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The Role of Food Prices, Caseload Composition, and Cost-Containment Practices

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Interstate Variation in WIC Food Package Costs

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Abstract

Food prices within States affect average monthly costs of State food benefits packages provided by the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) more than variations in WIC caseload composition do. In addition, cost-containment practices by State WIC agencies provide different levels of cost savings in different areas, which also contributes to interstate variation in benefits package costs. This study is one of the few to examine the degree to which food prices, caseloads, and cost-containment practices influence costs of State WIC food benefits packages. Because few data exist on the actual food items that WIC participants purchase, the study used a scanner dataset of supermarket transactions and other sources to estimate the average monthly cost of WIC food benefits in several areas.

Keywords: WIC program, cost-containment, food package costs, food prices, WIC foods, WIC caseloads, Special Supplemental Nutrition Program for Women, Infants, and Children.

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Contents

Introduction

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides Federal grants to States for supplemental foods, healthcare referrals, and nutrition education for low-income pregnant, breastfeeding, and nonbreastfeeding postpartum women and for infants and children at nutritional risk. The WIC program is administered by the Food and Nutrition Service (FNS) of the U.S. Department of Agriculture (USDA), which provides grants to the States. These are divided into food grants, which cover the costs of the supplemental foods, and nutrition services and administration (NSA) grants. Food grants constitute the majority of the program's overall cost, and in fiscal year 2002, grants for supplemental foods totaled $3.1 billion.

Average monthly food costs per participant varied considerably across States. In fiscal year 2002, these costs (net of rebates) for State agencies in the contiguous United States ranged from a low of $26.70 in Maine to a high of $41.43 in Connecticut.[1] Many factors likely contribute to interstate variation in food costs. Regional cost differences and other factors create regional price differences for WIC-approved foods. Infant formula manufacturers offer rebates for the exclusive right to supply infant formula for WIC programs on a State-by-State basis; the process by which manufacturers gain this right creates differences in net infant formula prices across States.[2] Seven WIC food packages, which differ in the mix of food products included and therefore in the average food package costs, are available for the various groups qualifying for WIC programs. The proportion of participants receiving the different food packages (WIC caseload composition) varies across States and likely affects the variation in average monthly food cost. States may tailor the quantity of foods offered to individuals or categories of participants for nutritional reasons, creating variations in the amount of food prescribed. A further factor in interstate cost variations may be that States differ in the mix of brands, container sizes, and types of foods available for WIC participants. Although required to follow Federal regulations, State agencies have freedom to restrict the foods that program participants are allowed to purchase. The agencies may attempt to satisfy food preferences and nutritional needs, or to restrain food costs, by adjusting the types of approved foods. Because WIC is not an entitlement program, funding depends on available appropriations. Lowering the cost of approved foods allows WIC agencies to maximize the number of applicants they can enroll.

At present, little is known about the degree to which each of these factors influences interstate variation in average monthly food costs. The associations between the variables and the costs, if better understood, may have large policy implications—for instance, for lowering WIC expenditures and serving more clients. At one extreme, all variation may result from differences in State policies (e.g., rebates or cost-containment practices). In this case, policies in low-cost States would provide key insights to high-cost States for reducing costs. At the other extreme, all variation may result from factors beyond the control of WIC administrators (e.g., food prices or caseload compositions), providing little policy guidance for reducing costs. However, because policies can affect program efficacy, understanding that high costs result from factors other than State policies can be important; high-cost States may be saved from

[1] FNS calculates State-specific per participant average monthly food costs by dividing each State's total annual WIC food expenditures by the number of WIC participants in the State, then dividing this figure by 12. Hereafter, we adopt the convention of referring to average monthly food costs. It should be understood these costs are per participant.

[2] Typically, WIC State agencies obtain significant discounts in the form of rebates from the manufacturers for each can of infant formula purchased by WIC participants. In exchange for the rebates, a manufacturer is given the exclusive right to provide its products to WIC participants in the State. The contract is awarded to the manufacturer offering the State WIC agency the lowest net price, as determined by the manufacturer's wholesale price minus the rebate.

enacting policies intended to reduce costs that instead only affect—and lower—participant satisfaction. Further, there are implications for State equity. In reality, factors both within and outside agency control likely affect interstate variation. The goal of this study was to understand the relative importance of some of these factors, including interstate differences in the effectiveness of cost-containment practices, food prices, and the mix of WIC participants (caseload compositions).

Few data exist on the actual foods WIC participants purchase and the prices they pay. Therefore, we simulated the purchase decisions of the participants. Information on food prices came from scanner data of food purchases in supermarkets in local market areas. Data on the composition of State caseloads are available from FNS. We used the Federal WIC regulations to identify the maximum quantity of food available in each of the seven food packages for WIC participants. This information allowed us to simulate State-specific average monthly food costs. By analyzing simulated food package costs, we were able to identify the relative importance of several factors that generate interstate variation in costs. Finally, we used the simulated food packages to conduct experiments for gauging the importance of State-specific cost-containment policies that restrict the food types allowed.

Research Approach

We used three pieces of information to simulate State-specific, average monthly food costs: State food prices, number of WIC participants by participant category by State, and the maximum quantity of food in WIC food packages.

Method for Simulating Food Package Costs

WIC participants can receive one of seven different food packages, each containing various combinations of WIC foods. We simulated the total monthly cost of food packages by multiplying the price of the items in the package by the per participant monthly quantities of the items allowed by Federal regulations. That is, the monthly cost ($C_{i,j}$) of package i in State j,

$$C_{i,j} = \sum_k \overline{P}_{k,j} * Q_{k,i} \qquad (1)$$

where $\overline{P}_{k,j}$ is the average price of food k in State j, and $Q_{k,i}$ is the quantity of food k allowed in food package i. The total cost in State j of package i ($STC_{i,j}$) is calculated by multiplying the cost of package i by the number of participants ($N_{i,j}$) in State j qualifying to purchase package i, or

$$STC_{i,j} = N_{i,j} * \mathrm{C}_{\mathrm{i,j}}. \qquad (2)$$

The per participant average monthly food cost in State j (AC_j) for all WIC packages is calculated by summing the $STC_{i,j}$ for all packages, and dividing by the total number of WIC participants in each State j. Letting $\frac{N_{i,j}}{\sum_i N_{i,j}}$ equal the proportion of the caseload qualifying for food package i in State j (hereafter called caseload composition ($CC_{i,j}$)), we get the following equation for simulated average monthly food costs in State j:

$$AC_j = \frac{\sum_i STC_{i,j}}{\sum_i N_{i,j}} = \frac{\sum_i (N_{i,j} * \sum_k \overline{P}_{k,j} * Q_{k,i})}{\sum_i N_{i,j}} = \sum_i (CC_{i,j} * \sum_k \overline{P}_{k,j} * Q_{k,i}). \qquad (3)$$

This simulation method requires three pieces of information, State-specific average food prices ($\overline{P}_{k,j}$), State-specific caseload compositions ($CC_{i,j}$), and the quantity of foods allowed in each food package ($Q_{k,i}$). Note also that average monthly food costs vary across States from two sources in this calculation: average food prices and the number of participants (and thus the caseload composition) qualifying for the different food packages.[3] Food quantities are held constant across States and are not a source of interstate variation in the simulated costs.

[3] We also examined whether there was significant variation over time in simulated WIC package costs. We have only 1998 State caseload data and 1997-99 price data, and since food quantities do not vary over time, time variation in simulated package costs comes only from price variation. It was clear that interstate variation in costs dominated within-State time variation, so we chose to focus on interstate variation in costs by averaging over all 3 years of price data.

Food Packages and Food Quantities

Federal regulations (7 CFR ch. 11 subpart D-Participant Benefits) specify the maximum monthly quantities of each food type for each food package. States have the option to restrict the types of foods they choose to provide their participants. We assumed each State provides, and participants then purchase, the federally mandated maximum amounts of each food.[4]

Federal regulations permit some flexibility and substitutions among approved foods. For example, the food package for children ages 1 through 4 allows for a monthly allotment of 24 quarts of milk. However, cheese may be substituted for fluid milk at the rate of 1 pound per 3 quarts, with a 4-pound maximum. In our calculations, we assumed a combination of milk and cheese were purchased.[5] Similarly, some packages stipulate that participants may receive either peanut butter or beans. For our calculations, we assumed these packages contain only peanut butter and no beans.

We detailed the per participant monthly food quantities for each of the five food packages simulated (table 1). Federal regulations stipulate two specialized food packages. With proper medical documentation, State agencies may issue women and children with special dietary needs food package 3. Food package 7 is an enhanced package for breastfeeding women and includes tuna and carrots in addition to milk or cheese, eggs, hot or cold cereals, fruit or vegetable juice, and legumes. We were not able to simulate food packages 3 and 7 because we did not have data on the proportion of a State's caseload purchasing these packages. Instead, we assume all children get food package 4 and that all women purchase either package 5 if they are pregnant or breastfeeding or package 6 if they are postpartum and not breastfeeding.

Price Data

To calculate State-specific average food prices, we used a special scanner dataset of household purchases of food items from the InfoScan Custom Store Tracking System from Information Resources, Inc. (IRI). These data record household purchases of food items at supermarkets and include price information and descriptions of the items.[6] The data include purchase transactions for about 43,000 households for 1997, 1998, and 1999, from 24 market areas. Market areas may not be representative of the entire State and do not cover all States (table 2 and fig. 1).[7]

Household members scan a card at the supermarket, and their purchase transactions are recorded at a scanner. IRI then matches household demographic information, recorded at the time households acquire their membership cards, with their purchase transactions. All transactions are recorded, but IRI sells data according to food categories.

We had data for household purchase transactions for nine categories of foods that are eligible for the WIC program according to Federal regulations:

- Fruit and vegetable juice
- Peanut butter
- Infant formula
- Baby cereal

[4] We recognize this as a strong assumption. It is likely that the quantities of foods purchased by WIC participants vary by State, undoubtedly playing a role in interstate cost variation. However, State-by-State purchase data are unavailable.

[5] We choose a substitution rate between cheese and milk to approximate FNS-reported cheese expenditures. In FY 2000, FNS reported that cheese expenditures represented 12.7 percent of the post-rebate food costs. Our method results in an all-State average expenditure share of 10.9 percent.

[6] We were not able to identify WIC-authorized vendors in these data. States impose a number of requirements on vendors that may result in different prices for WIC participants. However, if prices for WIC vendors and non-vendors are highly correlated within a State, then interstate comparisons, the focus of this report, would not be greatly affected if we were able to use prices from WIC vendors. Similarly, we were not able to examine the impact of WIC-only stores. Wic-only stores target WIC participants and provide only WIC-approved foods. They were not included in our data. Some data suggest WIC-only stores charge higher prices than other WIC vendors. And some States have more WIC vouchers redeemed through WIC-only stores than other States. Thus, Wic-only stores may contribute to interstate variation in food package costs.

[7] For example, there are no data for purchases made in rural areas, which may have higher or lower prices than in urban areas.

Table 1—WIC food packages

Food type	Food packages	
	Federal max. qty allowed	Simulated package qty
	Package 1: Infants 0 to 3 months	
Infant formula	403 oz of liquid concentrate	403 oz of liquid concentrate
	Package 2: Infants 4 to 12 months	
Infant formula	403 oz of liquid concentrate	403 oz of liquid concentrate
Infant cereal	24 oz	24 oz
Single-strength juice	92 fluid oz	92 fluid oz
	Package 3: Women and children with special needs	
	Not applicable	
	Package 4: Children 1 through 4 years	
Milk	24 qts of fluid milk	20 qts fluid milk
Eggs	30 count	30 count
Cereal	36 oz	36 oz
Peanut butter	18 oz	18 oz
Single-strength juice	276 fluid oz	276 fluid oz
Cheese	4 lbs	1.33 lbs
	Package 5: Pregnant and breastfeeding women (basic)	
Milk	28 qts of fluid milk	24 qts of fluid milk
Eggs	30 count	30 count
Cereal	36 oz	36 oz
Single-strength juice	276 oz	276 oz
Peanut butter	18 oz	18 oz
Cheese	4 lbs	1.33 lbs
	Package 6: Nonbreastfeeding postpartum women	
Milk	24 qts of fluid milk	20 qts of fluid milk
Eggs	30 count	30 count
Cereal	36 oz	36 oz
Single-strength juice	184 oz	184 oz
Cheese	4 lbs	1.33 lbs
	Package 7: Breastfeeding women (enhanced package)	
	Not applicable	

Source: Federal WIC regulations and ERS simlulations.

- Eggs
- Milk
- Cheese
- Ready-to-eat breakfast cereal
- Dried beans/peas

Because the IRI is our source for price data, we must restrict our analysis to the 3 years, 24 cities, and 17 States for which IRI scanned transactions.

Calculating Average Food Prices

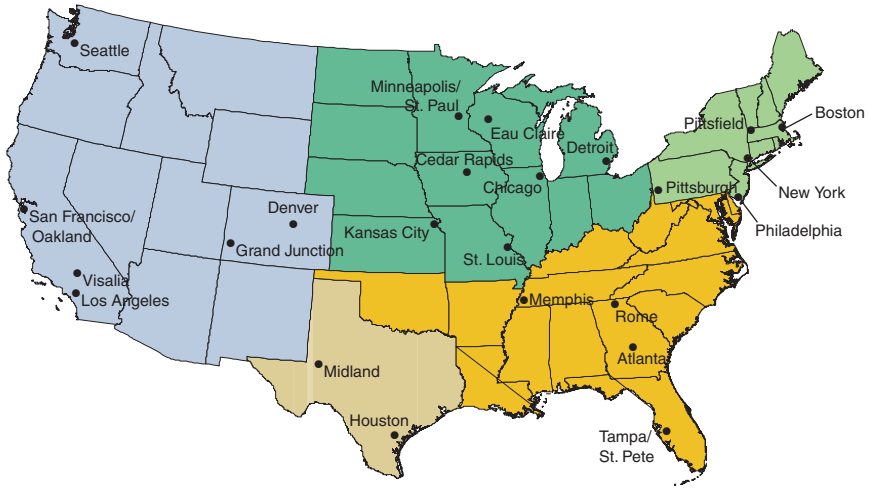
Many characteristics of foods purchased in the WIC program are left to participant choice; while general food types are dictated by Federal guidelines, individual participants have some freedom to choose the flavor, brand, and package size they prefer. State agencies frequently restrict the choice by dictating approved types (orange, apple, and grape juice), brands (e.g.,

Table 2—Market areas

State	Market areas
California	San Francisco/Oakland, Los Angeles, Visalia
Colorado	Denver, Grand Junction
Florida	Tampa/St. Petersburg
Georgia	Atlanta, Rome
Illinois	Chicago
Iowa	Cedar Rapids
Kansas	Kansas City
Massachusetts	Boston, Pittsfield
Michigan	Detroit
Minnesota	Minneapolis/St. Paul
Missouri	St. Louis
New York	New York City
Pennsylvania	Pittsburgh, Philadelphia
Tennessee	Memphis
Texas	Houston, Midland
Washington	Seattle/Tacoma
Wisconsin	Eau Claire

Figure 1

Market areas that were sources of scanner data



Source: Information Resources, Inc.

private label), and package sizes (e.g., only gallon containers of milk or 46-ounce cans of juice). While only some of these restrictions may be for cost containment, with others employed for administrative ease, we refer to all of them as cost-containment practices.

Because prices can vary by brand, flavor, and package size, interstate variation in participant preferences and cost-containment practices can be a source of interstate variation in average monthly food costs. However, we had limited information on State agency cost-containment practices and virtually no information on the actual food items, brands, and sizes purchased by WIC participants.[8] We addressed these issues by assuming all WIC participants purchase the same types, brands, and sizes of food

[8] Information on State plans is available from State agencies. We did not pursue this avenue because of the difficulty identifying practices in effect for the time period covered by our price data.

products. The effect that various cost-containment practices can have on State food package costs will be discussed.

We calculated average per unit prices (e.g., price per ounce) for food products from the available scanner dataset of food purchases. However, we wanted to avoid creating interstate variation in food prices from interstate variation in food purchases. For example, food prices can vary by package size and usually decrease on a per unit basis as package size increases. Thus, consumers in one State may purchase larger packages than consumers in another State. However, even if prices in both States are the same for identical products, when prices are averaged over all purchases the average price per unit will be lower in the State with the larger average purchase size. Similarly, interstate variation in consumer preferences for flavors, brands, and package types, along with a host of other factors, can generate interstate variation in average prices even if prices for identical products are equal. Because we wished to measure the price difference between two locations for identical products, we calculated a State-specific average price for a representative product. To minimize package-size effects, we did not include purchases of the smallest package sizes of the representative items.[9]

[9] We experimented with a variety of methods to calculate food prices. Notably, we calculated weighted average prices using brand shares as weights. Most analyses, subsequently reported in the main body of the text, were not qualitatively affected by using this method.

Defining Representative Products

For this analysis, the absolute price level of the representative item in a State (market area) is not as important as is its price relative to other States (market areas). Ideally, whether the price of the representative item in a market area is above or below the 17-State average should be invariant to the choice of the representative item for any food category. When this is true, it suggests that the price of the representative item accurately reflects the relative price of all items in the entire food category and is therefore a "good" representative for that category. Of course, this is unlikely to always be the case, as some food categories are inherently heterogeneous. For example, juice comes in many different flavors (orange, apple, grape, white grape, fruit punch, etc.), each with different prices per unit. It is not likely that the average per unit prices of all these flavors would simultaneously be above or below average in a particular market area. Nonetheless, choosing one representative item for each food category is a necessary simplification to make our analysis tractable.[10] Recognizing that the analysis can be affected by the choice of representative item, however, we present evidence that a different choice would not dramatically affect the results.

[10] Another method for calculating average prices is to calculate a weighted average price, with each brand and flavor receiving a separate weight, and with the weights held constant across States. However, not all brands are available in every State, and there is very little information by which to determine appropriate weights.

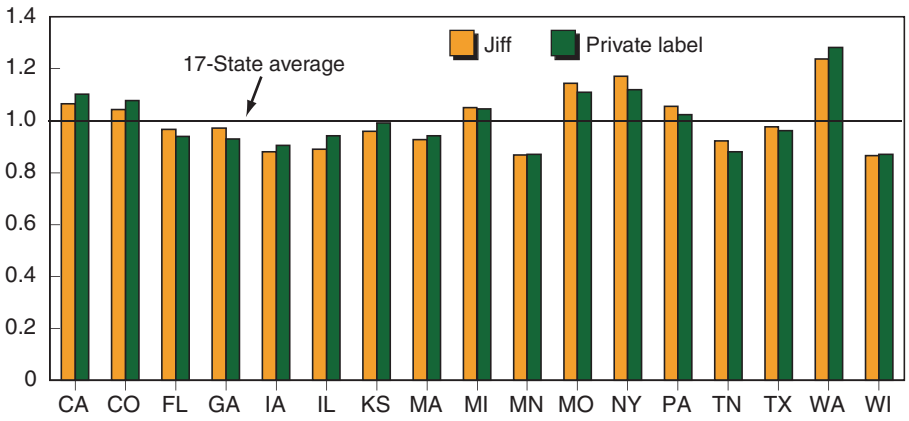
For peanut butter, private label in package sizes greater than 10 ounces is the representative item (table 3). We used the private label brand because it is widely available. Peanut butter does have branded products in all the market areas. However, it does not appear that using an alternative brand would affect our results. In figure 2, the red bar plots the price of private label peanut butter divided by the 17-State average price of peanut butter. The blue bar plots the price of Jiff, a popular brand of peanut butter, divided by its 17-State average price. A bar greater than 1 indicates a price higher than average, a bar less than 1 indicates a price lower than average, and a bar equal to 1 indicates a price equal to the average. In figure 2, the State-specific average prices of private label brands and the Jiff brand are always simultaneously above or below average.

Table 3—Representative foods

Food type	Representative item
Peanut butter	Private label greater than 10 oz
Ready-to-eat cereal	All boxes, 12 oz or larger
Milk	Unflavored one-gallon containers of fluid milk
Single-strength juice	Private label apple juice greater than 30 oz
Cheese	Private label cheddar greater than 8 oz
Infant formula	Liquid concentrate (State contract brand)
Baby cereal	Boxes of rice or oatmeal
Eggs	All brands
Dried beans	All brands

Figure 2

Private label and Jiff peanut butter prices relative to the 17-State average



Source: Appendix table 1.

The data include private label brands of ready-to-eat (RTE) cereal. However, it is not possible to distinguish types of cereals within the private label brand—for example, to distinguish between private label granola and corn flakes. There is thus little benefit to restricting the analysis to private label cereals. Instead, we included all RTE breakfast cereal in boxes 12 ounces or larger when calculating the average price of cereal. We included all brands and did not confine the analysis to low-sugar, WIC-approved cereals because our data did not include information on sugar content.

RTE cereal is a very heterogeneous product, with many brands and types whose prices vary on a per unit basis. However, it seems that choosing another representative item would affect our results only marginally. We plot the State-specific average price of all boxes 12 ounces or larger, divided by the 17-State average price (fig. 3). We also plot the State-specific average price of Cheerios, one of the most popular cereal brands, relative to its 17-State average.[11] Most of the time, the State-specific prices of the two items are jointly above or below the average (13 of 17 times).

We included all 1-gallon containers of unflavored milk to calculate the average price of milk, using an independent price survey to evaluate our choice of

[11] To determine popular brands, we calculated brand expenditure shares, which are the total expenditures for a single brand of an item divided by total expenditures for all brands of that item. We calculated brand expenditure shares for all brands of RTE cereal for each of the 17 States in the data, and Cheerios consistently had one of the largest expenditure shares.

representative product. USDA's Agricultural Marketing Service (AMS) regularly monitors milk prices in several market areas around the country. Some of these markets coincide with markets in our scanner data, and we compare the AMS average price for gallons of whole milk to the scanner data average (fig. 4).[12] AMS prices are frequently similar to the average prices from scanner data. For 6 of the 11 State price comparisons, prices are less than 5 percent apart, and for 9 of the 11 less than 15 percent apart.

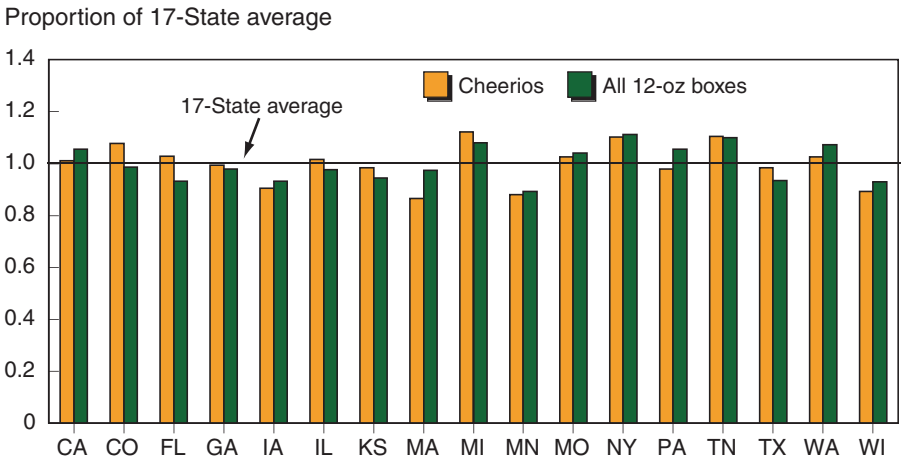
Single-strength private label apple juice (i.e., not from concentrate) in package sizes greater than 30 ounces serves as the representative product for juice. We chose the private label brand because it is widely available, and the apple flavor because it is one of the most popular flavors of juice.

Single-strength juice is another heterogeneous item, with many brands and flavors and prices that vary on a per unit basis. In our data, the three most frequently purchased flavors of juice are apple, orange, and grape. Figure 5

[12] AMS market administrators regularly survey retail milk prices for gallon containers of whole and 2-percent milk. Market administrators average the price of the leading milk brand, based on shelf space, at three locations: the largest and second-largest retailers and the largest convenience store in a market. The prices are recorded at the same stores between the 1st and 10th of each month.

Figure 3

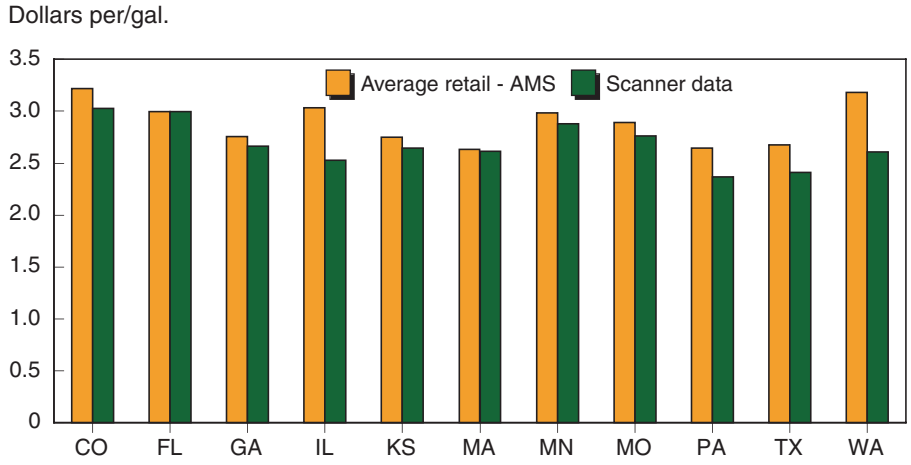
Ready-to-eat cereal prices relative to 17-State average



Source: Appendix table 2.

Figure 4

Milk prices—Agricultural Marketing Service (AMS) and scanner data



Source: Appendix table 3.

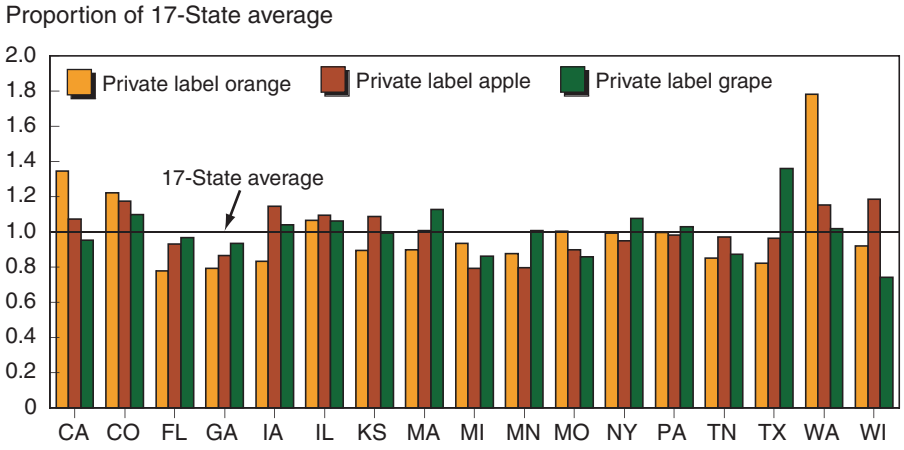
plots the average price relative to the 17-State average for the private label brands for all three of these juice flavors. Although the prices for all flavors usually move together, in several instances the price of one juice is higher (or lower) than average, while the price of at least one other flavor is lower (or higher) than average.

For cheese, we calculated a price for private label (natural) cheddar in packages greater than 8 ounces. Cheese is also a heterogeneous product, with many brands and types, and there was no clear choice for representative product. We chose cheddar because it is popular and the private label brand because it is widely available. We plot the average price of private label cheddar cheese, divided by the 17-State average price, and the average price of private label American cheese, divided by the 17-State average price of private label American cheese (fig. 6).[13] We note again

[13] Cheddar and American cheese are the two most frequently purchased cheese types in our data.

Figure 5

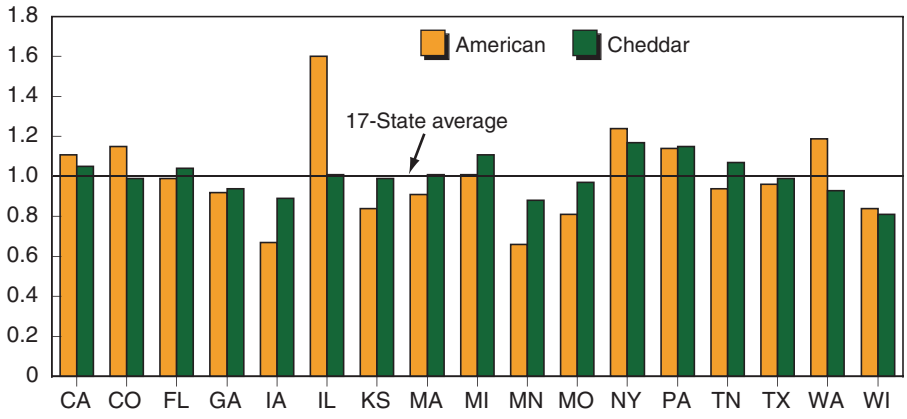
Juice prices relative to the 17-State average



Source: Appendix table 4.

Figure 6

Private label cheese price relative to the 17-State average



Source: Appendix table 5.

that the prices of the cheese types are usually in agreement, at above or below the 17-State average.

Infant formula is a case where information is available on actual WIC purchases, as WIC participants are required to buy the State-contract brand. While we were able to calculate prices for a variety of infant formula types (e.g., powder or ready-to-drink), an important factor in final WIC food package costs is the amount of rebate that WIC receives from formula manufacturers. We were able to calculate average rebates only for liquid concentrate.[14] So we assumed all formula purchases were liquid concentrate, which enabled us to examine the relative roles of interstate price and rebate differences.[15]

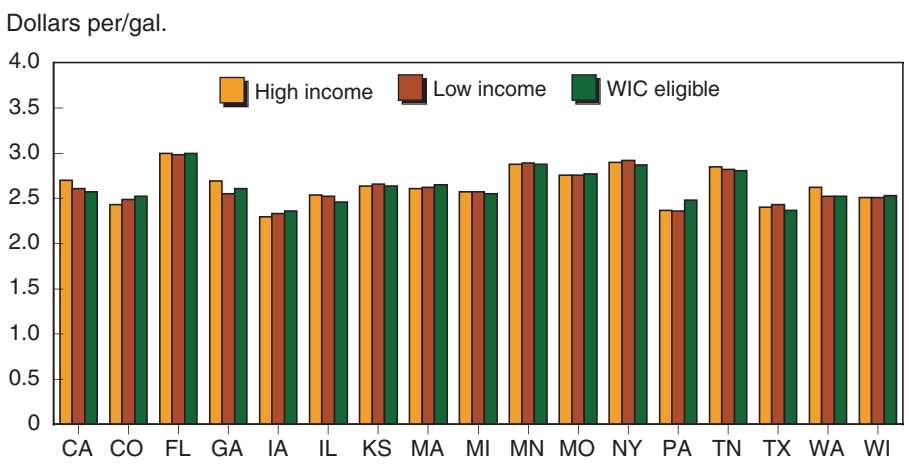
There are very few purchase transactions for private label baby cereal, so we included all brands but restricted analysis to boxes of rice or oatmeal. Eggs are a homogeneous product, and we included all brands of eggs.

Price Differences by Income Category

Participants in the WIC program are by definition low-income consumers. We examined whether low-income consumers pay different prices than those in other income categories. In most instances, they did not pay significantly lower average prices than consumers in higher income classes. As an example, we plot milk prices for three income classes of consumers (fig. 7).[16,17] Note that price varies only slightly for the different classes of households.

Because restricting the sample to low-income consumers dramatically reduced the sample of purchase transactions, and since we did not detect large average price differences for low-income or WIC-eligible households, we chose to average prices over all income classes and retain a much larger sample of observations.

Figure 7
Milk prices by income



Source: Appendix table 6.

[14] FNS reports historical rebate data only for cans of 13-ounce liquid concentrate infant formula.

[15] Liquid concentrate infant formula accounted for 27 percent of all formula sold in 2000.

[16] Households are defined as low income if the household has one member and income < $15K; two members and income < $20K; three members, and income < $25K; four or five members and income < $35K; six or seven members and income < $45K; eight members and income < $55K; nine members and income <$65K. High-income households are all households not defined as low-income, and WIC-eligible households are low-income households with children under 5 years old.

[17] In the scanner dataset, households report their appropriate income category and size. We used this information to identify purchases by households in each of the low-, middle-, and high-income categories defined above.

Caseload Composition

To simulate State food package costs, we needed data on the number of participants falling into the various WIC categories. The number of WIC participants qualifying for the various food packages are from the *Study of WIC Participant and Program Characteristics, 2000*, a biennial publication of FNS (USDA, FNS, 2000), a report that includes various measures of WIC program characteristics for 1998.

Figure 8 shows the composition of caseloads using data for the five WIC categories. Caseload composition varies across States. Each participant category qualifies for its own WIC food packages, which are differentiated by the type and/or quantity of food they contain, and so differ in cost. Therefore, differences in caseload composition can also be a source for interstate variation in average monthly food costs.

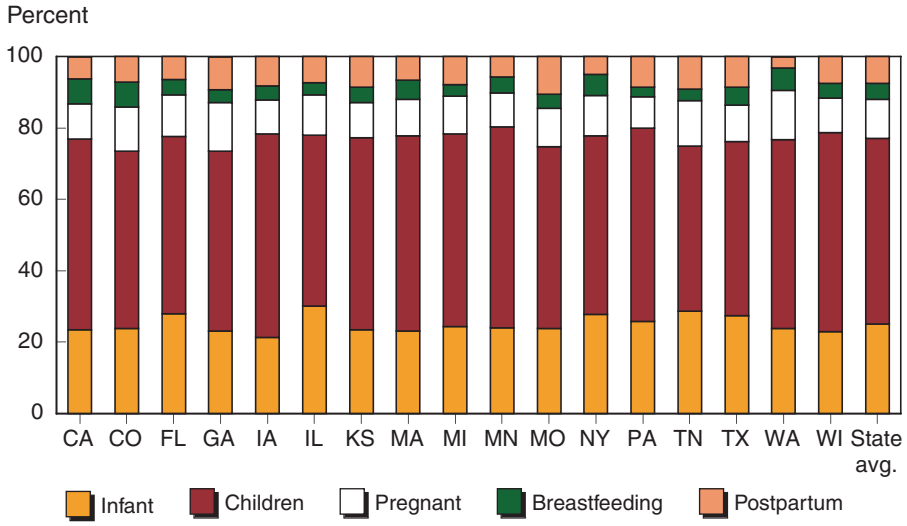
Results from Simulating Food Package Costs

We compared the simulated average monthly food costs from equation 4, along with the average for all 17 States as well as the average monthly food cost for 1997-99, calculated from food grant and participation data reported by FNS (fig. 9). FNS average monthly food costs are estimated by dividing total annual food costs by total annual participation, then dividing this figure by 12.

The simulated average costs reasonably approximate FNS average State costs (fig. 9). Most often (9 of 17 times), cost differences between simulated and FNS costs are less than 5 percent, and they are usually (12 of 17 times) less than 7.5 percent. We expected simulated costs to be higher than FNS costs because we assumed all participants purchase a full allotment of all foods and because we do not account for cost-containment practices. Simulated costs were indeed higher for 12 of 17 States; Texas, Colorado, Illinois, and Tennessee were notable instances where simulated costs are more than

Figure 8

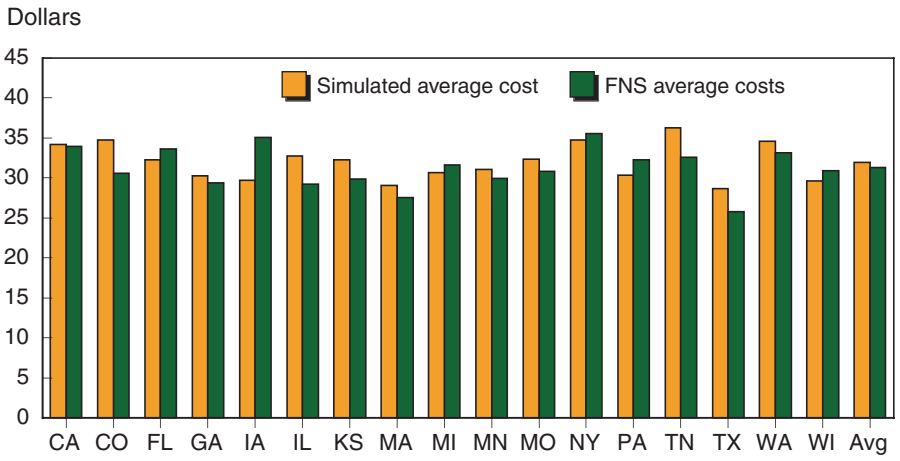
Caseload composition



Source: Appendix table 7.

Figure 9

Simulated State average cost vs. FNS average cost data



Source: Appendix table 8.

7.5 percent greater than FNS costs. For these States, our method of constructing average prices may result in a poor approximation of the prices WIC participants actually pay. Alternatively, these States may be successfully incorporating cost-containment practices to counteract price effects. In contrast, Iowa is a case where simulated costs suggest a low average package cost but where FNS costs are higher than the simulation predicted.

We did not expect exact replication of State costs because we lacked information on the actual products and quantities that WIC participants purchased and on purchases in rural or other metropolitan areas within a State, and because we did not incorporate information on State-specific cost-containment practices. Nonetheless, our simulated average costs correlated with actual costs. This correlation supports the overall methodology, suggesting that evaluating sources of cost differences in our simulated packages can offer insights into the sources of cost differences in actual WIC packages.

Decomposing Price and Participation Effects

We next sought to quantify the role of price and caseload composition differences in generating interstate variations in WIC food package costs. The method was to decompose the difference between State average costs and a comparison average cost. This difference was then decomposed into portions attributable to price and caseload differences. For each State, we decomposed the difference between average monthly food costs in State j (AC_j) and the 17-State average monthly food cost (AC_{17}) into price and caseload differences. An algebraic manipulation of the difference in simulated average costs between State j and the 17-State average results in the following relationship, which we use to decompose the difference in average monthly package costs:

$$AC_j - AC_{17} = \left[\sum_i \left\{\sum_k \overline{P}_{kj} * Q_{k,i} * (CC_{i,j} - CC_{i,17}\right\}\right] + \left[\sum_k \left\{\sum_i Q_{k,i} * CC_{i,17} * (\overline{P}_{k,j} - \overline{P}_{k,17})\right\}\right] \quad (4)$$

The term in the first set of square brackets is the difference in average cost between State *j* and the 17-State average, generated from differences in caseload composition for the *i=5* WIC food package's participants. The difference in caseload composition is weighted by State *j* prices and the quantities of the *k* foods in the *i* food packages.[18] Essentially, this portion of the equation holds food prices and quantities constant between location *j* and the 17-State average by counterfactually applying location *j* prices to calculate the 17-State average cost. It measures the effect of differences in caseload composition between *j* and the 17-State average, while holding food prices and quantities constant.

[18] Note that not all *i* participant categories qualify to purchase all *k* foods. In these cases, $Q_{k,i}$=0.

The term in the second set of square brackets is the difference in average cost between State *j* and the 17-State average, generated from differences in the prices of the *k* foods in State *j* and the 17-State average, weighted by the quantity of the *k* foods, and the 17-State average caseload compositions of the *i* groups. This portion of the equation holds caseload compositions and food quantities constant between location *j* and the 17-State average, by counterfactually applying the 17-State average caseload compositions to location *j* prices. It measures the effect of differences in prices, while holding caseload compositions and quantities constant.[19]

[19] Food quantities do not vary across States, so they are the same in State *j* and the 17-State average.

We simulated average costs for each of 17 States and a 17-State average. The 17-State average was calculated by averaging prices and participation rates over all 17 States for which we have data. Table 4 gives the results from decomposing simulated average cost differences between each of 17 States and the 17-State average. Figure 10 summarizes the data in table 4.[20] The first row of table 4 shows simulated average costs for 17 States. The second row shows the simulated 17-State average cost, and the third row gives the difference between the two. The next two blocks of rows report the results from using equation 4 to decompose the difference (row three) into portions attributable to differences in caseload compositions and prices. The greatest source of variation arises from differences in prices (table 4; fig. 10). While differences in caseload composition can generate differences in average costs, effects from price differences are, except for Kansas, larger.

[20] Recall that we approximated State package costs by using city data. In table 4 and figure 10, space limitations require that we head each column, or data point, with State rather than city abbreviations.

Most of the time the total price effect has the same sign as the individual food price effects. For example, Texas (Midland, Houston) has a total price effect of -$2.60, and six of the eight food price differences also have a negative sign, while one has no measurable price effect. In California (Los Angeles, San Francisco/Oakland, Visalia), the total price effect is $1.83, and all eight food price differences also have a positive sign. Indeed, for 16 of the 17 States, the difference between the simulated State average cost and the 17-State average cost appears to be driven mostly by the price effect. This difference suggests that some States have lower-than-average prices for most foods while others have higher-than-average prices. Low-price States have lower-than-average monthly food package costs, and high-price States have higher-than-average costs.

Variation in child caseloads generates many of the largest caseload effects. Caseload effects contribute more than $1.00 in absolute value to the total cost difference in 14 cases, nearly half of which are because caseloads of children are higher or lower than the 17-State average (in Iowa, Illinois, Minnesota, Tennessee, Texas, and Wisconsin). Notable instances of large

Table 4—Decomposing cost differences (dollars)

	CA	CO	FL	GA	IA	IL	KS	MA	MI	MN	MO	NY	PA	TN	TX	WA	WI
State	34.18	34.74	32.26	30.28	29.69	32.73	32.28	29.10	30.69	31.07	32.38	34.76	30.37	36.27	28.64	34.58	29.66
17-State	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92	31.92
diff.	2.26	2.81	0.33	-1.64	-2.23	0.81	0.36	-2.83	-1.24	-0.86	0.46	2.83	-1.55	4.35	-3.28	2.66	-2.26
From differences in caseload composition																	
Infant	-0.23	-0.18	0.46	-0.23	-0.43	1.10	-0.25	-0.12	-0.08	-0.16	-0.20	0.47	0.13	1.08	0.25	-0.18	-0.28
Child	0.56	-0.93	-0.87	-0.60	1.67	-1.61	0.64	0.93	0.66	1.45	-0.48	-0.77	0.73	-2.23	-1.21	0.32	1.24
Preg.	-0.49	0.60	0.26	1.03	-0.48	0.13	-0.44	-0.28	-0.07	-0.52	-0.05	0.16	-0.84	0.75	-0.24	1.21	-0.46
BF	1.02	1.04	-0.10	-0.36	-0.27	-0.47	-0.13	0.31	-0.54	-0.07	-0.22	0.57	-0.69	-0.57	0.16	0.75	-0.14
PP	-0.43	-0.08	-0.33	0.59	0.26	-0.01	0.41	-0.24	0.13	-0.51	1.03	-0.89	0.35	0.61	0.36	-1.48	0.02
Total	0.43	0.45	-0.58	0.43	0.74	-0.85	0.23	0.60	0.10	0.19	0.08	-0.47	-0.32	-0.36	-0.69	0.62	0.37
From differences in prices																	
Formula	1.38	-0.28	-1.49	-0.72	-0.33	2.37	-0.51	-1.79	-0.03	0.88	-2.35	0.84	-0.89	2.87	-0.71	0.61	0.16
Rebate	1.47	-0.07	-1.75	0.11	0.63	0.94	-0.63	0.45	0.72	0.31	-2.91	0.39	-0.68	-0.78	0.66	0.60	0.53
BCereal	0.02	0.00	-0.06	-0.04	0.04	0.01	0.02	-0.05	0.01	-0.02	0.04	0.06	-0.01	0.05	-0.03	-0.03	-0.01
Cereal	0.32	-0.06	-0.34	-0.10	-0.34	-0.10	-0.28	-0.42	0.44	-0.56	0.23	0.62	0.32	0.55	-0.33	0.41	-0.36
Juice	0.42	1.06	-0.25	-0.81	0.63	0.52	0.52	-0.49	-1.24	-0.84	-0.54	-0.14	-0.31	-0.14	0.31	1.38	-0.08
Milk	0.03	1.44	1.28	-0.01	-1.40	-0.53	-0.07	-0.20	-0.37	0.84	0.38	0.91	-1.16	0.69	-1.00	-0.22	-0.61
Cheese	0.19	-0.01	0.15	-0.18	-0.36	0.05	-0.02	-0.34	0.41	-0.38	-0.07	0.61	0.55	0.28	0.00	-0.23	-0.65
Eggs	0.84	0.03	-0.10	-0.10	-0.54	0.33	-0.22	0.55	0.06	-0.51	-0.14	0.65	-0.42	-0.27	-0.14	0.41	-0.42
PB	0.12	0.12	-0.03	-0.02	-0.03	-0.04	0.06	-0.25	0.11	-0.12	-0.08	0.13	0.01	-0.10	-0.05	0.30	-0.12
Total	1.83	2.37	0.91	-2.07	-2.97	1.66	0.12	-3.43	-1.34	-1.04	0.38	3.30	-1.22	4.71	-2.60	2.04	-2.64

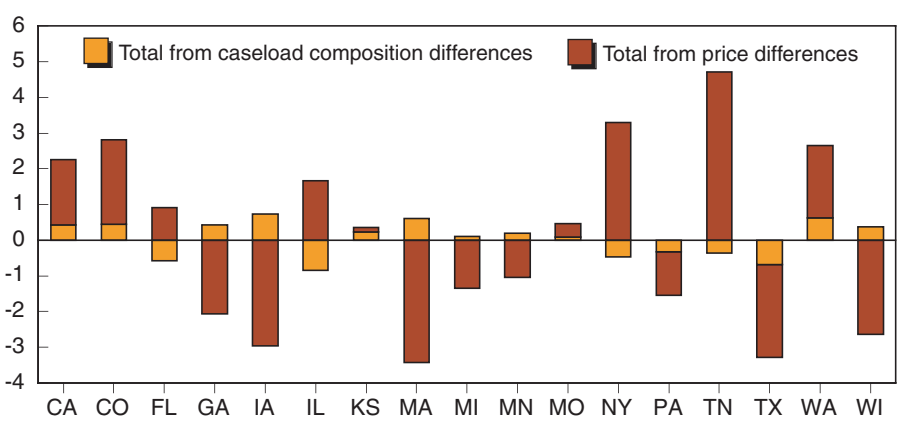
Infant = Infants 0 through 12 months; Child=Children 1 through 4 years; Preg=Pregnant women; BF=Breastfeeding women; PP=Nonbreastfeeding postpartum women; Formula=Infant formula; Rebate=Infant formula rebate; BCereal=Baby cereal; Cereal=Ready-to-eat cereal; PB=Peanut butter.

California=San Francisco/Oakland, Los Angeles, Visalia; Colorado=Denver, Grand Junction; Florida=Tampa/St. Petersburg; Georgia=Atlanta, Rome; Iowa=Cedar Rapids; Illinois=Chicago; Kansas=Kansas City; Massachusetts=Boston, Pittsfield; Michigan=Detroit; Minnesota=Minneapolis/St. Paul; Missouri=St. Louis; New York=New York City Pennsylvania=Pittsburgh, Philadelphia; Tennessee=Memphis; Texas=Houston, Midland; Washington=Seattle/Tacoma; Wisconsin=Eau Claire.

Sources: Rebate data: USDA, FNS. *WIC Program Infant Formula Rebate Contract Summary* (various report dates); all other data: ERS calculation from WIC cost simulations.

Figure 10

Cost differences from price and caseload effects



Source: Table 4.

caseload effects include lower-than-average caseloads of children in Tennessee and higher-than-average caseloads of children in Iowa. Tennessee has a child caseload of 46.30 percent (appendix table 7), 5.79 percent below the 17-Stage average, reducing the cost difference between Tennessee and the 17-State average by $2.23. In contrast, Iowa has a child caseload of 56.90 percent (appendix table 7), 4.81 percent above the 17-State average, increasing the cost difference between Iowa and the 17-State average by $1.67.

Differences in infant formula rebates sometimes reinforce, and sometimes counteract, differences in infant formula prices. Because rebates have an offsetting effect on the formula prices, we need to subtract the difference in formula rebates from the difference in formula prices. For instance, formula prices are lower than average in Texas (Houston, Midland), which translates into a $0.71 lower package cost in Texas than the 17-State average. However, the average rebate in Texas is also larger than the 17-State average, and so the difference in rebates contributes another $0.66 to lowering the package cost in Texas relative to the 17-State average. The total cost-reducing effect of lower formula prices and higher formula rebates in Texas is -$1.37 (-$0.71 - $0.66).

Price effects in Illinois (Chicago), Tennessee (Memphis), and Massachusetts (Boston, Pittsfield) are largely driven by net formula prices (price difference minus rebate difference). The net formula price effect in Illinois is $1.43 ($2.37 - $0.94), resulting largely from a much-higher-than-average formula price in the State. The average price of a 13-ounce can of infant formula is $3.13 in Illinois, vs. the 17-State average of $2.82. The net formula price effect in Tennessee is $3.65, resulting from a much-higher-than-average formula price ($3.19). The net formula price effect in Massachusetts is -$2.23, resulting largely from a lower-than-average formula price of $2.59.

In 10 of the 17 States, price effects go in the opposite direction of caseload effects, suggesting that some high-price States are servicing caseloads that counteract the cost-increasing effect of higher prices (fig. 10). In contrast, some low-price States are servicing caseloads that counteract the cost-decreasing effect of lower prices.

Cost-Containment Practices

State WIC agencies frequently impose restrictions on product types, flavors, or package sizes in order to reduce food costs, make efficient use of available funds, and accommodate more participants. Analysis to this point has emphasized that price differences among States for the same food products can play an important role in generating differences in average monthly food costs. An analysis of cost-containment practices, including a comparison of the magnitude of the restrictions across States, will suggest the role of cost-containment practices in creating interstate package cost variation.

Our method for evaluating these practices was similar to our method for simulating and comparing average monthly food costs. However, now we wished to estimate the effect of a specific practice. We began by calculating an unrestricted State average monthly food cost in State j (AC_j^U). We then determined average item prices with minimal restrictions on product brands, sizes, or types and constructed the equation[21]

$$AC_j^U = \frac{\sum_i (N_{i,j} * \sum_k Q_{i,k} * \overline{P_{j,k}^U})}{\sum_i N_{i,j}} \quad (5)$$

in which $\overline{P_{j,k}^U}$ is the average price of food k in State j, calculated without product restrictions, $N_{i,j}$ is the number of participants, and $Q_{i,k}$ is the quantity of food.

We next calculated average monthly package costs after imposing a single restriction, expressing the State average monthly food cost as AC^R_j:

$$AC_j^R = \frac{\sum_i (N_{i,j} * \sum_k Q_{i,k} * \overline{P_{j,k}^R})}{\sum_i N_{i,j}} \quad (6)$$

where $\overline{P_{j,k}^R}$ is the average price of food k in State j, calculated with a single restriction imposed.

The effect of the restriction is measured as the difference between the unrestricted and the restricted average monthly food costs:

$$Savings_j = AC_j^U - AC_j^R. \quad (7)$$

An example may clarify our method. Suppose we wish to measure the effect of restricting WIC participants to gallon containers of milk. In this case, we would calculate the unrestricted average monthly food cost by calculating an average milk price based on the distribution of all brands and package sizes purchased by consumers in our data. The restricted average monthly food cost is calculated by restricting the products included in the price calculation to 1-gallon containers (that is, we do not include purchases of pints, quarts, or half-gallons).

[21] We did impose some minor restrictions in an attempt to eliminate product types unlikely to be approved for WIC participants. For example, we did not include flavored milk products even when calculating the unrestricted milk price, and did not include shredded or "string" cheese when calculating the unrestricted cheese price.

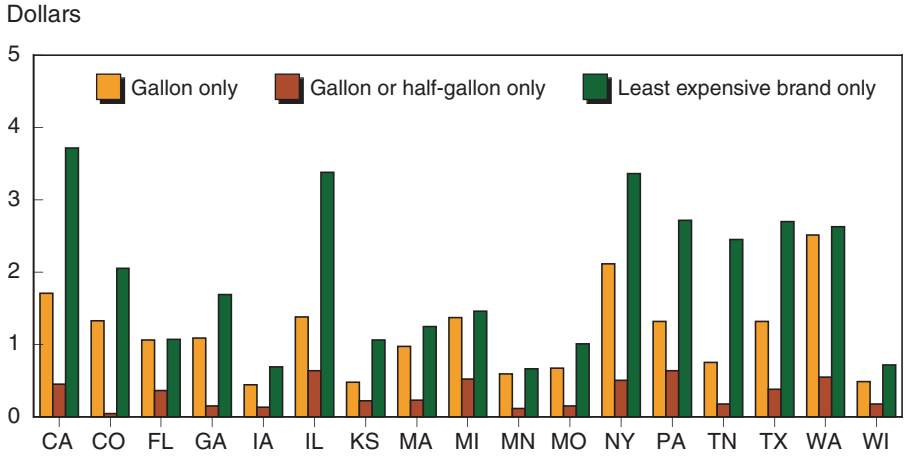
Milk

States frequently impose one or more of three types of restrictions on milk purchases (Kirlin and Cole, 2001, p. 12; Kirlin, Cole, and Logan, 2003a, p. 34). Some States require participants to buy gallon containers and others restrict the choice to gallon or half-gallons, while still other States require the least expensive brand of milk. We therefore restrict milk purchases to one brand per State (the brand with the lowest average price for the 3 years for which we have data) and one size (1-gallon). The final savings assumes that the least expensive brand is the same for all WIC participants and that all WIC participants have access to the least expensive brand.

Figure 11 presents the results from these calculations. Cost savings arise from changes in the average price as container sizes or brands included in the calculation of the average price change. The magnitude of the cost savings across States is also affected by the weight placed on the average price, which varies across States as WIC caseload compositions vary,[22] and by the degree to which purchases are constrained by the restriction. For example, if most consumers were already purchasing gallon containers before the restriction was imposed, then the restriction would not result in large cost savings, even if the per unit price reduction between the average gallon price and the average price of other containers is large. The same cost-containment practice has different effects across States (fig. 11). Thus, a restriction can result in interstate differences in overall average monthly food costs.

The savings from allowing both gallon or half-gallon containers are modest ($0.32 per month, on average, or about 0.9 percent of the unrestricted average monthly food cost), compared with restricting purchases to only gallon-sized containers ($1.15 per month, on average, or about 3.08 percent of the unrestricted average monthly food cost).[23] Restricting purchases to the least expensive brand results in the largest reduction in cost—$1.92 per month, on average, or about 5.13 percent of the unrestricted average monthly food cost. This last figure must be considered guardedly, because it assumes the least expensive brand is available to all milk-consuming WIC participants.

Figure 11
Monthly savings from milk-container restrictions



Source: Appendix table 9.

[22] Average prices also vary because the distribution of brands and package sizes varies across States. We assume this represents interstate variation in consumer preferences and that given the opportunity, WIC participants would purchase brands and sizes in accord with the households in our scanner dataset.

[23] Note that our method assumes that participants buy combinations of gallon and half-gallon containers in the same proportions as the consumers in the scanner dataset. We did not assume, for example, that given the opportunity to purchase half-gallons, WIC participants would purchase only 10 half-gallon containers.

Peanut Butter

We examined the effects of three cost-containment practices commonly used to reduce the cost of peanut butter: restricting purchases to 18-ounce containers (Kirlin and Cole, 2001, p. 12), restricting purchases to private label brands,[24] and substituting beans for peanut butter (allowed by most States in response to participant preferences). We calculated the change in average monthly food cost from buying 16 ounces of beans instead of 18 ounces of peanut butter.

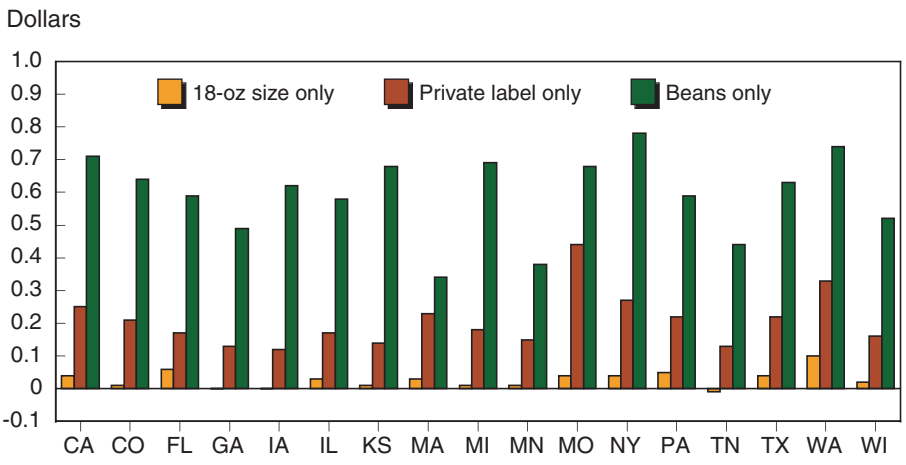
Restricting peanut butter purchases to 18-ounce containers results in modest cost reductions (less than 1-percent savings, on average), with little interstate variation in cost reductions (fig. 12). Average monthly cost reductions are somewhat larger when purchases are restricted to private label brands ($0.21 per month, on average, or about 0.56 percent of the unrestricted average monthly food cost). The cost savings from replacing peanut butter with beans are larger (about 1.6 percent of the unrestricted average monthly food cost), but the effect is relatively minor compared to, say, some of the effects of milk restrictions.

Cheese

We examined the effect of restricting cheese package sizes to 8 ounces or larger (Kirlin and Cole, 2001, p. 12). Some States require the purchase of the least expensive brand of cheese available. In our data on cheese transactions, very-low-priced brands frequently are available, but very small quantities are transacted at these low prices. Thus, it does not seem reasonable to let these items approximate the least expensive brand of cheese generally available to WIC participants (or consumers). Instead of using these sparse data to represent the lowest cost brand, we used the price for private label brands.

Restricting cheese purchases to package sizes of 8 ounces or larger has a small savings effect on WIC package costs—$0.26 per month, on average, less than 1 percent of the unrestricted average monthly food cost (fig. 13). The most significant effect of package-size restrictions is found in Missouri, where this restriction could save 1.59 percent of the unrestricted average

Figure 12
Monthly savings from peanut restrictions

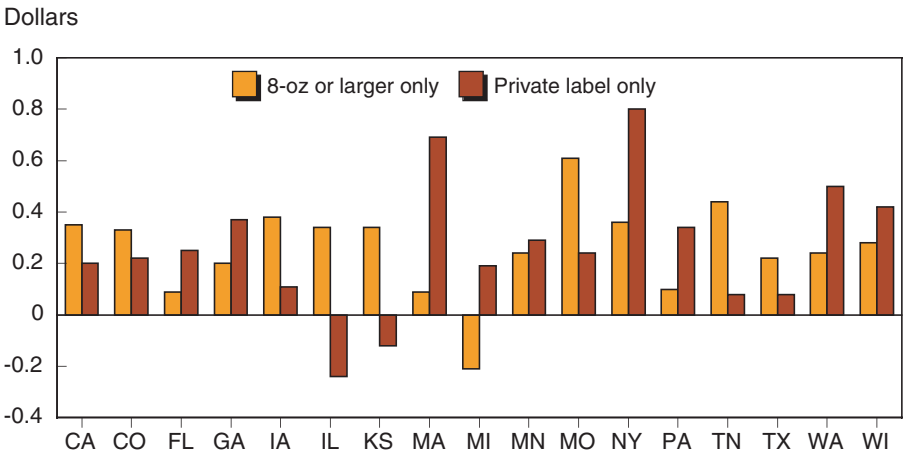


Source: Appendix table 10.

[24] Kirlin, Cole, and Logan (2003a, p. 23) report that negative participant reactions to the "least expensive brand" restriction on peanut butter led Oklahoma and Texas to drop these restrictions. Assuming that participants may have a similar reaction to a private label restriction on peanut butter, our analysis on this restriction may not be realistic for some States. However, we include the analysis because it is informative to know the potential cost savings sacrificed when such restrictions are foregone.

Figure 13

Monthly savings from cheese restrictions



Source: Appendix table 11.

monthly food cost in the State. The private label restriction would also save about 0.7 percent of the unrestricted WIC package cost, on average. In this case, the largest savings occurred in Massachusetts (1.99 percent) and New York (1.8 percent). Again, the variation in savings among States suggests that purchasing patterns, product assortment and variety, and average food prices differ significantly across markets.

Juice

We examined the effects of five restrictions on juice purchases. Four were based on common cost-containment practices (Kirlin, Cole, and Logan, 2003a, p. 35), while the fifth is included for information. We evaluated the cost-reducing effect of restricting fluid purchases to 46-ounce cans, to 64-ounce plastic bottles, and to 128-ounce plastic bottles.[25] We also examined the effect of restricting purchases to private label brands without container-size restrictions, and of frozen concentrate.

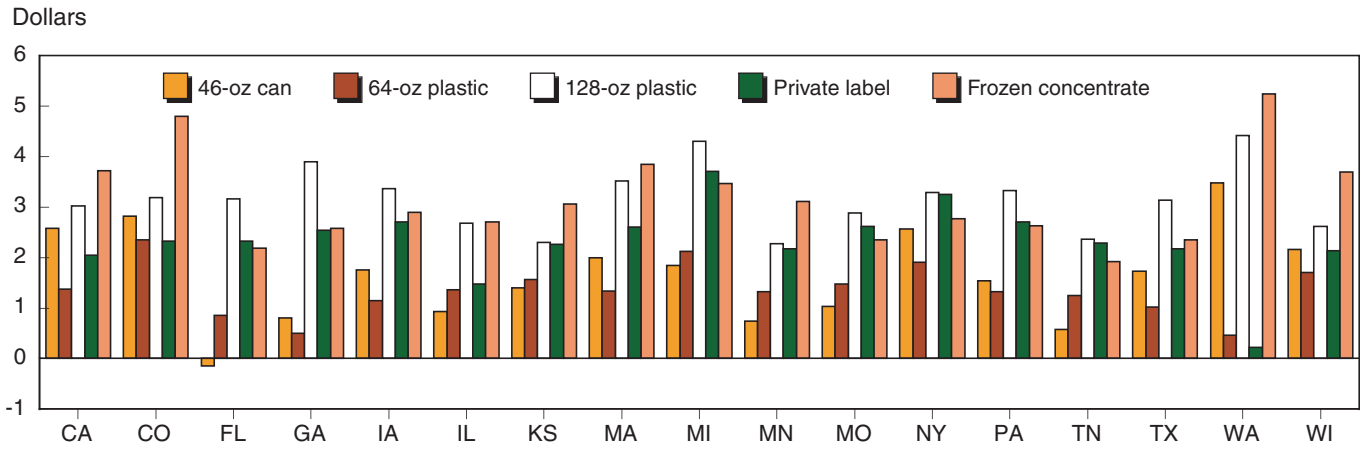
The maximum allotment of fluid single-strength juice is 276 ounces for adults and children (184 ounces for postpartum, nonbreastfeeding women) and 92 ounces for infants. Although this allotment is not evenly divisible by 64 or 128, we assume that a full 276-, 184-, or 92-ounce allotment is purchased under these two restrictions. The maximum allotment of reconstituted frozen concentrate is 288 ounces for adults and 96 ounces for infants. When analyzing the effect of requiring only frozen concentrate, we calculated the simulated restricted package, assuming that 276 ounces of adult juice (184 ounces for postpartum women), or 92 ounces of infant juice, were purchased.

The different restrictions result in a great deal of heterogeneity in State savings (fig. 14). In each State we examined, we found the cost reductions from restricting purchases to 128-ounce plastic bottles to be larger than from restricting to 64-ounce plastic bottles or 46-ounce cans. On average, restricting purchases to 128-ounce containers and frozen concentrate provide approximately the same cost savings. The restriction to 128-ounce bottles saves about 8.5 percent of the unrestricted average monthly food costs, and the frozen concentrate saves about 8.4 percent. In many cases the

[25] We are not aware of any State that restricts juice purchases to 128-oz containers, but include this analysis for informational purposes.

Figure 14

Monthly savings from juice restrictions



Source: Appendix table 12.

cost reductions from restricting to 64-ounce containers are larger than those from restricting to 46-ounce cans, but on average the 46-ounce can restriction provides the larger cost savings. The 46-ounce can restriction saves about 4.4 percent on average, while the 64-ounce restriction saves about 3.65 percent on average. Cost savings from the private label restriction are about 6.2 percent of the unrestricted average monthly food cost.

The savings from restricting purchases to frozen concentrate are somewhat overstated because buying frozen concentrate allows 12 more ounces of adult juice and 4 more ounces of infant juice to be purchased (fig. 14). These quantity effects are not accounted for in our analysis.

Breakfast Cereal

We examined the impact of restricting purchases of breakfast cereal to 12-ounce-or-larger boxes and to only private label brands.[26] The cost reductions from the size restriction are fairly modest, $0.17 per month, on average, or about 0.4 percent of the unrestricted average monthly food cost (fig. 15). Restricting purchases to private label brands, however, significantly reduces the cost—$1.89 per month, on average, or about 5 percent of the unrestricted average monthly food cost. This restriction provides the largest savings in Massachusetts (6.2 percent), Michigan (6.1 percent), and Missouri (6.1 percent).

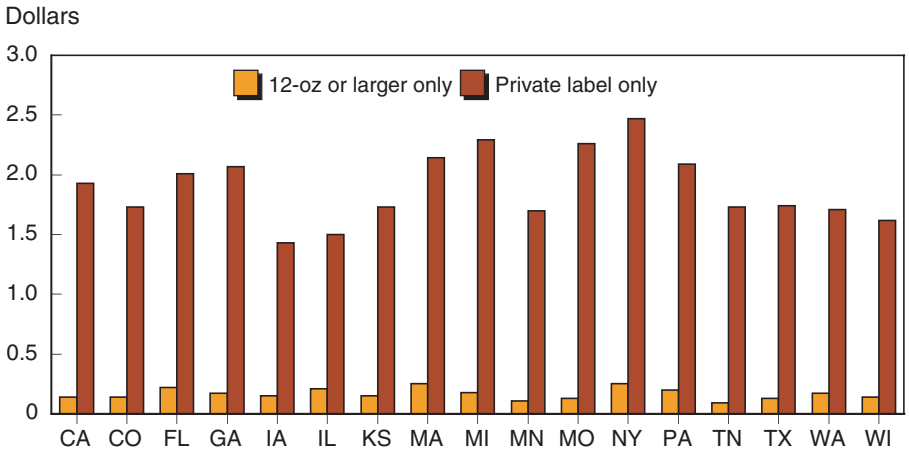
[26] In our data, we cannot otherwise distinguish private label breakfast cereal. That is, we cannot distinguish between, say, private label bran flakes, and private label raisin bran. Thus, the private label average price reflects a distribution of private label cereals, but we do not know the content of that distribution.

Eggs

Our scanner dataset did not provide product-type information on eggs that would allow us to examine many of the product restrictions commonly used. For example, States frequently restrict egg purchases to a particular size (medium, large, etc.) or color (white), which our data did not include as product descriptions. However, the data did include a descriptor of container size. Since we assumed an allotment of 30 eggs per package, we could examine the cost implications of restricting purchases to 18- and 12-pack containers (i.e., to one package of each). On average, this restriction saves about $0.13, or 0.34 percent of the WIC monthly package cost (fig. 16). A

Figure 15

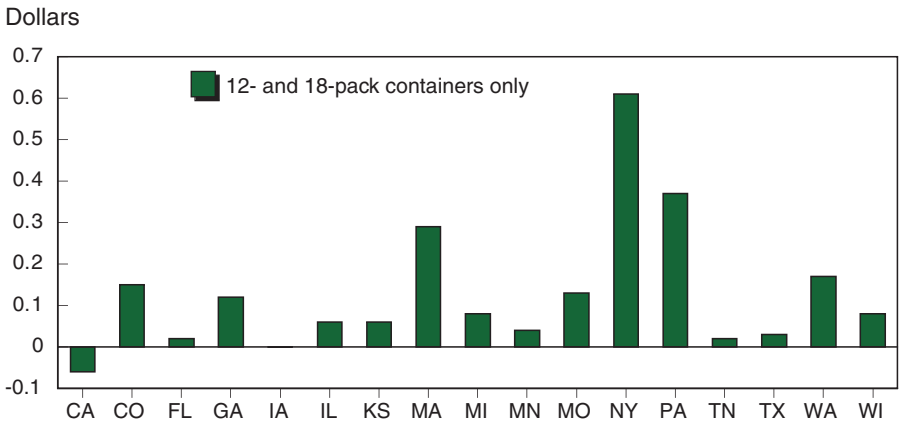
Monthly savings from ready-to-eat cereal restrictions



Source: Appendix table 13.

Figure 16

Average monthly savings from restricting egg-container sizes



Source: Appendix table 14.

notable exception to this small savings is seen in Massachusetts, Pennsylvania, and New York, where savings from egg package-size restrictions would save 0.84 percent, 1 percent, and 1.43 percent, respectively, of the unrestricted average cost.

To summarize, our analysis suggests that different States imposing the same cost-containment practice can create interstate variations in average monthly food costs. This will result if:

- the cost-containment practice reduces the average per unit price of the item restricted by different amounts in different States,
- the cost-containment practice affects participant purchase patterns differently in different States, and
- participant caseloads affected by the cost-containment practice are different in different States.

Furthermore, analysis of simulated food costs suggests interstate variation in the magnitude of cost savings can be quite large.[27]

[27] It is important to note that our simulations do not examine the effect of cost-containment practices on aspects of program participation. Cost-containment practices may decrease program participation or may cause under-redemption of food vouchers, providing even larger cost savings than are alluded to here. However, these cost savings come at the expense of program efficacy because fewer people are served.

A Case Study of California and Texas Cost-Containment Practices

We relied on an earlier report, "Assessment of WIC Cost-Containment Practices: Final Report" (Kirlin, Cole, and Logan, 2003a) for information on individual State cost-containment practices. This study examined in detail the cost-containment practices of six States, California, Connecticut, North Carolina, Ohio, Oklahoma, and Texas. Our scanner data contained price information for Texas and California, which allowed us to model the role of cost-containment practices in generating interstate cost variation between these two States. However, remember that the scanner data are for market areas within the State and are not representative of the entire State.

Table 3-1 in chapter three of the report details the WIC foods in Texas and California, approved by WIC State agencies in January 2001. Table 5 lists the approved foods that we were able to identify in the scanner data. We engaged in three separate exercises to gauge the effect of cost-containment practices:

(1) First, we used our scanner data to calculate State-level average prices for foods allowed in Texas and California, using each State's own cost-containment practices. For example, we calculated the average price of milk in California from the purchases of California's WIC-approved milk products, that is, of all brands of gallon containers of white milk and half-gallon containers of Lactaid. In Texas, we calculated the average price of milk using purchases of private label, gallon or half-gallon containers of white milk, and purchases of quart and half-gallon containers of Dairy Ease and Lactaid.

(2) Next we calculated an average price in a State for the products allowed under the other State's cost-containment practices; thus, we calculated the average price in Texas using foods allowed under California's cost-containment practices.

(3) Finally, we calculated the average price in California using products approved under the Texas cost-containment practices.

To demonstrate the effect of imposing various restrictions on average item prices, table 6 reports the average prices calculated from our data, including the average rebate for 13 ounces of infant formula and the price for 13 ounces of liquid concentrate formula, 16 ounces of baby cereal, 18 ounces of ready-to-eat cereal, 64 ounces of juice, 128 ounces of milk, one dozen eggs, 18 ounces of peanut butter, and 16 ounces of cheese.

In table 6, the column for CA indicates the average price of the products after we imposed California's restrictions, and the column for TX shows the average price of products after we imposed the product restrictions in Texas. Comparing column CA with column TX reveals that in all cases products in California have higher average prices than in Texas.

Table 5—Approved WIC foods in California and Texas

	California	Texas
	Fluid Milk	
Brand	Any	Least expensive (private label)
Package size	Gallons only	Gallon or half gallon
Flavor	White only	White only
Type	Lactose-reduced/free- Half-gallon Lactaid	Lactaid or Dairy Ease- Quart or half gallon
	Cheese	
Brand	Any	Any
Type/flavor	American, Cheddar, Monterey Jack, Mozzarella	American, Cheddar, Monterey Jack, Mozzarella, Colby, Colby-Jack
Package size	12 oz or larger, block or round, Deli-sliced	10 oz or larger, block or slices
Not allowed	Wrapped slices, shredded, string	Wrapped slices, shredded
	Eggs	
Brand	Any	Any
Not allowed		6- or 18-packs
	Infant Cereal	
Brand	Gerber	Gerber
Type/flavor	Rice, oatmeal, barley-mixed	Rice, oatmeal, barley-mixed
Package size	8 oz	8 or 16 oz
Not allowed	Cereal with fruit	Cereal with fruit
	Juice	
Brand	Campbell's, Dole, Minute Maid, Seneca, Tree Top, Private label	Least expensive of private label, Seneca, Tree Top, Welch's
Type	Apple, grape, orange, pineapple, white grape, vegetable	Apple, grape, orange, pineapple, white grape, grapefruit, orange-pineapple, vegetable
Package size	64-oz plastic	46-oz can

Continued—

Table 5—Approved WIC foods in California and Texas–Continued

	California	Texas
	Peanut Butter	
Brand	Any	Any
Package size	16 or 18 oz	18 oz
	RTE Cereal	
Package size	12 oz or larger	Product-specific
General Mills	Cheerios, Wheat Chex, Kix	Cheerios, Wheat Chex, Country Corn Flakes, Kix, Para Su Familia Cinnamon Corn Stars, Raisin Bran, Total
Kellogg's	Corn Flakes	Corn Flakes, Frosted Mini-Wheats
Malt-o-Meal		Toasty O's
Post	Bran Flakes	Bran Flakes Grape Nuts
Quaker	Crunchy Corn Bran	King Vitamin Life
Private label	All	13, 13.5, or 15 oz only

Source: Table 3-1 in Kirlin, Cole and Logan, 2003a.

Table 6—Average prices

Product	CA	CA with TX practices	TX	TX with CA practices
		Dollars		
Liquid concentrate	3.00	3.00	2.73	2.73
Rebate	2.66	2.66	2.55	2.55
16-oz box baby cereal	2.83	2.82	2.62	2.61
18-oz box RTE cereal	3.38	3.55	3.27	2.94
Half-gallon of juice	2.86	2.13	1.87	2.44
Gallon of milk	2.80	2.44	2.32	2.47
Dozen eggs	1.69	1.68	1.10	1.08
18 oz peanut butter	2.37	2.24	1.97	2.02
Pound of cheese	3.58	3.65	3.32	3.06

Source: ERS simulations from IRI scanner data.

The second exercise imposes Texas cost-containment practices on California products and then recalculates California average product prices. The column headed "CA with TX practices" reports the effect on average prices from this experiment. We see that while prices are usually lower in Texas for all products (column CA vs. column TX), imposing Texas practices on California products does not reduce average California prices to Texas levels. In some cases, prices rise in California when Texas practices are imposed.

The final exercise examines what happens if California practices are applied to Texas products. The final column headed "TX with CA practices" reports the effect on average prices from this experiment. We see that applying California practices does not increase Texas prices to California levels; in some cases imposing California restrictions decreases average prices. The key insight from these analyses is that price differences exist between California and Texas and that cost-containment practices do not erase the differences.

Another question is what effect cost-containment practices have on average package costs. Table 7 presents the results from using equation 3 to simulate average monthly package costs, using the prices in table 6. We see that a substantial difference exists between CA and TX prices even under different scenarios, reinforcing the notion that price differences play a predominant role in generating interstate average cost differences. The difference is $9.56 when we impose each State's own restrictions. However, a $7.88 difference remains even when Texas counterfactually imposes California practices, as the average cost in Texas rises $1.68. We also see that the average cost in California falls to $34.15 when California counterfactually imposes Texas practices, as the monthly average cost in CA decreases $3.75.

We next followed the procedure detailed in the first section of this report and decomposed the difference in monthly average food costs between California and Texas under various cost-containment scenarios (table 8). We did not alter the contract brand of infant formula among the States, so there is no input for formula prices or rebates because these factors were not changed.

Table 8 decomposes the difference in monthly average costs between California and Texas into caseload effects and price effects. The column "With own cost-containment practices" decomposes cost differences when each State's own cost-containment practices are imposed. The column, "With CA practices" decomposes cost differences after imposing California practices on both States. The final column, "With TX practices," decomposes cost differences after imposing Texas practices on both States.

In table 8, juice contributes $3.23 to the difference in average monthly food costs when each State imposes its own cost-containment practices. This figure drops to $1.40 when California practices are imposed on Texas. The reduction arises because the price of juice rises in Texas. In contrast, the effect emanating from juice price differences falls to only $0.82 when Texas restrictions are imposed on California. This decrease occurs because the average juice price decreases in California after Texas practices are imposed. Price effects similarly decrease under alternative cost-containment scenarios for milk and peanut butter.

Cereal contributes only $0.16 to the difference in costs between the two States when we impose each State's own practices. However, this effect increases to $0.63 when Texas imposes California restrictions, as the price of cereal decreases in Texas. Interestingly, imposing Texas practices on California also increases the price effect from cereal. In this case, the cereal effect rises from $0.16 to $0.40, as the price of cereal rises in California. Similarly, price effects from cheese increase when California imposes Texas

Table 7—State costs with cost-containment practices imposed

	With own practices	With CA practices	With TX practices
		Dollars	
CA	37.90	37.90	34.15
TX	28.34	30.03	28.34
Difference	9.56	7.88	5.81

Source: ERS calculations from table 5 data and IRI scanner data.

Table 8—Comparing the effect of product restrictions on CA and TX cost differences

	With own cost-containment practices	With CA practices	With TX practices
		Dollars	
Participant category			
Infant	-0.65	-0.65	-0.62
Children	2.14	2.14	1.91
Pregnant	-0.25	-0.25	-0.22
Breastfeeding	0.94	0.94	0.84
Postpartum	-0.90	-0.90	-0.81
Total from participation differences	1.28	1.28	1.09
WIC-approved product			
Formula	2.29	2.29	2.29
Rebate	-0.89	-0.89	-0.89
Baby cereal	0.06	0.06	0.05
Cereal	0.16	0.63	0.40
Juice	3.23	1.40	0.82
Milk	1.83	1.27	0.49
Eggs	1.08	1.11	1.06
Peanut butter	0.26	0.23	0.17
Cheese	0.26	0.51	0.32
Total from price differences	8.28	6.60	4.72
Total explained by prices and participation	9.56	7.88	5.81

Texas=Midland, Houston; California=San Francisco, Los Angeles, Visalia.

Source: ERS calculations from table 5 data and IRI scanner data.

restrictions, as Texas cheese prices decrease. And price effects from cheese increase when Texas imposes California practices, as California cheese prices increase.

Only in the case of eggs does it appear that if each State imposed the other's cost-containment practice could average prices be reduced. We see that the price effect from eggs increases from $1.08 under each State's own cost-containment practices to $1.11 when Texas imposes California's practices. The price of eggs decreases in Texas. In contrast, the egg price effect decreases from $1.08 to $1.06 when California imposes Texas practices, as the egg price in California also decreases.

Conclusions and Implications

Our method of simulating interstate variation in average monthly WIC food package costs suggests that interstate price differences play an important role. Simulated average monthly food costs suggest that States with higher-than-average WIC costs usually have higher-than-average food prices. Similarly, we found that States with lower-than-average WIC costs generally have lower-than-average food prices. We also found that interstate variation in the caseload composition of WIC participants usually plays a secondary role to interstate variation in food prices in creating variation in average monthly food costs across States.

Our simulations also suggest that the same cost-containment practice can generate different cost reductions across States. This results because per unit price reductions within a product category (for example, between a gallon and a half-gallon of milk) vary across States. Also, cost-containment practices generate cost reductions only if they impose constraints on WIC participant purchasing behavior. For example, if the majority of consumers prefer to buy milk in gallon containers, then imposing a cost-containment practice restricting purchases to gallon containers will not generate much cost savings. Because consumer preferences vary across States, the degree to which cost-containment practices actually constrain participant behavior will also vary, as will the effectiveness of cost-containment practices to generate cost savings.

Finally, we identified cost-containment practices in two States, California and Texas, and examined the effects on simulated average monthly costs from imposing these practices. Again, we found that identical cost-containment practices can have differential effects on average monthly food costs in different areas. While counterfactually imposing Texas cost-containment practices on California foods usually reduced the price of most foods, in some cases average food prices increased. Likewise, imposing California practices on Texas foods usually increased the price of Texas foods, but in some cases average prices fell. In neither case did prices change enough to completely offset average monthly food-cost differences. This implies that even if States provided identical food packages and had identical WIC caseloads, average monthly food costs would differ across States. It also suggests that even with equal food grants, accommodating WIC participants is more difficult in some areas because of higher food prices.

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Appendix Tables*

*The appendix tables, except for tables 7 and 8, were complied using ERS calculations detailed in the report.

Appendix table 1—Relative peanut butter prices

State	Private label	Jiff
	Dollars	
CA	1.10	1.06
CO	1.08	1.04
FL	0.94	0.97
GA	0.93	0.97
IA	0.91	0.88
IL	0.94	0.89
KS	0.99	0.96
MA	0.94	0.93
MI	1.05	1.05
MN	0.87	0.87
MO	1.11	1.14
NY	1.12	1.17
PA	1.02	1.06
TN	0.88	0.92
TX	0.96	0.98
WA	1.28	1.24
WI	0.87	0.87

Source: ERS calculations.

Appendix table 2—Relative ready-to-eat cereal prices

State	All 12-oz boxes	Cheerios
	Dollars	
CA	1.10	1.06
CA	1.06	1.01
CO	0.99	1.08
FL	0.93	1.03
GA	0.98	0.99
IA	0.93	0.91
IL	0.98	1.02
KS	0.94	0.98
MA	0.97	0.87
MI	1.08	1.12
MN	0.89	0.88
MO	1.04	1.03
NY	1.11	1.10
PA	1.06	0.98
TN	1.10	1.10
TX	0.94	0.98
WA	1.07	1.03
WI	0.93	0.89

Source: ERS calculations.

Appendix table 3—AMS and scanner milk prices[1]

State	Average retail - AMS	Scanner data
	Dollars	
CO	3.22	3.03
FL	3.00	2.99
GA	2.76	2.66
IL	3.03	2.53
KS	2.75	2.65
MA	2.64	2.61
MN	2.99	2.88
MO	2.89	2.76
PA	2.65	2.37
TX	2.68	2.41
WA	3.18	2.61

[1]AMS milk price data was available only for these markets.

Source: ERS calculations.

Appendix table 4—Private label juice prices relative to 17-State average

State	Grape	Apple	Orange
	Proportion of 17-State average		
CA	0.95	1.07	1.34
CO	1.10	1.17	1.22
FL	0.97	0.93	0.78
GA	0.94	0.86	0.79
IA	1.04	1.14	0.83
IL	1.06	1.09	1.06
KS	0.99	1.09	0.89
MA	1.13	1.01	0.90
MI	0.86	0.79	0.93
MN	1.01	0.79	0.88
MO	0.86	0.90	1.00
NY	1.08	0.95	0.99
PA	1.03	0.98	1.00
TN	0.87	0.97	0.85
TX	1.36	0.97	0.82
WA	1.02	1.15	1.78
WI	0.74	1.18	0.92

Source: ERS calculations.

Appendix table 5—Private label cheese prices relative to 17- State average

State	American	Cheddar
	Proportion of 17-State average	
CA	1.11	1.05
CO	1.15	0.99
FL	0.99	1.04
GA	0.92	0.94
IA	0.67	0.89
IL	1.60	1.01
KS	0.84	0.99
MA	0.91	1.01
MI	1.01	1.11
MN	0.66	0.88
MO	0.81	0.97
NY	1.24	1.17
PA	1.14	1.15
TN	0.94	1.07
TX	0.96	0.99
WA	1.19	0.93
WI	0.84	0.81

Source: ERS calculations.

Appendix table 6—Milk prices by income

State	High income	Low income	WIC-eligible
		Dollars	
CA	2.70	2.61	2.57
CO	2.43	2.49	2.52
FL	3.00	2.98	3.00
GA	2.69	2.55	2.61
IA	2.30	2.33	2.36
IL	2.54	2.52	2.46
KS	2.64	2.66	2.64
MA	2.61	2.62	2.65
MI	2.57	2.57	2.55
MN	2.88	2.89	2.88
MO	2.76	2.76	2.77
NY	2.90	2.92	2.87
PA	2.37	2.36	2.48
TN	2.85	2.82	2.81
TX	2.40	2.43	2.37
WA	2.62	2.52	2.52
WI	2.51	2.51	2.53

Source: ERS calculations.

Appendix table 7—Caseload compositions

State	Infant	Children	Pregnant	Breastfeeding	Postpartum
			Percent		
CA	23.50	53.50	9.76	7.01	6.14
CO	23.80	49.80	12.28	7.00	7.13
FL	27.90	49.80	11.53	4.37	6.40
GA	23.10	50.40	13.59	3.66	9.22
IA	21.40	56.90	9.61	3.86	8.22
IL	30.20	47.80	11.24	3.43	7.35
KS	23.50	53.80	9.81	4.29	8.60
MA	23.10	54.70	10.17	5.42	6.62
MI	24.40	53.90	10.72	3.23	7.75
MN	24.10	56.20	9.53	4.43	5.73
MO	23.90	50.80	10.78	4.05	10.47
NY	27.70	50.20	11.27	5.90	4.93
PA	25.90	54.10	8.72	2.82	8.46
TN	28.60	46.30	12.73	3.24	9.14
TX	27.50	48.70	10.28	5.02	8.50
WA	23.90	52.90	13.73	6.36	3.09
WI	23.00	55.70	9.65	4.22	7.43
17-State avg	25.03	52.09	10.91	4.61	7.36

Source: USDA, FNS.

Appendix table 8—Simulated and FNS average costs

State	FNS average costs	Simulated average cost
	Dollars	
CA	33.94	34.18
CO	30.63	34.74
FL	33.62	32.26
GA	29.41	30.28
IA	35.08	29.69
IL	29.26	32.73
KS	29.86	32.28
MA	27.57	29.10
MI	31.64	30.69
MN	29.98	31.07
MO	30.86	32.38
NY	35.58	34.76
PA	32.25	30.37
TN	32.62	36.27
TX	25.81	28.64
WA	33.14	34.58
WI	30.93	29.66
17-State avg.	31.30	31.98*

*Total differs from 17-State average in appendix table 4 due to rounding.

Source: ERS calculations and USDA. FNS.

Appendix table 9—Average monthly savings from restricting milk containers

State	To gallon containers		To gallon or half-gallon containers		To least expensive	
	Dollars	*Percent*	*Dollars*	*Percent*	*Dollars*	*Percent*
CA	1.71	4.19	0.45	1.11	3.72	9.07
CO	1.33	3.44	0.04	0.12	2.05	5.30
FL	1.06	2.93	0.36	1.00	1.07	2.96
GA	1.09	3.06	0.15	0.42	1.69	4.73
IA	0.44	1.33	0.13	0.39	0.69	2.10
IL	1.38	3.71	0.64	1.73	3.38	9.12
KS	0.48	1.25	0.22	0.58	1.06	2.76
MA	0.97	2.80	0.23	0.67	1.25	3.60
MI	1.37	3.63	0.52	1.38	1.46	3.87
MN	0.59	1.67	0.11	0.31	0.66	1.88
MO	0.67	1.79	0.15	0.40	1.01	2.70
NY	2.11	4.97	0.50	1.17	3.36	7.91
PA	1.32	3.60	0.64	1.73	2.72	7.41
TN	0.75	1.87	0.18	0.46	2.45	6.12
TX	1.32	4.05	0.38	1.17	2.70	8.26
WA	2.51	5.60	0.55	1.23	2.63	5.88
WI	0.49	1.43	0.18	0.52	0.72	2.07

Source: ERS calculations.

Appendix table 10—Average monthly savings from restricting peanut butter

State	To 18-oz size		To private label		To beans	
	Dollars	*Percent*	*Dollars*	*Percent*	*Dollars*	*Percent*
CA	0.04	0.11	0.25	0.61	0.71	1.73
CO	0.01	0.03	0.21	0.54	0.64	1.65
FL	0.06	0.17	0.17	0.48	0.59	1.64
GA	0.00	0.01	0.13	0.36	0.49	1.37
IA	0.00	-0.01	0.12	0.35	0.62	1.88
IL	0.03	0.08	0.17	0.46	0.58	1.56
KS	0.01	0.03	0.14	0.36	0.68	1.78
MA	0.03	0.09	0.23	0.67	0.34	0.99
MI	0.01	0.03	0.18	0.49	0.69	1.83
MN	0.01	0.03	0.15	0.44	0.38	1.08
MO	0.04	0.10	0.44	1.17	0.68	1.82
NY	0.04	0.10	0.27	0.63	0.78	1.84
PA	0.05	0.14	0.22	0.61	0.59	1.62
TN	-0.01	-0.01	0.13	0.34	0.44	1.11
TX	0.04	0.13	0.22	0.66	0.63	1.92
WA	0.10	0.22	0.33	0.73	0.74	1.65
WI	0.02	0.07	0.16	0.47	0.52	1.50

Source: ERS calculations.

Appendix table 11—Average monthly savings from restricting cheese

State	To 8-oz or larger		To private label	
	Dollars	*Percent*	*Dollars*	*Percent*
CA	0.35	0.85	0.20	0.48
CO	0.33	0.84	0.22	0.57
FL	0.09	0.24	0.25	0.68
GA	0.20	0.56	0.37	1.05
IA	0.38	1.15	0.11	0.32
IL	0.34	0.92	-0.24	-0.64
KS	0.34	0.88	-0.12	-0.31
MA	0.09	0.27	0.69	1.99
MI	-0.21	-0.56	0.19	0.50
MN	0.24	0.67	0.29	0.84
MO	0.61	1.59	0.24	0.63
NY	0.36	0.85	0.80	1.88
PA	0.10	0.28	0.34	0.91
TN	0.44	1.08	0.08	0.19
TX	0.22	0.68	0.08	0.24
WA	0.24	0.53	0.50	1.12
WI	0.28	0.81	0.42	1.20

Source: ERS calculations.

Appendix table 12—Average monthly savings from restricting juice

State	To 46-oz can		To 128-oz plastic		To 64-oz plastic		To private label		To frozen concentrate	
	Dollars	*Percent*	*Dollars*	*Percent*	*Dollars*	*Percent*	*Dollars*	*Percent*	*Dollars*	*Percent*
CA	2.58	6.30	3.02	7.38	1.37	3.35	2.04	4.98	3.72	9.10
CO	2.82	7.28	3.18	8.20	2.35	6.07	2.32	5.99	4.80	12.39
FL	-0.15	-0.42	3.16	8.75	0.86	2.39	2.33	6.47	2.19	6.07
GA	0.81	2.27	3.89	10.90	0.50	1.40	2.54	7.12	2.58	7.23
IA	1.76	5.34	3.36	10.22	1.15	3.48	2.70	8.22	2.90	8.82
IL	0.93	2.51	2.68	7.24	1.36	3.67	1.47	3.97	2.71	7.30
KS	1.40	3.66	2.30	6.00	1.56	4.07	2.26	5.90	3.06	7.97
MA	2.00	5.76	3.52	10.13	1.34	3.85	2.60	7.49	3.85	11.08
MI	1.84	4.90	4.30	11.43	2.12	5.63	3.70	9.83	3.47	9.24
MN	0.74	2.12	2.27	6.49	1.33	3.80	2.17	6.19	3.11	8.88
MO	1.03	2.77	2.88	7.72	1.47	3.94	2.62	7.03	2.35	6.29
NY	2.56	6.02	3.29	7.74	1.91	4.49	3.25	7.64	2.77	6.53
PA	1.54	4.20	3.33	9.07	1.33	3.63	2.70	7.37	2.63	7.16
TN	0.57	1.43	2.36	5.91	1.25	3.14	2.29	5.73	1.92	4.79
TX	1.73	5.29	3.14	9.61	1.02	3.13	2.17	6.64	2.35	7.20
WA	3.48	8.17	4.42	10.37	0.46	1.07	0.22	0.52	5.24	12.29
WI	2.16	6.26	2.62	7.60	1.71	4.96	2.14	6.20	3.69	10.69

Source: ERS calculations.

Appendix table 13—Average monthly savings from restricting breakfast cereal

State	To 12-oz size or larger		To private label	
	Dollars	*Percent*	*Dollars*	*Percent*
CA	0.14	0.34	1.93	4.72
CO	0.14	0.36	1.73	4.46
FL	0.22	0.60	2.01	5.56
GA	0.17	0.47	2.07	5.81
IA	0.15	0.46	1.43	4.36
IL	0.21	0.57	1.50	4.04
KS	0.15	0.39	1.73	4.51
MA	0.25	0.73	2.14	6.17
MI	0.18	0.49	2.29	6.08
MN	0.11	0.31	1.70	4.85
MO	0.13	0.34	2.26	6.06
NY	0.25	0.58	2.47	5.81
PA	0.20	0.54	2.09	5.71
TN	0.09	0.23	1.73	4.32
TX	0.13	0.39	1.74	5.31
WA	0.17	0.37	1.71	3.80
WI	0.14	0.41	1.62	4.68

Source: ERS calculations.

Appendix table 14—Average monthly savings from restricting eggs

State	To 12- and 18- pack containers	
	Dollars	Percent
CA	-0.06	-0.14
CO	0.15	0.40
FL	0.02	0.04
GA	0.12	0.34
IA	0.00	-0.01
IL	0.06	0.17
KS	0.06	0.15
MA	0.29	0.84
MI	0.08	0.21
MN	0.04	0.12
MO	0.13	0.35
NY	0.61	1.43
PA	0.37	1.01
TN	0.02	0.05
TX	0.03	0.08
WA	0.17	0.39
WI	0.08	0.24

Source: ERS calculations.