

# Chapter 8

## Food Instrument Redemption

This chapter examines food instrument redemption in the six case study States and the relationship between redemption rates and food-item restrictions. The key research question is whether food-item restrictions lead to decreased redemption rates.

### Research Approach

State WIC administrative data on food instrument issuance and redemption are used to examine rates of redemption. Each issuance record indicates the food categories and amounts included on the instrument, the month for which the food instrument was valid, and whether or not the instrument was redeemed.

Two different measures of redemption are examined using the administrative data:

1. Percentage of certified participants who pick up their food instruments
2. Percentage of issued food instruments that are redeemed

A third measure is “partial redemption,” where only some of the prescribed foods on a single instrument are selected. The administrative data cannot be used to examine this measure because the data do not indicate which of the foods listed on the instrument were selected, and in what amount, only whether the instrument was redeemed. Instead, the analysis uses survey data on the percentage of respondents who said they did not buy all of their prescribed food. This is not an exact measure of partial redemption, because it may include respondents who did not redeem an instrument at all. Nevertheless, the survey data are able to provide information on the likely magnitude of partial redemptions.

Some of the following analyses exclude data from North Carolina or indicate that the North Carolina data are not representative of the entire State. The problem is one of incomplete coverage of the State; food instrument issuance and redemption data are largely missing for several counties. This data limitation, however, is not expected to bias the results of the analyses.<sup>1</sup>

This chapter examines all three measures of food instrument redemption: the rates of pickup, redemption, and partial redemption. As explained in the chapter, a multivariate analysis of instrument redemption rates was conducted, but results were extremely sensitive to model specification. Conclusions about the effects of food-item restrictions on instrument redemption, therefore, rely on the tabulations presented in the chapter due to the absence of consistent model results.

---

<sup>1</sup> According to State officials, food instruments are either manually prepared or printed online. Of the 100 counties in the State, 95 printed their food instruments online at the time of the study, and the issuance information was automatically logged onto the State’s computer system. The remaining counties prepared their instruments manually. Even in the online counties, some instruments were manually prepared. Although the manual data were later logged into the State’s online issuance system, analysis of the issuance file received from the State suggests that some records were missing. Specifically, the percentage of certified WIC participants who picked up their food instruments appeared to be artificially low.

## Issuance and Redemption Process

When a WIC applicant is certified as eligible, a nutritionist or competent professional authority (CPA) assesses his or her dietary needs and selects an appropriate food prescription. The food prescription may be one of the food packages specified in program regulations, or it may be tailored to meet the specific nutritional needs of individual participants or categories of participants. When the prescription is determined, the local office issues a set of food instruments to the participant. California, Connecticut, and Oklahoma issue WIC checks. Ohio and Texas issue WIC vouchers, and North Carolina issues WIC drafts. These are all referred to as “food instruments,” and they are used by participants to obtain prescribed food at authorized outlets.

To reduce burden on both office staff and participants, food instruments are often issued for 2 or 3 months at a time, saving participants extra trips to the WIC office or clinic. All food instruments, however, are valid only during the specific month printed on the instrument.

The six States varied in the number of food instruments issued per participant per month. Typically, multiple food instruments were issued for a given month, with each instrument listing a portion of the participant’s total monthly prescription. Table 8-1 indicates the average number of food instruments issued per WIC participant in each of the six case study States. California, Connecticut, and Ohio issued an average of over 4 instruments per month, whereas the other States issued, on average, about 2.5 instruments. Infants usually received fewer instruments than women or children, in part because breastfed infants received no instruments. Issuing multiple instruments for a given month enabled participants to buy their WIC foods over the course of the month, reducing problems of spoilage and storage.

**Table 8-1—Average number of food instruments issued per participant per month**

	CA	CT	NC <sup>a</sup>	OH	OK	TX
	<i>Number</i>					
All participants	4.6	4.4	2.5	4.1	2.5	2.4
All women	5.8	4.5	2.7	4.1	2.6	2.8
Infants <sup>b</sup>	1.2	3.4	1.8	4.2	1.0	1.0
Children	5.1	4.9	2.8	4.1	2.8	2.7

a The North Carolina data represent about 80 percent of all WIC participants within the State.

b Base includes infants who were breastfed and received no food instruments for the month.

Sources: State food instrument issuance and redemption data for November 2000.

With multiple instruments issued to each participant each month, and with most food prescriptions including foods from multiple categories, States have flexibility in how to structure each food instrument. In California and Texas, most instruments were for a single food category (for instance, just milk or infant formula). In the other four States, most food instruments contained prescriptions for multiple food categories. To illustrate, table 8-2 displays the most commonly issued food instruments in the six States, identified by the food categories listed on the instrument. Each table entry indicates the percentage of that State’s instruments issued for a specific food category or group of categories. Thus, for example, 27.8 percent of all California food instruments issued for November 2000 were for

**Table 8-2—Distribution of most common food instruments in each State**

Food categories	CA	CT	NC <sup>a</sup>	OH	OK	TX
	<i>Percent</i>					
Single-category instruments						
Milk	27.8	2.1		4.6		61.4
Eggs	0.0	0.0		0.1		
Peanut butter or dried beans/peas	8.2	0.0				0.0
Cheese	0.0			0.0		0.0
Juice	17.4	0.1	0.0	0.2		
Cereal	17.2	11.7	0.0	0.0		
Infant formula	0.6	17.4	13.2	18.9	6.5	6.1
Tuna	0.0					
Carrots	0.0					
Subtotal, single category	71.2	31.3	13.2	23.8	6.5	67.5
Multiple-category instruments						
Milk, peanut butter or dried beans/peas		10.1				
Milk, juice		5.0	0.0	29.5	0.1	
Milk, cheese		5.7	0.2	0.2		0.0
Juice, cheese		8.4	0.0	0.0		
Peanut butter or dried beans/peas, juice	7.9		0.0		0.0	
Milk, eggs, juice		14.2	23.3	7.9	2.5	
Milk, eggs, cheese	17.2	7.5	1.1	0.0		
Milk, peanut butter or dried beans/peas, juice			0.0	24.7	24.7	
Milk, juice, cheese		2.8	0.1	7.7	1.2	
Infant formula, juice, infant cereal			0.3	6.2	0.3	
Milk, eggs, peanut butter or dried beans/peas, juice		0.3	16.7	0.0	0.0	
Milk, eggs, peanut butter or dried beans/peas, cheese		4.4		0.0		
Milk, eggs, juice, cheese		0.2	3.2	1.7	27.7	
Milk, juice, cheese, cereal			26.6	0.0	0.2	
Milk, eggs, peanut butter or dried beans/peas, juice, cheese		0.0	7.6	0.0		
Milk, eggs, juice, cheese, cereal				3.8	28.6	3.3
Milk, eggs, peanut butter or dried beans/peas, juice, cheese, cereal				14.1	0.0	27.4
Other <sup>b</sup>	3.7	10.1	7.7	5.1	8.2	1.8
Subtotal, multiple categories	28.8	68.7	86.8	76.2	93.5	32.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

a The North Carolina data represent about 80 percent of all WIC participants within the State.

b “Other” includes all food instruments with food category combinations that did not represent at least 4 percent of all instruments redeemed in at least one State.

Sources: State food instrument issuance and redemption data for November 2000.

milk only, 17.4 percent were for juice only, and 0.6 percent were for infant formula only<sup>2</sup>. In Texas, 61.4 percent of all issued instruments contained only milk. The most common instrument in Ohio was for milk and juice (29.5 percent).

## Rate of Food Instrument Pickup

The first measure of food instrument redemption is the “rate of food instrument pickup”, calculated as the percentage of certified participants who pick up their food instruments for a given month. The following analysis uses November 2000 as the reference month because accurate counts of certified participants are available from the November administrative data provided by each State.

Food instrument “issuance” occurs when participants pick up their instruments at the local WIC office. Note that, because some food instruments are issued in advance of the month for which they are valid, this first measure of redemption does not mean that participants actually picked up the instruments during November 2000.

One would expect that rates of food instrument pickup would be higher in the early months of a certification period than in the later months, for several reasons. Most important, for most participants, food instruments for the first 1 to 3 months of the certification period are issued at time of certification; pickup rates should be nearly 100 percent because most participants are already in the office.<sup>3</sup> After the initial instruments are issued, pickup rates might decline for two main reasons. First, some certified participants might not be able to get to the office for their scheduled appointment to pick up their instruments. They might be out of town, in the hospital, or simply unable to make it to the office on time. If a new appointment could not be scheduled before the end of the month, they might not be able to pick up their food instruments for the month. Second, some participants might effectively drop out of the program by simply not showing up for their instruments. This could be related to dissatisfaction with the State’s list of allowed WIC foods, or it could be the result of factors entirely unrelated to food-item restrictions (for instance, difficulty getting to the local WIC office, dissatisfaction with office operations or staff, relocation out of the WIC clinic’s service area, or perceived ineligibility due to changed circumstances).

Table 8-3 presents rates of food instrument pickup over the first 6 months of a participant’s certification period. The rates are calculated as the number of instrument packages issued divided by the number of certified WIC participants, excluding infants.<sup>4,5</sup> The data confirm the expected decline in

---

<sup>2</sup> The percentage of food instruments for infant formula in California was low, relative to the other States, because California issued so many single-category instruments. This raises the total number of instruments issued in California and reduced the share for infant formula.

<sup>3</sup> Some infants are certified for WIC while still in the hospital. Their mothers would need to go to the office to pick up their first food instruments.

<sup>4</sup> Information on participants’ certification dates was appended to the analysis file to enable identification of month of certification period.

<sup>5</sup> Infants who are being entirely breastfed do not receive a WIC food prescription. The study could identify such infants for November 2000, using the food package code from the State’s certification file, but not for the months for which certification data were not collected. Because infants initially breast-fed may start to receive prescriptions for formula at any time (and they may receive prescriptions for infant cereal or juice at the age of 4 months), table 8-3 excludes all infants and infant food packages from the calculated rates to avoid presenting misleadingly low food instrument pickup rates.

the rate of food instrument pickup over the first months of a participant's certification period. Pickup rates in the first month of certification were nearly 100 percent. They declined thereafter, with the largest declines occurring in month 4 for all States except California. The decline in month 4 may correspond to the States' having issued 3 months of food instruments during the initial pickup.

**Table 8-3—Rate of food instrument pickup by month of certification period**

Certification month	CA	CT	OH	OK	TX
			<i>Percent</i>		
1	98.5	99.4	99.6	99.9	99.9
2	92.7	96.9	99.2	95.8	98.3
3	89.8	95.2	98.9	93.7	95.7
4	88.2	89.2	87.3	79.1	84.7
5	87.1	87.7	87.7	77.0	85.9
6	80.3	84.1	83.9	73.2	83.9

Data limitations preclude including North Carolina in the analysis of food instrument pickup rates. Table excludes all infants.

Sources: State food instrument issuance and redemption data for November 2000 to February 2001.

Table 8-4 presents the same data on food instrument pickup rates, but broken out by certification category and averaged over all months of a certification period. For all participants, pickup rates varied from a low of 88.8 percent in Oklahoma to a high of 94.2 percent in Ohio. The rates exclude infants who were breastfed and received no food package in November 2000.

**Table 8-4—Rate of food instrument pickup by certification category**

Certification category	CA	CT	OH	OK	TX
			<i>Percent</i>		
All participants	90.0	93.8	94.2	88.8	90.0
All women	90.9	93.7	93.7	89.5	91.0
Infants	88.8	94.8	95.3	91.5	87.8
Children	90.2	93.3	93.9	87.0	90.8

Data limitations preclude including North Carolina in the analysis of food instrument pickup rates. Table excludes only infants who were breastfed and received no food package.

Sources: State food instrument issuance and redemption data for November 2000.

Within each State, pickup rates generally did not vary much by certification category; they were always within 3 percentage points of each other. Infants had the lowest pickup rates in California and Texas, but the highest rates in Connecticut, Ohio, and Oklahoma. This may be due to different rates among States in the extent to which infants were certified for WIC while still at the hospital. In such

cases a separate trip to the WIC office would be needed to pick up the infant’s initial food instruments.<sup>6</sup>

The rates of food instrument pickup presented above cannot be meaningfully related to the presence or absence of food-item restrictions because participants must pick up **all** their instruments for the month at the same time. They are not allowed to choose which instruments they plan to use. Food-item restrictions may cause some participants to drop out of the program (that is, to stop picking up their instruments), but the administrative data examined here on food instrument issuance cannot isolate the possible impacts of food-item restrictions.<sup>7</sup>

## Rate of Food Instrument Redemption

The rate of food instrument redemption is defined as the percentage of food instruments issued (that is, picked up) that are redeemed, in whole or in part, excluding instruments that have been voided. Table 8-5 presents these rates for all participants in the six States and by certification category. California had the highest rate among the six States—of all food instruments issued in California for November 2000, 90.7 percent were redeemed. Ohio had the lowest rate at 80.6 percent. Redemption rates were generally highest for children, especially in California and Texas.

**Table 8-5—Food instruments redeemed**

Certification category	CA	CT	NC <sup>a</sup>	OH	OK	TX
	<i>Percent</i>					
All participants	90.7	87.9	85.7	80.6	85.7	85.2
All women	89.7	86.4	82.8	77.5	83.2	80.2
Infants	89.8	87.6	86.5	81.6	86.2	84.4
Children	97.8	89.6	88.1	81.1	88.0	95.9

a The North Carolina data represent about 80 percent of all WIC participants within the State.

Sources: State food instrument issuance and redemption data for November 2000.

Conceptually, it is possible to relate food instrument redemption rates to the presence or absence of food-item restrictions. A modeling approach is suggested, however, because States include more than one food category on individual instruments. The next section describes the study’s analysis of the effects of restrictions on food instrument redemption.

## Effects of Food-Item Restrictions on Redemption

The purpose of this section is to determine if there is a statistically significant relationship between food-item restrictions and rates of food instrument redemption. That is, do item restrictions lower the

<sup>6</sup> Despite efforts to control for infants receiving no food packages, the variation in pickup rates for infants may still reflect some differences across States in the percentages of infants who were breastfed. As was shown in table 4-1 of chapter 4, California and Texas had the highest percentages of breastfeeding women among their participants.

<sup>7</sup> Chapter 9 examines dropout rates and food-item restrictions.

perceived value of a prescribed food to the extent that instruments listing that food category are less likely to be used?

If all food instruments included just one category of food, it would be relatively easy to test the above hypothesis; redemption rates for instruments listing one category could be compared between groups of States with and without restrictions on that category. The presence of multiple food categories on single instruments, as documented in table 8-2, makes it more difficult to determine the effect of individual food-item restrictions. The difficulty is both theoretical (for instance, do restrictions on one food-item affect the perceived value of other items on the food instrument?) and practical (in terms of data requirements and limitations).

## Theory

The probability that a food instrument will be redeemed is based on the simple theory that demand for a food instrument is a function of the food categories included on the instrument, the quantity specified for each food category, the number of food categories included, and the restrictions on those categories. Each WIC participant might rank the food categories differently, but the probability of redeeming the instrument should be highly correlated with the demand for the prescribed foods.

Generally, one would expect demand to increase with the quantity and variety of food categories on the instrument; and to decrease when restrictions are placed on food items. The probability of redeeming an instrument with a highly valued item and a little-valued item should be no less than the probability of redeeming the instrument with just a highly valued item. That is, the food instrument can be partially redeemed (or undesired food given away), so the consumer can ignore any food category that she does not want.<sup>8</sup> Similarly, consider two food instruments with the same food category and quantity, but with one from a State with a restriction on that category: the demand for the food instrument with the restriction should be the same as for the unrestricted food instrument if the restriction is not binding on the consumer's choices. For example, the consumer may consider the store-brand cereal to be comparable to a national brand. In that case, a restriction that the instrument be used to buy only the store-brand (or private-label) cereal should have no effect on the participant's selection because the restriction does not eliminate any items that are more preferred. If the restriction does eliminate some preferred brands, or otherwise limit the participant's choices, however, one would expect it to reduce the perceived value of that food instrument, thereby reducing its likelihood of being redeemed.

Beyond this simple basis of preference ordering, there are other factors that could affect redemption. The demand for the food categories could be defeated by the logistics of getting to the store in the right month with the correct instruments. Something as simple as losing the instrument may have little relation to the preference ordering of the consumer. Moreover, it is unclear whether food instruments with two food items on the same instrument are more likely to be redeemed than separate instruments with a single food item each. The study does not test the effect of these differences on redemption probabilities because they vary by State and are often indistinguishable from patterns of State-level restrictions.

---

<sup>8</sup> Program regulations, of course, require that all food items be selected and consumed by the participant.

## Data

The primary source of data used in the analysis is the 4.2 million food instrument records issued by the six study States for November 2000 (excluding instruments that were returned or voided). These data were supplemented with participant demographic information from the States' certification files.

The food instruments included 32 food specifications, aggregated to 11 food categories; the aggregation involved removing package size indicators. For instance, milk gallons and half-gallons were combined into the milk category. Information was not lost, however, as the total quantity of each food category prescribed was retained on the records. Aggregation also included combining "similar" foods, such as cow's milk, powdered milk, evaporated milk, buttermilk, and acidophilus milk.

As shown in table 8-6, States in the study imposed food-item restrictions on 8 of the 11 food categories. The restrictions on milk, eggs, peanut butter, and dried beans or peas included purchase of the least expensive brand, as did the cheese restrictions in Connecticut and Oklahoma and the juice restrictions in Connecticut and Texas. California limited allowed types of cheese, breakfast cereal, and juice. Oklahoma prohibited purchase of most national brands of cereal and juice, and Texas required that cereal be bought in large packages. California, Connecticut, and Texas limited infant cereal selection to one brand. Previous chapters provide more complete descriptions of the restrictions.

**Table 8-6—Food category restrictions by State**

	CA	CT	NC	OH	OK	TX
Milk	Π			Π	Π	
Lactaid						
Eggs	Π	Π			Π	Π
Cheese	Π	Π			Π	
Breakfast cereal	Π				Π	Π
Infant cereal	Π	Π				Π
Juice	Π	Π			Π	Π
Legumes		Π			Π	
Tuna						
Carrots						
Infant formula						

The legumes food category is an aggregation of peanut butter and dried beans/peas, necessitated by the fact that North Carolina food instruments allowed the bearer to choose either at the time of purchase. Information on selected items is not available. Therefore, to include North Carolina instruments in the analysis, peanut butter and dried beans/peas were combined into the "legumes" category, though separate food-item restrictions were maintained in the model specification.

Only one State, North Carolina, had no food-item restrictions. At the other extreme, Oklahoma had six restrictions (though no single instrument in Oklahoma was subject to more than five). Most food instruments had one restriction or none, and the modal value was one restriction. Table 8-7 combines data from all six States and breaks out food instrument redemption rates by the number of food category restrictions affecting use of the instrument. Redemption rates were consistently **higher** for



instruments containing restricted food categories than for the 25 percent of food instruments not subject to any restrictions. The pattern of redemption rates in the table fails to support the hypothesis that restrictions reduce redemption rates. The average redemption rate for instruments with any restriction was 89.1 percent, which is significantly higher than the redemption rate of 82.3 percent for instruments not subject to restrictions. From this initial evidence, food-item restrictions do not appear to depress redemption rates.

**Table 8-7—Redemption rates by number of restrictions**

	0	1	2	3	4	5
	<i>Percent</i>					
Redemption rates	82.3	87.4	94.0	94.2	84.1	88.9
Distribution of food instruments	25.0	54.0	3.0	17.0	1.0	<1.0

Sources: State food instrument issuance and redemption data for November 2000.

The redemption rates in table 8-7 do not distinguish among instruments containing different food categories. A strong effect of restrictions on redemption rates for one category could be diluted by the absence of effects for other categories. (Note that one would not expect to see “offsetting” effects. There is no hypothesis that would lead one to expect food-item restrictions to cause higher redemption rates.<sup>9</sup>)

Table 8-8 presents redemption rates by food category, overall and separately for restricted and non-restricted States. In reviewing these rates, it is important to remember that, for the most part, these are not single-category instruments. Thus, for example, the 86.8 percent redemption rate for milk could be affected by demand for other food categories listed on the instruments containing milk.

For each food category in table 8-8 subject to food-item restrictions, the table presents the pooled redemption rates within States with and without restrictions, as noted in table 8-6. The difference in redemption rates between the two groups of States is also given. If food-item restrictions reduce redemption rates, one would expect to see negative differences in the table. Negative differences are seen only for peanut butter and dried beans/peas (and the aggregated legumes category), and the magnitudes of these differences are small. Again, subject to the caveat that other factors may have affected these redemption rates, the results suggest that food-item restrictions did not have an adverse impact on redemption rates.

One of the “other factors” expected to affect redemption rates is the quantity of food prescribed on the instruments for each food category. States with and without restrictions did not always prescribe equal average amounts per instrument. Thus, quantity effects could be complicating the comparisons in table 8-8. When the analysis compared redemption rates while holding quantities constant,

<sup>9</sup> Selection bias could lead to higher redemption rates for food instruments with restrictions if the presence of food-item restrictions was correlated with participants who really needed or wanted their food and were more likely to pick up their instruments. As noted in the previous section, the relationship between food-item restrictions and pickup rates cannot be examined with available data.

however, the results remained inconsistent. Redemption rates were sometimes higher in the States with restrictions and sometimes lower.

**Table 8-8—Redemption rates by food category**

	Total	Restricted	Non-restricted	Group difference
			<i>Percent</i>	
Milk	86.8	88.6	83.5	5.2
Lactaid	73.7			
Eggs	90.9	93.8	82.0	11.8
Cheese	91.3	94.8	86.7	8.1
Breakfast cereal	87.6	88.3	84.0	4.3
Infant cereal	93.2	96.3	84.0	12.3
Juice	87.6	90.5	81.1	9.3
Peanut butter	87.2	85.9	87.2	-1.3
Dried beans/peas	86.8	84.4	86.9	-2.5
Legumes	86.7	85.0	86.7	-1.7
Tuna	83.5			
Carrots	85.9			
Formula	89.4			

North Carolina's food instruments are in the "not restricted" group for each food category. The North Carolina data represent about 80 percent of all WIC participants within the State.

Sources: State food instrument issuance and redemption data for November 2000.

Based on the raw redemption data, that is, not controlling for any factors other than food category and quantity prescribed, there were few categories for which the restricted redemption rates were lower than the nonrestricted redemption rates. This was true only for peanut butter and dried beans/peas. The results were mixed for milk, depending on quantity prescribed. For the other food categories, the redemption rates for restricted instruments were larger than the nonrestricted instruments. This suggests that, with the possible exception of restrictions on peanut butter and dried beans/peas, the food-item restrictions in these case study States had no impact on food instrument redemption rates, and the effects on peanut butter and dried beans/peas were small—a reduction in rates of 1.3 and 2.5 percentage points, respectively. To control for other factors and to confirm these results, however, it is necessary to model the redemption probability of food instruments.

### Model Specification

The main disadvantage of the tabular comparisons is that the differences do not control for factors other than the restriction of the particular food category. Given that many instruments have multiple food-items, it is possible that there are cross (interaction) effects between food categories and food restrictions. There may also be differences in demographics or other State factors that would affect redemption rates independent of a restriction. With the restrictions based on State rules, it is certainly possible that the food restrictions would be correlated with demographics or miscellaneous other State effects. In that case, the correlations could make the simple comparison between redemption rates misleading. There are insufficient data to control adequately for all the possibilities, but a logistic regression model was specified in which the dependent variable was based on the probability of

redemption (1 if the food instrument was redeemed, 0 otherwise). The independent variables included measures for the amount of food prescribed, indicators for food-item restrictions, and controls for demographics and miscellaneous State effects. This model was estimated using all 4.2 million food instrument records for November 2000.

The most general model had the following specification:  
where:

$$\text{Log}\left(\frac{\text{REDEEM}}{1-\text{REDEEM}}\right) = \beta_0 + \sum_{f=1}^{11} (\beta_{1f} * \text{QUANTITY}_f) + \sum_{f=1}^{11} (\beta_{2f} * \text{RESTRICTDUM}_f) + \sum (\beta_3 * \text{DEMOGRAPHICS}) + \beta_4 * \text{NUMITEMS} + \sum_{j=1}^6 (\beta_{5j} * \text{STATE}_j)$$

REDEEM = a binary variable indicating whether an issued food instrument was redeemed (1) or not (0).

QUANTITY<sub>f</sub> = the quantity listed on the food instrument for food category f, f=1 to 11.

RESTRICTDUM<sub>f</sub> = a dummy variable indicating whether food category f, f=1 to 11, was restricted in the State in which the food instrument was issued.

DEMOGRAPHICS = a vector of variables indicating the following characteristics of the WIC participant: certification category; month of certification period; gender; race or ethnicity; household size; migrant status; poverty status; location (urban, suburban, rural); and receipt of program benefits (food stamps, TANF, Medicaid).

NUMITEMS = a count of the number of different food categories included on the food instrument.

STATE<sub>j</sub> = a dummy variable indicating the State, j=1 to 6, in which the participant resided.

In specifications including STATE<sub>j</sub>, the RESTRICTDUM<sub>f</sub> vector was replaced with RESTRICTQ<sub>f</sub>—a vector of interactive terms between the QUANTITY<sub>f</sub> and RESTRICTDUM<sub>f</sub> vectors—to avoid problems of multicollinearity.

In either model specification, one would expect positive coefficients on the QUANTITY<sub>f</sub> vector: the larger the quantity of a food category prescribed, the greater the value of the instrument and the greater the likelihood of its being redeemed.

The estimated coefficients on the RESRICTDUM<sub>f</sub> vector are expected to be negative or zero, but never positive. Restrictions could lower the value of an instrument or have no effect, but they should not increase its value (compared with the same instrument in an unrestricted State). Estimated coefficients that are positive and significant would suggest a misspecified model. Likewise, the estimated coefficients on the RESTRICTQ<sub>f</sub> vector should be negative or zero, but not positive.<sup>10</sup>

<sup>10</sup> Again, the possibility of selection bias cannot be discounted. If one could model the participant's probability of picking up the food instruments using different explanatory variables than in the model of instrument redemption, then it would be possible to control at least partially for any selection bias, if present. To lead to positive coefficients on the

## Analysis Results

The results of the modeling effort are not reported here because, in general, the different model specifications were not robust. With such large sample sizes, it was easy to get statistically significant results, but the signs of the coefficients were extremely sensitive to the model specification. More problematic, there was no consistent support for the theory that food quantities have positive coefficients and food restrictions have zero or negative coefficients.

The results from the pooled data were further tested by estimating separate logistic regressions on the subset of instruments for each food category. For most food categories, the model specification included the full set of food quantities and restrictions because there were instruments with nearly every combination of food-items. Again, the signs of the coefficients were sensitive to the specification. It was not uncommon for the sign on the restriction coefficient to change depending on whether the single restriction was included or the full set of restrictions.

Despite extensive specification searching and regression experimentation, the study was unable to find evidence of a consistent negative effect from the food restrictions on instrument redemption. The problem of inconsistent findings is largely a data problem. It is difficult to control for State-level effects when food-item restrictions are applied statewide. There is also a likely omitted-variables problem in the specification—a variable that decreases redemption rates that has different values in the unrestricted States than in the restricted States.

## Partial Redemption of Food Instruments

The last component of the redemption analysis addresses whether participants purchase items from all food categories listed on the food instrument. For single-category instruments, partial redemption would mean that only part of the total quantity listed on the instrument was obtained. For multiple-category instruments, partial redemption could mean either that some foods were not selected at all, or that the full quantities of one or more listed foods were not purchased.<sup>11</sup>

The food instrument data do not indicate whether food items for all listed categories were selected. The only data available to examine possible partial redemptions are responses to survey questions that asked respondents whether they purchased all the items prescribed for them or their WIC children within each food category. These data, originally presented in chapter 6 in a different format, are presented again in table 8-9. Table entries provide the percentage of respondents who did not purchase all the food, by category, prescribed for their family for a month.

---

RESTRICTDUM<sub>r</sub> or RESTRICTQ<sub>r</sub> vectors, however, the probability of picking up food instruments would have to be positively related with the presence of restrictions, an unlikely behavioral response.

<sup>11</sup> Focus group participants in several States, however, said that store personnel insisted that all foods and quantities listed on a food instrument be selected before ringing up the WIC items.

**Table 8-9—Partial redemptions of WIC food instruments by food category (not buying “all” items)**

	Individual States						State groups				
	CA	CT	NC	OH	OK	TX	Total	Res- triction	No restric- tion	Group differ- ence	
	<i>Percent</i>										
Milk	7.2	6.0	10.1	11.4	6.7	11.6	8.8	8.6	9.3	-0.7	
Eggs	1.9	2.4	6.5	3.1	8.8	4.3	4.5	5.6	4.0	1.6	
Cheese	0.6	5.5	7.7	2.9	5.5	5.2	4.6	5.5	4.1	1.4	
Breakfast cereal	7.3	7.7	12.6	5.0	14.5	3.1	8.4	10.9	7.1	3.8	
Infant cereal	5.6	9.6	12.3	22.4	12.4	3.0	10.9	6.0	15.7	-9.6	
Juice	0.2	1.3	4.8	6.6	5.0	2.0	3.3	2.1	5.7	-3.6*	
Peanut butter	2.2	4.6	23.6	2.6	3.6	6.9	7.2	4.6	7.8	-3.2	
Dried beans/ peas	8.8	5.6	33.5	15.2	15.2	0.6	13.1	15.2	12.7	2.4	

Weight estimates for States were obtained with SUDAAN software. Group estimates give equal weight to each State in the group.

States with restrictions and sample size vary by food category. See tables in chapter 6 and appendix I for sample sizes for each food category.

Significant differences in means and proportions between State groups are noted by \* (0.05 level) and \*\* (0.01 level).

Source: Survey of WIC Participants.

Over all six States, the percentage of survey respondents who said they did not buy all their prescribed food varied from a low of 3.3 percent for juice to a high of 13.1 percent for dried beans or peas. Within States with restrictions, the high was 15.2 percent for dried beans or peas (Oklahoma was the only State with restrictions on dried beans or peas). Looking at the group differences in the table, the only statistically significant finding is the 3.6 percentage-point difference for juice. For juice, respondents in States with restrictions (California, Connecticut, Oklahoma, and Texas) were more likely, not less, to buy all their prescribed juice than were respondents in the unrestricted States.<sup>12</sup>

If restrictions were causing partial redemptions, one would expect to see positive and significant group differences in the table. None of the positive differences are statistically significant, so these data suggest that food-item restrictions were not related to partial redemptions in the study States. The survey data are somewhat ambiguous, however, with respect to partial redemptions as defined above. If respondents said they purchased only some of their prescribed food, this could reflect either partial redemption of one or more food instruments or a failure to redeem one or more instruments at all. The survey data cannot distinguish between the two possibilities. Nevertheless, regardless of the interpretation, there is no evidence that the restrictions were reducing purchase of prescribed food.

<sup>12</sup> The 9.6 percentage-point difference for infant cereal is not statistically significant because the survey included relatively few infants. Furthermore, the direction of the effect is toward higher redemption rates for infant cereal in the States that limited infant cereal to one brand, opposite to the hypothesized effect.

## Conclusions

Given the inconsistency of both the tabular and modeling results, there is no convincing evidence that State restrictions on food-items reduced rates of food instrument redemption. The tabular results show that redemption rates were often higher in States with restrictions than those without, and the modeling effort failed to resolve this discrepancy. The positive and significant model coefficients observed for some restrictions suggest that factors not captured in the models, but correlated with the presence of restrictions, explain the likelihood that a food instrument will be redeemed.

If food-item restrictions did reduce the likelihood of a food instrument's being redeemed, the model results suggest that the effect must have been small; otherwise, the results would have been more consistent. This finding is corroborated by the information collected by the Survey of WIC Participants and presented in chapter 6—very few survey respondents, when faced with restrictions, said they did not purchase all of their prescribed food because they did not like the item.