed a linear relationship between log-transformed SAE and a group of predictor variables, such as:

$$\log(Y) = \beta_0 + \beta_1 X_1 + \ldots + \beta_k X_k + \varepsilon$$

where Y is SAE per case and $X_1, \ldots, X_k$ are the explanatory variables, with ε normally distributed. In log-level regression modeling, we can recover expected percentage increases in SAE associated with increases in X_1 holding all other variables constant:

$$\%\Delta y = 100.\,(e^{\beta_1 \Delta X_1} - 1)$$

where ΔX_1 is the unit change in the explanatory variable of interest (e.g. $\Delta X_1 = 1$ for one unit increase in X_1). For instance, in our preferred model in Exhibit 4.2, the coefficient for the *State*

[48] Indian administration funds are reported in the following States: Arizona (2012–2016), Minnesota (2012–2016), Montana (2016), South Dakota (2012–2016), Utah (2012–2016), and Wisconsin (2012–2016).

uses BBCE variable is equal to -0.071. Using the expression above, we find that States that adopt BBCE are expected to decrease their SAE per case by about 7 percent: $\%\Delta y = 100.(e^{-0.071} - 1) = -6.85$, which rounds to 7 percent.

For the cases where the explanatory variable is also log-transformed (log-log regression modeling), we can recover expected percentage increases in SAE associated with *percentage* increases in X_1 holding all other variables constant:[49]

$$\%\Delta y = \beta_1 \%\Delta X_1$$

where $\%\Delta X_1$ is the percentage change in the variable of interest. For instance, in our preferred model in Exhibit 4.2, the coefficient for the Log (average wage welfare workers) variable is equal to 0.550. Using the expression above, we find that a 10 percent increase in wages was associated with a 5 percent increase in costs: $\%\Delta y = 0.55 \times 10\% = 5.5\%$.

Using Partial R^2 to Measure the Relative Importance of Different Factors

To understand which set of variables better predict variation in SAE per case, we also estimated partial R-squares. The partial R^2 is a measure of the mutual relationship between the dependent variable Y and independent variable(s) X when all the other variables of the model (X_1,X_2,X_3,…) are held constant. It provides insights into the predictive power of the additional variable(s) X in a fully specified regression model.

In precise terms, the partial R^2 estimates the proportion of unexplained variation of Y that becomes explained with the addition of variable(s) X to the regression model. It can be obtained by examining the R^2 of a regression of the residuals of Y with respect to (X_1,X_2,X_3,…) on the residuals of X with respect to (X_1,X_2,X_3,…).

[49] The expression is based on the approximation that $\Delta y\% \approx 100.\Delta log(y)$, which is accurate for small changes in y. See Wooldridge (2015) for more details.

The sum of partial R^2 of covariates from a regression can be easily above or below its total R^2. In fact, if all predictors are perfectly collinear, a regression can have a large total R^2., but the partial R^2 for all predictors will be exactly zero, because any additional predictor has zero additional explanatory power. On the other hand, if all predictors explain the dependent variable perfectly (i.e., the total R^2=1), then the partial R^2 for each predictor will be 1, because whatever is unexplained by all other predictors can be perfectly explained by the remaining one.

Appendix B: Correlation Matrices

This appendix begins by presenting correlations between our dependent variable measures, including both the cost components of total SNAP SAE and the cost components of certification-related SNAP SAE. We then present correlations between all the explanatory variables used in our expanded model. The correlations indicate the strength of the relationship between the explanatory variables and provide context for our decision to only use certain variables in our models. Variables that are highly correlated should not all be included in a statistical model because their estimated impacts on the outcome variable will be unstable and thus difficult to determine.

Exhibit A.2. Correlations: Cost Components of Total SNAP SAE

	Total Costs	Certification-Related Costs	Issuance	Fraud Control	ADP Operations	ADP Develop-mint	E&T and Workfare	Miscellaneous
Total Costs	1							
Certification-Related	0.9936	1						
Issuance	0.8641	0.8487	1					
Fraud Control	0.9015	0.8667	0.7811	1				
ADP Operations	0.8607	0.8574	0.7885	0.6891	1			
ADP Development	0.564	0.5388	0.6097	0.538	0.4816	1		
E&T and Workfare	0.797	0.7499	0.5589	0.8197	0.5386	0.3032	1	
Miscellaneous	0.881	0.8626	0.8135	0.8261	0.7275	0.5238	0.7047	1

Exhibit A.3. Correlations: Cost Components of Certification-Related SNAP Expenses

	Reported Certification Costs	Unspecified Other	DoD Appropriations	Outreach	New Investment/ Reinvestment
Reported Certification Costs	1				
Unspecified Other	0.5554	1			
DoD Appropriations	0.1861	0.0708	1		
Outreach	0.7026	0.3939	0.1728	1	
New Investment/ Reinvestment	0.0749	0.0029	-0.0354	-0.0455	1

Exhibit A.4. Correlations: State Economic Conditions

	Average Wages (Welfare Workers)	Average Wages (All Occupations)	Housing Price Index	Lagged State Unemploy-ment Rate	Change in Unemploy-ment Rate	State Revenue per Capita
Average wages (Welfare Workers)	1					
Average Wages (All Occupations)	0.7871	1				
Housing Price Index	0.2653	0.3535	1			
Lagged State Unemployment Rate	0.1833	0.2512	0.0052	1		
Change in Unemployment Rate	0.0141	-0.004	-0.0634	-0.2781	1	
State Revenue per Capita	0.1139	0.1357	0.1664	0.0016	-0.0752	1

Exhibit A.5. Correlations: Characteristics of SNAP Caseloads

	Share of SNAP House-holds with Earnings	Share of SNAP House-holds with TANF	Average People per House-hold	Share of SNAP House-holds in Rural Areas	Share of SNAP Households with Elderly or People with Disabilities	Share of SNAP Households With at Least One Non-Citizen Eligible for SNAP
Share of SNAP Households with Earnings	1					
Share of SNAP Households with TANF	-0.3743	1				
Average People per Household	0.4543	0.1843	1			
Share of SNAP Households in Rural Areas	0.1784	0.04	0.4557	1		
Share of SNAP Households with Elderly or People with Disabilities	-0.4129	-0.1317	-0.3568	0.1839	1	
Share of SNAP Households with at Least One Non-Citizen Eligible for SNAP	-0.1279	0.2676	-0.2004	-0.4234	-0.138	1

Exhibit A.6. Correlations: State Policies

	State uses BBCE	State operates CAP	Avg. certification period (in months) for SNAP units with earnings	Avg. certification period (in months) for nonearning, nonelderly SNAP units	State requires fingerprinting of SNAP applicants	State uses simplified reporting	State excludes all vehicles in the house-hold from the SNAP asset test	State offers transitional SNAP benefits to families leaving TANF	State operates call centers	State granted waiver of face-to-face inter-views at initial certification	State has online application option	Statewide ABAWD waiver	Partial ABAWD waiver	Share of states with Medicaid expansion under ACA
State uses BBCE	1													
State operates CAP	0.2973	1												
Avg. cert. period (in months) for SNAP units with earnings	0.1677	0.1213	1											
Avg. cert. period (in months) for nonearning, nonelderly SNAP unit	0.2325	0.2526	0.7937	1										
State requires fingerprinting of SNAP applicants	0.0379	0.1476	-0.0759	-0.0439	1									
State uses simplified reporting	0.3781	0.2428	0.1382	0.2115	-0.1122	1								
State excludes all vehicles in the house-hold from the SNAP asset test	0.5279	0.1521	0.1947	0.186	-0.0712	0.4893	1							

	State uses BBCE	State operates CAP	Avg. certification period (in months) for SNAP units with earnings	Avg. certification period (in months) for nonearning, nonelderly SNAP units	State requires fingerprinting of SNAP applicants	State uses simplified reporting	State excludes all vehicles in the house-hold from the SNAP asset test	State offers transitional SNAP benefits to families leaving TANF	State operates call centers	State granted waiver of face-to-face inter-views at initial certification	State has online application option	Statewide ABAWD waiver	Partial ABAWD waiver	Share of states with Medicaid expansion under ACA
State offers transitional SNAP benefits to families leaving TANF	0.2897	0.2038	0.1393	0.1145	0.1783	0.2946	0.2601	1						
State operates call centers	0.4066	0.194	-0.0027	0.0805	-0.0034	0.3494	0.3425	0.3136	1					
State granted waiver of face-to-face interviews at initial certification	0.5035	0.2734	0.2068	0.2562	-0.047	0.4426	0.368	0.2444	0.4373	1				
State has online application option	0.4266	0.3274	0.21	0.3074	0.0254	0.4229	0.357	0.2851	0.491	0.6032	1			
Statewide ABAWD waiver	0.4198	0.2556	0.1863	0.1664	-0.0836	0.348	0.3585	0.1471	0.2911	0.5006	0.2927	1		
Partial ABAWD waiver	-0.3288	-0.1211	-0.1314	-0.1436	0.0486	-0.1929	-0.2096	-0.0468	-0.1377	-0.3768	-0.2037	-0.6942	1	
Share of States with Medicaid Expansion under ACA	0.3087	0.0586	0.1756	0.2223	-0.044	0.1897	0.1951	0.1123	0.2129	0.3431	0.3237	0.1257	-0.0655	1

Appendix C: Additional Statistical Analyses

This appendix presents additional analyses of some of the statistical models we discussed in Chapters 4 and 5. In Exhibit A.7, we present the results of our preferred model for county-administered States compared to State-administered States. In Exhibit A.8, we present detailed models where the dependent variable is the logarithm of total SNAP SAE, rather than the logarithm of SNAP SAE per case.

In Exhibit A.7, we estimated the preferred model for the sample of State–administered States and county-administered States separately in the first two columns. In the third column, we tested whether the coefficients of these two regressions were statistically different from each other. Overall, we concluded that there was not much difference in the effect of SNAP policies on costs across county-administered and State–administered States. The only coefficient that appeared to be significantly different across these two sets of States was whether a State required fingerprinting of SNAP applicants. We found that introduction of this policy increased costs by 31 percent in State-administered States but had no effect on costs in county-administered States. Three State-administered States (Arizona, Massachusetts, and Texas) required fingerprinting at some point during the observed period, as did two county-administered States (California and New York).

Two other variables appear to differ between the two sets of States, although our test in column 3 showed that we cannot be sure that these differences are significant at the 90 percent confidence level. We found that the negative relationship between the share of SNAP households with earnings and SAE per case was apparently driven by State-administered States. (The relationship was insignificant among county-administered States.) We also estimated that the average certification period (in months) for nonearning, nonelderly SNAP units was negatively

associated with SAE per case in State-administrated States (but not in county-administered States). But again, we could not reject a significant difference in coefficients across the two sets of States at a 90 percent level.

By restricting the sample to 10 county-administered States, we incurred the risk of over-specifying the model. We also tested an alternate specification, where instead of splitting the sample, we used interaction terms with the county-administered indicator. The findings were mostly like those shown in Exhibit A.7. with factors having the same general effect in both sets of States. The only exception was that we found that a longer certification period (measured for nonearning, nonelderly SNAP units) led to more of a reduction in SAE per case for county-administered States than for State-administered States.

Exhibit A.7. The Effects of County Administration on SNAP SAE per Case

Dependent Variable: Log of SAE per Case				
Explanatory Variables	All States	Model 1 State Administration	Model 2 County Administration	Statistical Differences in Coefficients
State Operations				
County Administration	0.239			
	(0.071)***			
State Economic Conditions				
Log (average wage welfare workers)	1.043	0.498	0.677	
	(0.194)***	(0.244)**	(0.842)	
Log (State revenue per capita)	0.184	0.075	0.047	
	(0.044)***	(0.030)**	(0.013)***	
Lagged State unemployment rate	-9.842	-5.675	-5.087	
	(1.708)***	(1.415)***	(1.633)**	
Characteristics of SNAP Caseloads				
Share SNAP households with earnings	-0.242	-0.985	0.092	
	(0.605)	(0.484)**	(0.844)	
Share SNAP households with TANF	0.230	-0.431	-1.010	
	(0.317)	(0.479)	(0.317)**	
People per household	0.695	0.427	0.682	
	(0.175)***	(0.261)	(0.396)	
State Policies				
State uses BBCE	-0.078	-0.088	-0.034	
	(0.052)	(0.048)*	(0.046)	

Dependent Variable: Log of SAE per Case				
Explanatory Variables	**All States**	**Model 1 State Administration**	**Model 2 County Administration**	**Statistical Differences in Coefficients**
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.005	-0.003	-0.036	
	(0.007)	(0.008)	(0.011)***	
State requires fingerprinting of SNAP applicants	-0.047	0.267	-0.057	***
	(0.085)	(0.042)***	(0.060)	
State uses simplified reporting	-0.115	-0.064	-0.100	
	(0.053)**	(0.046)	(0.056)	
State granted waiver of face-to-face interviews at initial certification	-0.008	-0.040	-0.042	
	(0.045)	(0.047)	(0.038)	
State Fixed Effects	**No**	**Yes**	**Yes**	
Region Fixed Effects	**Yes**	**No**	**No**	
Year Fixed Effects	**Yes**	**Yes**	**Yes**	
Observations	**918**	**738**	**180**	
Adjusted R Squared	**0.782**	**0.89**	**0.923**	

Robust standard errors clustered at the State level in parentheses. The multivariate analysis presented in the All States column controls for regional fixed effects (using the nine Census Bureau-designated divisions) and year fixed effects, but not State fixed effects.

*** p < .01, ** p < .05, * p < .1

Exhibit A.8. Detailed Analysis of Total SNAP SAE

Dependent Variable: Log of Total SNAP SAE				
Explanatory Variables	Model			
	Preferred (1)	Expanded (2)	With SNAP Policy Index (3)	No State Fixed Effects (4)
Log (number of cases)	0.164	0.190	0.171	1.002
	(0.108)	(0.109)*	(0.105)	(0.038)***
State Economic Conditions				
Log (average wage welfare workers)	0.224	0.045	0.230	1.335
	(0.181)	(0.169)	(0.177)	(0.226)***
Lagged State unemployment rate	-0.690	0.284	-0.731	-8.860
	(1.106)	(1.292)	(1.081)	(2.128)***
Log (State revenue per capita)	0.031	0.014	0.033	0.207
	(0.016)*	(0.017)	(0.016)**	(0.062)***
Log (average wages; all occupations)		0.834		
		(0.563)		
Log (average housing price)		0.041		
		(0.133)		
Change in unemployment rate		-0.991		
		(1.053)		
Characteristics of SNAP Caseloads				
Share SNAP households with earnings	0.745	0.661	0.712	0.438
	(0.322)**	(0.313)**	(0.320)**	(0.649)
Share SNAP households with TANF	-0.357	-0.073	-0.348	0.106
	(0.248)	(0.236)	(0.250)	(0.440)
Average people per household	-0.045	-0.002	-0.027	0.599
	(0.189)	(0.197)	(0.189)	(0.232)**
Share SNAP households in rural areas		-0.056		
		(0.099)		
Share elderly or disabilities		0.609		
		(0.366)		
Share of SNAP households with at least one eligible non-citizen		-0.283		
		(0.667)		
State Policies				
State uses BBCE	-0.060	-0.066	-0.055	-0.129
	(0.031)*	(0.040)	(0.031)*	(0.065)*
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.005	-0.013	-0.005	-0.001
	(0.007)	(0.010)	(0.007)	(0.009)
State requires fingerprinting of SNAP applicants	0.051	0.090		0.146
	(0.073)	(0.066)		(0.176)
State uses simplified reporting	-0.028	-0.022	-0.030	-0.145
	(0.026)	(0.025)	(0.027)	(0.075)*
Index of six other SNAP policies*			-0.011	

			(0.012)	
State granted waiver of face-to-face interviews at initial certification	-0.041	-0.037		-0.043
	(0.041)	(0.039)		(0.047)
State operates CAP		-0.025		
		(0.041)		
Average certification period (in months) for SNAP units with earnings		0.007		
		(0.008)		
State excludes all vehicles in the household from the SNAP asset test		0.012		
		(0.029)		
State offers transitional SNAP benefits to families leaving TANF		0.019		
		(0.039)		
State operates call centers		-0.002		
		(0.026)		
State has online application option		0.011		
		(0.029)		
Statewide ABAWD waiver		0.010		
		(0.028)		
Partial ABAWD waiver		0.029		
		(0.024)		
States with Medicaid Expansion under ACA		0.110		
		(0.054)**		
State Fixed Effects	**Yes**	**Yes**	**Yes**	**No**
Year Fixed Effects	**Yes**	**Yes**	**Yes**	**Yes**
Observations	**918**	**918**	**918**	**918**
Adjusted R-Squared	**0.985**	**0.986**	**0.985**	**0.927**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1
ǂ Variables included in the index of six other SNAP policies

Exhibit A.9: Outlier Sensitivity Analysis

Dependent Variable: Log of SNAP SAE per Case						
		State dropped:				
Explanatory Variables	**All**	**Alabama**	**Alaska**	**Arizona**	**Arkansas**	**California**
State Economic Conditions						
Log (average wage welfare workers)	0.550	0.561	0.577	0.546	0.566	0.562
	(0.233)**	(0.238)**	(0.233)**	(0.234)**	(0.239)**	(0.232)**
Log (State revenue per capita)	0.057	0.063	0.054	0.061	0.054	0.054
	(0.019)***	(0.019)***	(0.020)***	(0.019)***	(0.019)***	(0.019)***
Lagged State Unemployment Rate	-5.452	-5.649	-5.750	-5.419	-5.470	-5.583
	(1.161)***	(1.159)***	(1.189)***	(1.173)***	(1.153)***	(1.181)***
Characteristics of SNAP Caseloads						
People per household	0.455	0.496	0.410	0.421	0.475	0.547
	(0.238)*	(0.241)**	(0.243)*	(0.241)*	(0.237)*	(0.232)**
Share Earnings	-0.809	-0.764	-0.907	-0.793	-0.801	-0.860
	(0.432)*	(0.436)*	(0.436)**	(0.443)*	(0.436)*	(0.423)**
Share TANF	-0.659	-0.723	-0.725	-0.631	-0.714	-0.444
	(0.363)*	(0.370)*	(0.363)*	(0.363)*	(0.362)*	(0.374)
State Policies						
State uses BBCE	-0.071	-0.078	-0.078	-0.072	-0.062	-0.074
	(0.041)*	(0.042)*	(0.041)*	(0.042)*	(0.041)	(0.042)*
State uses simplified reporting	-0.072	-0.078	-0.074	-0.068	-0.077	-0.060
	(0.036)*	(0.037)**	(0.037)*	(0.036)*	(0.037)**	(0.037)
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.009	-0.009	-0.011	-0.008	-0.009	-0.006
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.007)
State requires fingerprinting of SNAP applicants	0.098	0.096	0.106	0.096	0.097	0.174
	(0.094)	(0.094)	(0.093)	(0.096)	(0.094)	(0.081)**
State granted waiver of face-to-face interviews at initial certification	-0.048	-0.050	-0.045	-0.046	-0.052	-0.047
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
Observations	**918**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.903**	**0.902**	**0.900**	**0.904**	**0.904**	**0.901**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case						
	State dropped:					
Explanatory Variables	Colorado	Connecticut	Delaware	District of Columbia	Florida	Georgia
State Economic Conditions						
Log (average wage welfare workers)	0.579	0.497	0.537	0.527	0.490	0.518
	(0.235)**	(0.229)**	(0.237)**	(0.265)*	(0.227)**	(0.236)**
Log (State revenue per capita)	0.059	0.056	0.057	0.055	0.054	0.057
	(0.020)***	(0.019)***	(0.019)***	(0.019)***	(0.019)***	(0.019)***
Lagged State Unemployment Rate	-5.510	-5.856	-5.405	-5.490	-5.127	-5.302
	(1.172)***	(1.127)***	(1.172)***	(1.178)***	(1.151)***	(1.178)***
Characteristics of SNAP Caseloads						
People per household	0.397	0.437	0.442	0.480	0.429	0.474
	(0.238)	(0.240)*	(0.244)*	(0.248)*	(0.241)*	(0.243)*
Share Earnings	-0.789	-0.932	-0.835	-0.828	-0.866	-0.835
	(0.444)*	(0.425)**	(0.440)*	(0.437)*	(0.433)*	(0.437)*
Share TANF	-0.667	-0.647	-0.665	-0.659	-0.574	-0.686
	(0.363)*	(0.365)*	(0.363)*	(0.366)*	(0.361)	(0.364)*
State Policies						
State uses BBCE	-0.077	-0.072	-0.073	-0.067	-0.057	-0.068
	(0.042)*	(0.042)*	(0.042)*	(0.041)	(0.040)	(0.042)
State uses simplified reporting	-0.072	-0.070	-0.071	-0.072	-0.070	-0.075
	(0.037)*	(0.037)*	(0.036)*	(0.037)*	(0.036)*	(0.037)**
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.009	-0.009	-0.008	-0.009	-0.011	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
State requires fingerprinting of SNAP applicants	0.098	0.089	0.102	0.096	0.105	0.100
	(0.094)	(0.095)	(0.094)	(0.094)	(0.093)	(0.094)
State granted waiver of face-to-face interviews at initial certification	-0.049	-0.026	-0.046	-0.047	-0.057	-0.046
	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)	(0.039)
Observations	**900**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.905**	**0.905**	**0.902**	**0.903**	**0.907**	**0.902**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case						
	State dropped:					
Explanatory Variables	**Hawaii**	**Idaho**	**Illinois**	**Indiana**	**Iowa**	**Kansas**
State Economic Conditions						
Log (average wage welfare workers)	0.554	0.528	0.582	0.573	0.593	0.598
	(0.235)**	(0.232)**	(0.232)**	(0.238)**	(0.230)**	(0.231)**
Log (State revenue per capita)	0.059	0.061	0.051	0.056	0.062	0.058
	(0.019)***	(0.019)***	(0.019)**	(0.019)***	(0.019)***	(0.019)***
Lagged State Unemployment Rate	-5.045	-5.563	-5.347	-5.337	-5.684	-5.550
	(1.142)***	(1.168)***	(1.173)***	(1.181)***	(1.169)***	(1.179)***
Characteristics of SNAP Caseloads						
People per household	0.432	0.473	0.444	0.450	0.458	0.424
	(0.241)*	(0.241)*	(0.239)*	(0.244)*	(0.243)*	(0.247)*
Share Earnings	-0.807	-0.815	-0.851	-0.812	-0.716	-0.816
	(0.433)*	(0.431)*	(0.436)*	(0.436)*	(0.438)	(0.439)*
Share TANF	-0.563	-0.464	-0.660	-0.653	-0.706	-0.700
	(0.364)	(0.338)	(0.374)*	(0.370)*	(0.361)*	(0.362)*
State Policies						
State uses BBCE	-0.073	-0.056	-0.070	-0.071	-0.066	-0.068
	(0.042)*	(0.039)	(0.042)	(0.043)	(0.042)	(0.042)
State uses simplified reporting	-0.080	-0.070	-0.068	-0.071	-0.075	-0.079
	(0.037)**	(0.038)*	(0.037)*	(0.037)*	(0.038)*	(0.036)**
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.008	-0.008	-0.010	-0.009	-0.012	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
State requires fingerprinting of SNAP applicants	0.090	0.093	0.104	0.098	0.104	0.101
	(0.095)	(0.095)	(0.093)	(0.095)	(0.092)	(0.093)
State granted waiver of face-to-face interviews at initial certification	-0.047	-0.040	-0.047	-0.049	-0.046	-0.047
	(0.040)	(0.037)	(0.039)	(0.040)	(0.038)	(0.039)
Observations	**900**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.905**	**0.906**	**0.904**	**0.903**	**0.904**	**0.906**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case						
	State dropped:					
Explanatory Variables	**Kentucky**	**Louisiana**	**Maine**	**Maryland**	**Massachusetts**	**Michigan**
State Economic Conditions						
Log (average wage welfare workers)	0.648	0.529	0.556	0.551	0.568	0.560
	(0.222)***	(0.238)**	(0.235)**	(0.234)**	(0.235)**	(0.236)**
Log (State revenue per capita)	0.058	0.058	0.056	0.059	0.063	0.057
	(0.019)***	(0.019)***	(0.020)***	(0.019)***	(0.019)***	(0.019)***
Lagged State Unemployment Rate	-5.353	-5.111	-5.463	-5.487	-5.363	-5.450
	(1.161)***	(1.131)***	(1.167)***	(1.179)***	(1.179)***	(1.243)***
Characteristics of SNAP Caseloads						
People per household	0.460	0.499	0.426	0.442	0.431	0.456
	(0.236)*	(0.239)**	(0.243)*	(0.243)*	(0.235)*	(0.240)*
Share Earnings	-0.699	-0.695	-0.774	-0.687	-0.790	-0.793
	(0.423)	(0.437)	(0.434)*	(0.420)	(0.435)*	(0.437)*
Share TANF	-0.669	-0.704	-0.628	-0.652	-0.688	-0.647
	(0.363)*	(0.363)*	(0.366)*	(0.361)*	(0.353)*	(0.364)*
State Policies						
State uses BBCE	-0.085	-0.076	-0.067	-0.081	-0.075	-0.071
	(0.040)**	(0.042)*	(0.042)	(0.041)*	(0.043)*	(0.042)
State uses simplified reporting	-0.069	-0.066	-0.070	-0.080	-0.072	-0.076
	(0.037)*	(0.036)*	(0.036)*	(0.036)**	(0.037)*	(0.037)**
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.006	-0.010	-0.009	-0.010	-0.008	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
State requires fingerprinting of SNAP applicants	0.098	0.095	0.097	0.102	0.015	0.097
	(0.096)	(0.092)	(0.095)	(0.094)	(0.097)	(0.094)
State granted waiver of face-to-face interviews at initial certification	-0.050	-0.055	-0.047	-0.046	-0.045	-0.049
	(0.039)	(0.039)	(0.040)	(0.039)	(0.039)	(0.039)
Observations	**900**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.905**	**0.905**	**0.900**	**0.904**	**0.903**	**0.903**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case						
	State dropped:					
Explanatory Variables	**Minnesota**	**Mississippi**	**Missouri**	**Montana**	**Nebraska**	**Nevada**
State Economic Conditions						
Log (average wage welfare workers)	0.529	0.608	0.534	0.560	0.545	0.550
	(0.233)**	(0.233)**	(0.234)**	(0.235)**	(0.234)**	(0.237)**
Log (State revenue per capita)	0.057	0.061	0.054	0.058	0.060	0.056
	(0.019)***	(0.019)***	(0.019)***	(0.019)***	(0.019)***	(0.019)***
Lagged State Unemployment Rate	-5.468	-5.218	-5.328	-5.285	-5.765	-5.529
	(1.186)***	(1.153)***	(1.171)***	(1.178)***	(1.157)***	(1.285)***
Characteristics of SNAP Caseloads						
People per household	0.446	0.434	0.484	0.457	0.484	0.450
	(0.242)*	(0.236)*	(0.243)*	(0.239)*	(0.246)*	(0.241)*
Share Earnings	-0.874	-0.895	-0.924	-0.809	-0.797	-0.779
	(0.439)*	(0.427)**	(0.460)*	(0.442)*	(0.439)*	(0.444)*
Share TANF	-0.709	-0.592	-0.674	-0.663	-0.700	-0.654
	(0.403)*	(0.369)	(0.367)*	(0.363)*	(0.363)*	(0.369)*
State Policies						
State uses BBCE	-0.075	-0.065	-0.077	-0.078	-0.070	-0.071
	(0.042)*	(0.041)	(0.041)*	(0.042)*	(0.043)	(0.042)*
State uses simplified reporting	-0.075	-0.066	-0.075	-0.070	-0.075	-0.075
	(0.038)*	(0.037)*	(0.036)**	(0.037)*	(0.037)**	(0.037)**
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.009	-0.007	-0.007	-0.009	-0.007	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
State requires fingerprinting of SNAP applicants	0.099	0.102	0.103	0.096	0.103	0.099
	(0.094)	(0.096)	(0.095)	(0.095)	(0.095)	(0.094)
State granted waiver of face-to-face interviews at initial certification	-0.051	-0.049	-0.062	-0.031	-0.044	-0.048
	(0.039)	(0.039)	(0.037)	(0.038)	(0.039)	(0.039)
Observations	**900**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.902**	**0.903**	**0.902**	**0.904**	**0.903**	**0.902**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case						
	State dropped:					
Explanatory Variables	**New Hampshire**	**New Jersey**	**New Mexico**	**New York**	**North Carolina**	**North Dakota**
State Economic Conditions						
Log (average wage welfare workers)	0.568	0.527	0.562	0.536	0.557	0.502
	(0.231)**	(0.234)**	(0.236)**	(0.236)**	(0.234)**	(0.236)**
Log (State revenue per capita)	0.058	0.061	0.058	0.065	0.058	0.056
	(0.019)***	(0.021)***	(0.020)***	(0.020)***	(0.020)***	(0.022)**
Lagged State Unemployment Rate	-5.607	-5.561	-5.231	-5.397	-5.488	-5.366
	(1.183)***	(1.178)***	(1.159)***	(1.180)***	(1.193)***	(1.219)***
Characteristics of SNAP Caseloads						
People per household	0.519	0.464	0.480	0.426	0.458	0.437
	(0.254)**	(0.242)*	(0.244)*	(0.240)*	(0.239)*	(0.244)*
Share Earnings	-0.781	-0.907	-0.867	-0.826	-0.811	-0.748
	(0.433)*	(0.439)**	(0.435)*	(0.440)*	(0.437)*	(0.452)
Share TANF	-0.689	-0.656	-0.649	-0.659	-0.669	-0.650
	(0.371)*	(0.366)*	(0.366)*	(0.366)*	(0.365)*	(0.364)*
State Policies						
State uses BBCE	-0.067	-0.071	-0.069	-0.074	-0.074	-0.071
	(0.042)	(0.042)*	(0.042)	(0.042)*	(0.042)*	(0.043)
State uses simplified reporting	-0.083	-0.073	-0.075	-0.069	-0.072	-0.075
	(0.036)**	(0.037)*	(0.037)**	(0.037)*	(0.037)*	(0.039)*
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.010	-0.010	-0.010	-0.010	-0.009	-0.008
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
State requires fingerprinting of SNAP applicants	0.098	0.091	0.093	0.141	0.097	0.097
	(0.094)	(0.094)	(0.093)	(0.106)	(0.095)	(0.095)
State granted waiver of face-to-face interviews at initial certification	-0.046	-0.049	-0.044	-0.051	-0.051	-0.037
	(0.038)	(0.039)	(0.040)	(0.039)	(0.039)	(0.040)
Observations	**900**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.903**	**0.899**	**0.903**	**0.902**	**0.902**	**0.903**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case						
	State dropped:					
Explanatory Variables	**Ohio**	**Oklahoma**	**Oregon**	**Pennsylvania**	**Rhode Island**	**South Carolina**
State Economic Conditions						
Log (average wage welfare workers)	0.546	0.568	0.600	0.544	0.574	0.509
	(0.232)**	(0.246)**	(0.231)**	(0.234)**	(0.236)**	(0.241)**
Log (State revenue per capita)	0.056	0.057	0.056	0.059	0.058	0.058
	(0.019)***	(0.019)***	(0.019)***	(0.019)***	(0.019)***	(0.020)***
Lagged State Unemployment Rate	-5.456	-5.293	-5.473	-5.438	-5.465	-5.127
	(1.178)***	(1.169)***	(1.160)***	(1.165)***	(1.188)***	(1.149)***
Characteristics of SNAP Caseloads						
People per household	0.506	0.463	0.479	0.445	0.430	0.434
	(0.238)**	(0.242)*	(0.236)**	(0.242)*	(0.244)*	(0.241)*
Share Earnings	-0.889	-0.808	-0.858	-0.776	-0.738	-0.805
	(0.427)**	(0.446)*	(0.435)*	(0.445)*	(0.435)*	(0.436)*
Share TANF	-0.690	-0.663	-0.743	-0.651	-0.638	-0.617
	(0.365)*	(0.367)*	(0.361)**	(0.363)*	(0.421)	(0.365)*
State Policies						
State uses BBCE	-0.061	-0.073	-0.063	-0.071	-0.072	-0.071
	(0.041)	(0.043)*	(0.041)	(0.042)*	(0.042)*	(0.042)*
State uses simplified reporting	-0.077	-0.070	-0.074	-0.074	-0.077	-0.070
	(0.036)**	(0.037)*	(0.037)*	(0.037)**	(0.036)**	(0.036)*
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.008	-0.009	-0.010	-0.009	-0.008	-0.011
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
State requires fingerprinting of SNAP applicants	0.104	0.099	0.097	0.100	0.102	0.094
	(0.094)	(0.093)	(0.093)	(0.094)	(0.090)	(0.095)
State granted waiver of face-to-face interviews at initial certification	-0.046	-0.046	-0.052	-0.050	-0.051	-0.057
	(0.039)	(0.039)	(0.038)	(0.039)	(0.038)	(0.038)
Observations	**900**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.905**	**0.903**	**0.905**	**0.903**	**0.903**	**0.900**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case						
	State dropped:					
Explanatory Variables	South Dakota	Tennessee	Texas	Utah	Vermont	Virginia
State Economic Conditions						
Log (average wage welfare workers)	0.593	0.522	0.529	0.468	0.542	0.551
	(0.235)**	(0.237)**	(0.233)**	(0.223)**	(0.236)**	(0.233)**
Log (State revenue per capita)	0.056	0.059	0.058	0.050	0.053	0.061
	(0.019)***	(0.020)***	(0.019)***	(0.018)***	(0.020)***	(0.021)***
Lagged State Unemployment Rate	-5.684	-5.724	-5.563	-5.793	-5.341	-5.440
	(1.166)***	(1.131)***	(1.169)***	(1.166)***	(1.179)***	(1.170)***
Characteristics of SNAP Caseloads						
People per household	0.430	0.459	0.456	0.603	0.436	0.452
	(0.240)*	(0.239)*	(0.237)*	(0.216)***	(0.239)*	(0.242)*
Share Earnings	-0.793	-0.763	-0.864	-0.895	-0.856	-0.787
	(0.437)*	(0.437)*	(0.432)*	(0.434)**	(0.438)*	(0.433)*
Share TANF	-0.620	-0.645	-0.693	-0.748	-0.658	-0.648
	(0.365)*	(0.365)*	(0.357)*	(0.360)**	(0.363)*	(0.368)*
State Policies						
State uses BBCE	-0.078	-0.060	-0.069	-0.081	-0.074	-0.074
	(0.041)*	(0.040)	(0.043)	(0.040)*	(0.042)*	(0.042)*
State uses simplified reporting	-0.059	-0.068	-0.070	-0.062	-0.074	-0.073
	(0.037)	(0.037)*	(0.037)*	(0.037)*	(0.037)**	(0.037)*
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.011	-0.010	-0.008	-0.011	-0.008	-0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
State requires fingerprinting of SNAP applicants	0.099	0.091	0.059	0.100	0.097	0.099
	(0.094)	(0.093)	(0.127)	(0.092)	(0.094)	(0.095)
State granted waiver of face-to-face interviews at initial certification	-0.050	-0.049	-0.049	-0.053	-0.056	-0.048
	(0.039)	(0.040)	(0.039)	(0.039)	(0.039)	(0.039)
Observations	**900**	**900**	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.904**	**0.902**	**0.904**	**0.906**	**0.904**	**0.901**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Exhibit A.9 Continued

Dependent Variable: Log of SNAP SAE per Case				
	State dropped:			
Explanatory Variables	**Washington**	**West Virginia**	**Wisconsin**	**Wyoming**
State Economic Conditions				
Log (average wage welfare workers)	0.521	0.559	0.564	0.440
	(0.241)**	(0.248)**	(0.233)**	(0.220)*
Log (State revenue per capita)	0.056	0.057	0.055	0.059
	(0.019)***	(0.020)***	(0.020)***	(0.020)***
Lagged State Unemployment Rate	-5.470	-5.413	-5.401	-5.497
	(1.173)***	(1.178)***	(1.167)***	(1.151)***
Characteristics of SNAP Caseloads				
People per household	0.451	0.464	0.405	0.373
	(0.240)*	(0.239)*	(0.246)	(0.228)
Share Earnings	-0.841	-0.776	-0.749	-0.582
	(0.436)*	(0.439)*	(0.428)*	(0.402)
Share TANF	-0.703	-0.692	-0.600	-0.720
	(0.360)*	(0.369)*	(0.371)	(0.351)**
State Policies				
State uses BBCE	-0.067	-0.075	-0.072	-0.059
	(0.043)	(0.042)*	(0.042)*	(0.040)
State uses simplified reporting	-0.072	-0.067	-0.072	-0.091
	(0.037)*	(0.037)*	(0.037)*	(0.034)***
Average certification period (in months) for nonearning, nonelderly SNAP units	-0.008	-0.009	-0.008	-0.010
	(0.008)	(0.008)	(0.008)	(0.008)
State requires fingerprinting of SNAP applicants	0.102	0.097	0.103	0.098
	(0.094)	(0.094)	(0.095)	(0.092)
State granted waiver of face-to-face interviews at initial certification	-0.047	-0.052	-0.045	-0.058
	(0.039)	(0.039)	(0.039)	(0.039)
Observations	**900**	**900**	**900**	**900**
Adjusted R-squared	**0.904**	**0.901**	**0.903**	**0.906**

Robust standard errors clustered at the State level in parentheses
*** p < .01, ** p < .05, * p < .1

Appendix D: Detailed Sources and Methods for Explanatory Variables

For each explanatory variable used in our statistical models, this appendix lists:

- The name of the variable
- The name(s) of the source(s) used to obtain data for the variable
- The URL(s) for these data sources
- Whether the data for the variable were reported by calendar year or by fiscal year

A summary of the steps needed to acquire the data from the source link is also included.

State Economic Conditions

1) Average Wages (Welfare Workers)
Census Bureau
https://www.census.gov/programs-surveys/apes.html
Calendar Year
"Tables"
"YYYY Government Employment and Payroll Tables"
Download "State and Local Government Employment and Payroll Data" spreadsheets

2) Average Wages (All Occupations)
Bureau of Labor Statistics (BLS)
https://www.bls.gov/oes/#databases
Calendar Year
"OES Databases" - "Tables"
Download the file for "State" in each year
Note: Data for this variable are reported in BLS' spreadsheets from 2001-2016. However, we also calculated 1999 and 2000 data for this variable using wage and employment figures for major occupations per the instructions of the BLS Occupational Employment Statistics Program.

3) Average Housing Price (State Cost of Living)
Housing and Urban Development (HUD)
https://www.fhfa.gov/DataTools/Downloads/Pages/House-Price-Index-Datasets.aspx#qpo
Calendar Year
Quarterly data, purchase-only indexes (estimated using sales price data)

4) State Unemployment Rate (Lagged) and Change in Unemployment Rate from Prior Year
BLS
https://www.bls.gov/lau/
Calendar Year
"Tables and Maps Created by BLS"
"Employment Status of the Civilian Noninstitutional Population by State"
Download the "Annual Average Series" zip file under "Statewide Data"

Note: We used this State unemployment rate data to calculate the change in the unemployment rate from year to year, as well as the lagged State unemployment (i.e., the previous year's rate of unemployment).

5) State Revenue per Capita[50]
For all States except Washington, DC:
Census Bureau
https://www.census.gov/programs-surveys/state.html
State Fiscal Year
"Data" - "Tables"
Select a year (e.g., 1999)
"YYYY Annual Survey of State Government Finances Tables"
"State Government Finances Summary Table"

For Washington, DC:
Washington, DC, Office of the Chief Financial Officer - Comprehensive Annual Financial Reports
https://cfo.dc.gov/node/292422
State Fiscal Year
The links to the reports from 2015 and 2016 are on this page
"Annual Financial Report Archives" for links to the reports from 1999 to 2014
For 1999–2002 - "Financial Section" PDF from each report
For 2003–2016 - "Basic Financial Statements" PDF from each report

State population data (for per capita calculations):
University of Kentucky National Welfare Data
http://www.ukcpr.org/data
Calendar Year
"UKCPR Welfare Data 1980-2016"
Divide the State revenue totals by the State population totals to obtain State revenue per capita.

Note: Per capita data for all States except Washington, DC, are available from 1999 to 2003. For 2004–2016, as well as 1999–2003 for Washington, DC, we calculated per capita revenue using State population data.

Characteristics of SNAP Caseloads

1) Share of SNAP Households in Rural Areas
SNAP QC Database
Mathematica Policy Research (MPR)
https://host76.mathematica-mpr.com/fns/
Federal Fiscal Year

[50] State revenue per capita was listed under State caseload characteristics in the study plan. However, because it is an indicator of differences in financial conditions across States, we have moved it to State economic conditions.

We explored using both the March Current Population Survey (CPS) from the Census Bureau and the SNAP Quality Control (QC) Database from MPR to gather data for this variable. Unfortunately, each data source has significant limitations.

The CPS datasets have very small sample sizes for SNAP recipients, particularly in the earlier portion of the 1999–2016 period. In addition, 90 non-Washington, D.C. State-Year observations have zero households in non-metropolitan areas within the 1999–2016 period. The Census Bureau confirmed that the reason for this is that the number of non-metropolitan households in those State-Years was too small to post results. For those observations of State-Years, the unidentified category of the variable contains the non-metropolitan households, but it also contains metropolitan households. Furthermore, there's no way to distinguish the number or proportion of non-metropolitan versus metropolitan households within the unidentified category.

The SNAP QC measure for rural location is partly or completely missing data for several States over the period from 1999 to 2016. Based on our tabulations of this measure, approximately 12 percent of all 918 observations in the dataset have at least one unknown case. Moreover, approximately 1 percent of all 918 observations in the dataset are 100 percent unknown for this measure.

Given the significant issues with both measures of rural household location, we opted in favor of the SNAP QC measure because it does not undercount SNAP recipients and because prior analyses of SNAP conducted for FNS have worked with and incorporated the SNAP QC variable.

2) Share of SNAP Households with Elderly Residents or Residents with Disabilities
"Supplemental Nutrition Assistance Program Quality Control Data" (SNAP QC Database)
MPR
https://host76.mathematica-mpr.com/fns/
Federal Fiscal Year
Download the zip file for the STATA date file, as well as the complete technical documentation file (PDF).
Note: Variables 3–5 below are from the same source as variable 2 (i.e., share of SNAP households with elderly residents or residents with disabilities). The source information and steps required to download these variables are the same as for variable 2.

3) Share of SNAP Households with at Least One Non-Citizen Eligible for SNAP

4) Share of SNAP Households with Earnings

5) Share of SNAP Households with TANF

6) Average People per Household
FNS
Form 388, "State Issuance and Participation Estimates"
Federal Fiscal Year

State Policy Options

1) State Uses BBCE
SNAP Policy Database
Economic Research Service (ERS)
https://www.ers.usda.gov/data-products/snap-policy-database.aspx
Federal Fiscal Year
Download the dataset in the middle of the page.
On the left side of the page, click on "Documentation." The codebook for the database is on this page.
We received an updated version of this database directly from ERS on March 26, 2018. It has since been updated on the website above.
Note: Variables 2–12 below are from the same source as variable 1 (i.e., State uses BBCE). The source information and steps required to download these variables are the same as for variable 1.

2) State Operates CAP

3) Average Certification Period (in Months) for SNAP Units with Earnings

4) Average Certification Period (in Months) for Nonearning, Nonelderly SNAP Units

5) State Requires Fingerprinting of SNAP Applicants

6) State Uses Simplified Reporting

7) State Excludes All Vehicles in the Household from the SNAP Asset Test

8) State Offers Transitional SNAP Benefits to Families Leaving the TANF or State-Funded Cash Assistance Programs

9) State Operates Call Centers

10) EBT Issuance

11) State Granted Waiver of Face-to-Face Interviews at Initial Certification

12) State Has Online Application Option

13) Waivers of ABAWD time limits (Statewide and partial)
FNS provided data on whether States had waivers in place for ABAWD time limits, either Statewide or in part of the State.

14) Share of States with Medicaid Expansion Under ACA
Kaiser Family Foundation
https://www.kff.org/health-reform/state-indicator/state-activity-around-expanding-medicaid-under-the-affordable-care-

act/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D
Calendar Year
Using the table on the page and the information in the footnotes below the table, we created a dataset containing the name of each State and its expansion year.

Other Variables

County-Administered State
FNS provided a list of the county-administered States: California, Colorado, Minnesota, New Jersey, New York, North Carolina, North Dakota, Ohio, Virginia, and Wisconsin.

Appendix E: Data Dictionary

This appendix defines the name of each variable the MSG-Urban Team used in its data analysis file. Variables are organized primarily according to their role in the statistical models and secondarily by the research question to which they apply.

Variables Used to Denote Observations or Construct Other Variables

state: Name of the State

year: Year of the observation

stateyear: The unit of analysis—a unique value for each combination of State and year in the dataset

parthouseholdsactualfinal: Participating SNAP Households (i.e., cases for SAE per case dependent variables)

dollar2016: GDP deflator index used to convert nominal monetary values to 2016 dollars

statepop: State population; used to generate State revenue per capita

Dependent Variables

rtotcosts: Reported total SAE, excluding reported total Nutrition Education costs (2016 dollars)

rtotcostcase: Reported total SAE per case (i.e., participating SNAP household [excluding Nutrition Education; 2016 dollars])

rnarrcert: Total certification-related costs (2016 dollars): sum of reported certification costs, unspecified other costs, outreach costs, new investment costs, DoD appropriation costs, and SAVE costs

rnarrcertcase: Total certification-related costs per case (2016 dollars)

rothercosts: Total other costs (2016 dollars): difference between total costs (excluding nutrition education) and certification-related costs; also equal to the sum of the following cost component totals: issuance, fraud control, ADP development, ADP operations, E&T and workfare, and miscellaneous costs (fair hearings, quality control, management evaluation, SAVE, and 10 percent State exchange)

rothercostcase: Total other costs per case (2016 dollars)

rtotfednonutri: Reported total Federal share of SAE, excluding Federal Nutrition Education costs (2016 dollars)

sharefed: Percentage of reported total SAE comprised of Federal share of SAE (excluding Nutrition Education)

rcertif: Total reported certification costs (2016 dollars)

rcertifcase: Total reported certification costs per case (2016 dollars)

runspecother: Total unspecified other costs (2016 dollars)

runspecothercase: Total unspecified other costs per case (2016 dollars)

routreach: Total outreach costs (2016 dollars)

routreachcase: Total outreach costs per case (2016 dollars)

rnewinvstmt: Total new investment costs (2016 dollars)

rnewinvstmtcase: Total new investment costs per case (2016 dollars)

radpops: Total ADP operations costs (2016 dollars)

radpdev: Total ADP development costs: sum of 50 percent, 63 percent, and 75 percent rates (2016 dollars)

radpdevcase: Total ADP development costs per case (2016 dollars)

radpdev50: Total ADP development costs, 50 percent rate (2016 dollars)

radpdev63: Total ADP development costs, 63 percent rate (2016 dollars)

radpdev75: Total ADP development costs, 75 percent rate (2016 dollars)

rfraud: Total fraud control costs: sum of 50 percent and 75 percent rates (2016 dollars)

rfraudcase: Total fraud control costs per case (2016 dollars)

rfraud50: Total fraud control costs, 50 percent rate (2016 dollars)

rfraud75: Total fraud control costs, 75 percent rate (2016 dollars)

rmisclns: Total miscellaneous costs: sum of fair hearings, quality control, management evaluation, and 100 percent State exchange (2016 dollars)

rmisclnscase: Total miscellaneous costs per case (2016 dollars)

rfairhearings: Total fair hearings costs (2016 dollars)

rqualctrl: Total quality control costs (2016 dollars)

rmgmteval: Total management evaluation costs (2016 dollars)

rsavecost: Total SAVE costs (2016 dollars)

rstateexch: Total 100 percent State exchange costs (2016 dollars)

rissuance: Total issuance costs: sum of coupon issuance costs, EBT issuance costs, indirect costs for EBT issuance systems, and EBT system start-up costs (2016 dollars)

rissuancecase: Total issuance costs per case (2016 dollars)

rcoupissue: Total coupon issuance costs (2016 dollars)

rebtissue: Total EBT issuance costs (2016 dollars)

rissueindirect: Total indirect costs for EBT issuance systems (2016 dollars)

rebtstartup: Total EBT system start-up costs (2016 dollars)

retworkfare: Total E&T and workfare costs: sum of 100 percent E&T grant costs, 50 percent match E&T administrative costs, E&T dependent care reimbursement costs, E&T transportation and other reimbursement costs, E&T ABAWD grant allocation costs, and optional workfare program costs (2016 dollars)

retworkfarecase: Total E&T and workfare costs per case (2016 dollars)

ret100: Total grant allocation costs for the E&T program (100 percent grant; 2016 dollars)

ret50: Total administrative costs for the E&T program (50 percent matching; 2016 dollars)

retdepcare: Total reimbursement costs for E&T participants' dependent care expenses (2016 dollars)

rettransp: Total reimbursement costs for E&T participants' transportation expenses and other reasonable and necessary expenses (2016 dollars)

retabawd: Total grant allocation costs for ABAWD E&T opportunities (100 percent; 2016 dollars)

roptworkfare: Total operational costs for workfare programs not included in E&T programs (2016 dollars)

rdodappr: Total SNAP funding costs, DoD Appropriations Act of 2010 (2016 dollars)

Explanatory Variables

State Economic Conditions

avgwagewelfworker: Average monthly wages for all State welfare agency employees (2016 dollars)

realannualwagesall: Average annual wages for all occupations by State (2016 dollars)

hudseasonadjusted: Average housing price (State cost of living)

unemprate: State unemployment rate

lagunemprate: Lagged State unemployment rate

unempchange: Change in State unemployment rate from prior year

realrevpercapmill: Annual State revenue per capita (2016 dollars)

Characteristics of SNAP Caseloads

shareruralqcnew: Share of SNAP households in rural areas

shareelderordisab: Share of SNAP households with either elderly residents or persons with disabilities

shareatleastonenonctzn: Share of SNAP households with at least one non-citizen eligible for SNAP

shareearnings: Share of SNAP households with earnings

sharetanf: Share of SNAP households with TANF

peopleperhousehold: Average number of people in SNAP household

State Policy Options

bbce: State uses BBCE to increase or eliminate the asset test and/or to increase the gross income limit for virtually all SNAP applicants; 1 = yes, 0 = no

cap: State operates a CAP for recipients of SSI, so that SSI recipients are able to use a streamlined SNAP application process; 1 = yes, 0 = no

certearnavg: Average certification period (months) for SNAP units with earnings

certnonearnavg: Average certification period (months) for nonearning, nonelderly SNAP units

fingerprint: State requires fingerprinting of SNAP applicants; 1 = fingerprints required either Statewide or in select parts of the State, 0 = no

reportsimple: For households with earnings, the State uses the simplified reporting option that reduces requirements for reporting changes in household circumstances; 1 = yes, 0 = no

vehexclall: State excludes all vehicles in the household from the SNAP asset test (Note: When a State removes the asset test due to its adoption of BBCE, vehexclall is assigned a value of 1.); 1 = yes, 0 = no

transben: State offers transitional SNAP benefits to families leaving the TANF or State-funded cash assistance programs; 1 = yes, 0 = no

call: State operates call centers; 1 = call centers available either Statewide or in select parts of the State, 0 = no call centers

ebtissuance: Proportion of the dollar value of all SNAP benefits that are accounted for by EBT

faceini: State has been granted a waiver to use a telephone interview in lieu of a face-to-face interview at initial certification, without having to document household hardship; 1 = waiver applies in at least part of the Stat, 0 = no waiver

oapp: State allows households to submit a SNAP application online; 1 = available either Statewide or in select parts of the State, 0 = no

ABAWD_total: State has waiver for ABAWD time limit across the entire State; 1 = yes, 0 = no

ABAWD_partial: State has waiver for ABAWD time limit in part of the State; 1 = yes, 0 = no

medicaidexp: State has expanded Medicaid under the ACA; 1 = yes, 0 = no

Payment Accuracy, Timeliness, and Program Access

combinedstateerrorrate: Combined rate of underpayment and overpayment of SNAP benefits

timeli: Timeliness (i.e., the number of cases timely processed divided by the number of cases subject to the timeliness measure)

partrate: State participation rate (i.e., the estimated percentage of people eligible for SNAP who are using it)

Other

countyadmin: SNAP administered by county governments; 1 = county governments administer SNAP, 0 = State government administers SNAP