Spillover Effect of Participation in Women, Infant and Children (WIC) Program on Consumer's Purchasing Behavior of Private Label Goods

Madiha Zaffou[1], Benjamin Campbell[2] and Adam Rabinowitz[3]

[1] Graduate Research Assistant, Department of Agricultural and Resource Economics, 1376 Storrs Road, University of Connecticut, Storrs, CT 06269-4021; madiha.zaffou@uconn.edu

[2] Assistant Professor and Extension Economist, Department of Agricultural and Applied Economics, University of Georgia; Conner Hall, Athens, GA 30602; bencamp@uga.edu; corresponding author.

[3] Assistant Research Professor, Department of Agricultural and Resource Economics, 1376 Storrs Road, University of Connecticut, Storrs, CT 06269-4021; adam.rabinowitz@uconn.edu

Abstract

The special supplemental nutrition program for women, infants, and children program (WIC) allows its participants to purchase food items from a WIC approved list at retail grocery stores. However, this program restricts not only the type and the quantity of food to be purchased but also the specific food brand. In fact, participants are often required to purchase private label brands –the least expensive brand- for some of the food products. Using Nileson home-scan data on daily food purchases across the county, this study aims to evaluate how these food brand restrictions may impact consumer brand preference even outside of the WIC program.

Introduction

The special supplemental nutrition program for women, infants, and children program (WIC) serves to safeguard the health of low income pregnant, postpartum, and breastfeeding women, infants, and children up to age 5 who are at nutritional risk by providing nutritious foods to supplement diets, information on healthy eating including breastfeeding promotion and support, and referrals to health care[1]. Most state WIC programs provide vouchers that participants use at authorized food stores. A wide variety of State and local organizations cooperate in providing the food and health care benefits, and 46,000 merchants nationwide accept WIC vouchers[2].

WIC participation was almost 8.26 million in 2014 serving 76% of the infants and children in the US and with approximately an average monthly food cost of $43.7 per person. The Food and Nutrition Services (FNS) ranks WIC as one of most the successful and cost-effective nutrition programs in the nation. In fact, research has shown that every $1.00 spent on WIC results in savings of between $1.77 and $3.13 in health care costs in the first 60 days after an infant's birth. The cost savings are due in part to WIC's effectiveness in reducing rates of low birth weight, and improving rates of childhood immunization[3].

The WIC program provides its participants with a voucher or electronic benefit card that allows them to purchase food items from a WIC approved list at retail grocery stores. This foods list is selected based on the individual's nutritional needs aligned with certain dietary guidelines, for the purpose to improve the nutrition and health of low-income pregnant women, new mothers, infants and children. Furthermore, WIC does not only restrict the type and the quantity of food to

---

[1] http://www.fns.usda.gov
[2] http://www.fns.usda.gov
[3] Children's health watch policy action brief

be consumed but also the specific food brand. In fact, the voucher has a prescription for the corresponding brand names of every listed food product that program participants are limited to. Approved WIC food lists change from one state to another, however, most of the states require participants to buy private label brands for some of the products, given that they usually represent the least expensive brand in the store.

In this context, it is important to consider how this food restriction may have an impact on consumers brand preference that may probably carry on even beyond participation in the WIC program. This raises some important research questions: 1) is brand preference driven by WIC program participation for benefit-households? 2) Does brand preference last after participants drop out of the WIC program? 3) And how does brand preference change as participants enter and exit the program?

This study aims to answer the above questions by using panel data of household's daily food purchases across the country to examine their consumption patterns. Many empirical studies have examined the effects of WIC participation on health, psychosocial, academic and nutritional outcomes. To our knowledge, there is no previous study that evaluated the effect of WIC program participation on brand purchasing behavior and brand preference. In this study, we focus of this part and we primarily consider consumption of private label brands for cereal products. We are interested in private label brands given their strong popularity in the last decades and also given that they represent a considerable part of the generated retail revenue. In fact, in our sample, we observe a high presence of private label brands purchases for the products subject to this study, especially among WIC recipient households.

Literature Review

Past research on outcomes from participation in food assistance programs FAP -such as WIC- on consumers can be divided into two major categories: one category had primarily focused on evaluating the effect of participation in these programs from a health and nutrition perspectives, and another category examined the effect of participation on individuals' food consumption decisions.

In the first category, most existing studies (e.g. Lee et al. 2006; Lee et al. 2000; Montgomery et al. 1997; Gayman et al. 2010; Kowaleski-Jones et al. 2000; Chatterji and Brooks-Gunn 2004) serve as an indicators of the benefits of participation in such programs for the low-income households. They concluded that when people participate only in WIC, or in another food assistance program, or in both at the same time, there is a lower risk of abuse and neglect reports, and of diagnosis of several nutrition related health problems, especially for infants and young children. In fact, participation in WIC program in particular was associated with many positive outcomes, mainly an increased probability of breastfeeding among mothers which helps decrease developmental delays, and therefore young children receiving WIC are found to be more healthier than those who are eligible but do not receive the benefit.

In the second category, the focus was more on food consumption behavior among participants in FAP (e.g. Andreyeva et al. 2012; Andreyeva and Luedicke 2014; Gleason et.al. 2011). Although in this category the number of studies is limited, but they all shed light on how the design of WIC food package can directly incentivize participants in the program to increase their purchase for products belonging to that package.

For example, on study reported an increased purchases of sugar-sweetened beverages among households enrolled in WIC and SNAP programs. Furthermore, when comparing participants

from each program, the authors found that SNAP households tended to buy less nutritious fruit drinks, whereas WIC households favored 100% juice as this is what the WIC program provides. In another study, researchers examined how the provision of cash value vouchers to purchase fruits and vegetables in the revised WIC food packages, had an impact on overall purchases of these products among WIC benefit households. Results show that the implementation of package revision generated a decline in the amounts of fruits and vegetables purchased with non-WIC funds and participants in the program spent three times more of their WIC vouchers buying fresh fruits than fresh vegetables. In a recent study, the USDA-ERS conducted focus groups among WIC participants to discuss their preference for some of the changes occurring in the WIC food package. As an example, significant changes were made to the types of milk provided. Based on the findings, these changes have not deterred participants from buying milk through WIC, however, they are found to affect what type of milk is being purchased outside of WIC. In fact, more participants reported buying the restricted type by the program with their own money even after they fully used their WIC checks.

Data

The Nielsen Home-scan panelists use in-home scanners to record all of their purchases, from any outlet, intended for personal, in-home use. The data describes when, where, and what the panelists purchase, and at what price. It contains approximately 40,000 households for 2004-2007, and 60,000 for 2007 onwards. Some panelists stay on the panel for several years, while others may join or drop off each year. Data collection is performed for products purchased in many different retail channels. Nielsen assigns each retail chain a retailer code and a channel type, and channels are classified into different mutually exclusive categories.

Each item that a consumer purchases is recorded using a UPC code which provides detailed product attributes about type, brand, size, unit, quantity, and the price paid for this item.

Demographic and product ownership variables are recorded for the entire household and the head of household, as well as demographics for other household members. Demographic variables include household size, income, age, presence and age of children, employment, education, marital status, occupation, type of residence, race, and WIC participation.

The WIC indicator variable only appears in the data for years 2006 and later (panelists were not asked for WIC data prior to the year 2006). Therefore, in the analysis below, we use data from 2006 to 2011 on daily consumption for cereal products as they belong to WIC-eligible food category. Table 1 describes our sample demographic characteristics by year.

To best address our research questions, we divide the sample into two major groups: 1) households that have never participated in WIC to serve as a control group, 2) households that have always participated in the program for the entire period they were present in the data, or households for whom we observe entry and exit of the WIC program. We refer to these groups as, non-benefit households (grp 1), benefit households (grp 2), respectively. Furthermore, our dependent variable is represented by the ratio of monthly household total consumption in ounces of private label cereal divided by total (private label and branded cereals) cereal consumption. Table 2 presents the average of this ratio for each group of households.

Methodology

In order to assess the impact of WIC participation on household purchasing behavior, we estimate a two stage Heckman model given by:

$$y_{it} = x_i\beta + \varepsilon_{1i} \qquad\qquad \textit{regression equation}$$

Where Y_{it} is the ratio of total consumption in ounces of private label cereal divided by total (private label and branded cereals) cereal consumption, for household i, in month t. x_i is a vector of explanatory variables and includes the following:

- WIC_participation: to indicate whether or not the household receives WIC benefits for a given year.

- Monthly_county_avg_p: is a measure of cereal's price per ounce for a given month and in a given county. This variable is calculated by dividing total cereal price paid (in $) by households in the same county for a given month by total cereal purchases (in ounces) of the same households.

- Ethnicity: indicates each household ethnicity (e.g. white, African American, Asian, and Hispanic).

Our dependent variable is not always observed because there are months where households do not purchase any cereal. Therefore, the dependent variable for observation i is observed only if

$$z_j\gamma + \varepsilon_{2i} > 0 \qquad\qquad selection\ equation$$

Where
$$\varepsilon_1 \sim N(0, \sigma)$$
$$\varepsilon_2 \sim N(0, 1)$$
$$corr\ (\varepsilon_1, \varepsilon_2) = \varphi$$

Results

Table 3 reports results of the Heckman model regression. Starting by the selection model, as expected, the county average price per ounce of cereal is found to have a negative impact on households buying decision. Unsurprisingly, white people followed by the Hispanic category are

more likely to participate in the cereal market, while Asian and African American are less likely to do so.

Of interest, we observe that participation in WIC program has a significant positive influence on households' decision to buy cereals. Compared to non-benefit households, those receiving WIC benefit are more likely to purchase cereal products simply because WIC package provides a free voucher for cereals. However, the negative parameter estimate of WIC participation in the regression model indicates that WIC participants tend to buy less of private label cereal products. This is also in line of our expectations since, sometimes; the WIC food package offers participants the option to either buy private label or branded cereals products.

References

Stephens, M. "" 3rd of tha Month": Do Social Security Recipients Smooth Consumption Between Checks?." *American Economic Review* (2003): 406-422.

Gayman, A., S. Ettinger, J.T. Cook, E.L. March, and S. Coleman. "WIC Improves Child Health and School Readiness." Unpublished manuscript, Children's Health Watch Policy Action Brief, January 2010.

Montgomery, D.L., and P.L. Splett. "Economic benefit of breast-feeding infants enrolled in WIC." *Journal of the American Dietetic Association* 97.4(1997): 379-385.

Andreyeva, T., et al. "Effects of reduced juice allowances in food packages for the women, infants, and children program." *Pediatrics* 131.5(2013): 919-927.

Lee, B. J., and L. Mackey-Bilaver. "Effects of WIC and Food Stamp Program participation on child outcomes." *Children and Youth Services Review 29*(2007): 501-517.

Andreyeva, T., and J. Luedicke. "Federal food package revisions: effects on purchases of whole-grain products." *American journal of preventive medicine* 45.4(2013): 422-429.

Ortu, A., and D. Mirtcheva. "Food Stamp Participation and Child Outcomes: The Effects of Federal Food Assistance Programs on Children's Health, Behavior, and Academic Performance." Unpublished manuscript, The College of New Jersey, Spring2011.

Andreyeva, T., J. Luedicke, K.E. Henderson, and A.S. Tripp. "Grocery store beverage choices by participants in federal food assistance and nutrition programs." *American journal of preventive medicine* 43(2012): 411-418.

Andreyeva, T., and J. Luedicke. "Incentivizing fruit and vegetable purchases among participants in the Special Supplemental Nutrition Program for Women, Infants, and Children." *Public health nutrition* 18.01(2015): 33-41.

Shapiro, J.M. "Is there a daily discount rate? Evidence from the food stamp nutrition cycle." *Journal of public Economics* 89.2(2005): 303-325.

Damon, A.L., R.P. King, and E. Leibtag. "First of the month effect: Does it apply across food retail channels?." *Food Policy* 41(2013): 18-27.

Hastings, J.S., and E.L. Washington. "The first of the month effect: consumer behavior and store responses." *American Economic Journal: Economic Policy, American Economic Association,* 2(2010): 142-62.

Ter Braak, A., B. Deleersnyder, I. Geyskens, and M.G. Dekimpe. "Does private-label production by national-brand manufacturers create discounter goodwill?." *International Journal of Research in Marketing* 30.4(2013): 343-357.

Koschate-Fischer, N., J. Cramer, and W.D. Hoyer. "Moderating effects of the relationship between private label share and store loyalty." *Journal of Marketing* 78.2(2014): 69-82.

Choi, S. C., and A.T. Coughlan. "Private label positioning: Quality versus feature differentiation from the national brand." *Journal of retailing* 82.2(2006): 79-93.

Ngobo, P.V. "Private label share, branding strategy and store loyalty." *Journal of retailing and consumer Services* 18.4(2011): 259-270.

Ailawadi, K.L., K. Pauwels, and J.B.EM Steenkamp. "Private-label use and store loyalty." *Journal of Marketing* 72.6(2008): 19-30.

Geyskens, I., K. Gielens, and E. Gijsbrechts. "Proliferating private-label portfolios: How introducing economy and premium private labels influences brand choice." *Journal of Marketing Research*, *47*(2010): 791-807.

Olbrich, R., and G. Grewe. "Proliferation of private labels in the groceries sector: The impact on category performance." *Journal of retailing and consumer services* 20.2(2013): 147-153.

Dobson, P.W., and L. Zhou. "The Competition Effects of Lookalike Private Label Products." *National Brands and Private Labels in Retailing*. Springer International Publishing, 2014. 17-26.

Ailawadi, K.L., and K.L. Keller. "Understanding retail branding: conceptual insights and research priorities." *Journal of retailing* 80.4(2004): 331-342.

Steiner, R.L. "The nature and benefits of national brand/private label competition." *Review of Industrial Organization* 24.2(2004): 105-127.

Gleason, S., and J. Pooler. The effects of changes in WIC food packages on redemptions. USDA, FANRP, 2011

Carlyn Hood, M. P. A., A. Martinez-Donate, and A. Meinen. "Promoting healthy food consumption: a review of state-level policies to improve access to fruits and vegetables." *WMJ* 111.6 (2012): 283-6.

The University of Chicago Booth School of Business. Internet site: http://www.chicagobooth.edu/capideas/magazine/fall-2013/secrets-of-shopping

U.S. Department of Agriculture – Economic Research Service. Internet site: http://www.ers.usda.gov/amber-waves/2015-april/painting-a-more-complete-picture-of-wic-how-wic-impacts-nonparticipants.aspx#.VpK_vlIfR-g

Table 1. Demographic Characteristics of the Sample

Variable	Observations	Mean	Std. Dev.	Min	Max
Ethnicity					
African American					
2006	440268	0.095	0.293	0	1
2007	719052	0.087	0.282	0	1
2008	704172	0.089	0.284	0	1
2009	696516	0.090	0.286	0	1
2010	697740	0.091	0.287	0	1
2011	696072	0.092	0.290	0	1
White					
2006	440268	0.835	0.371	0	1
2007	719052	0.845	0.362	0	1
2008	704172	0.845	0.362	0	1
2009	696516	0.844	0.363	0	1
2010	697740	0.841	0.366	0	1
2011	696072	0.841	0.366	0	1
Asian					
2006	440268	0.023	0.150	0	1
2007	719052	0.023	0.151	0	1
2008	704172	0.024	0.153	0	1
2009	696516	0.025	0.155	0	1
2010	697740	0.026	0.159	0	1
2011	696072	0.027	0.163	0	1
Hispanic					
2006	440268	0.058	0.234	0	1
2007	719052	0.052	0.222	0	1
2008	704172	0.051	0.219	0	1
2009	696516	0.050	0.219	0	1
2010	697740	0.052	0.222	0	1
2011	696072	0.050	0.219	0	1
Average Income					
2006	276768	57487.22	37428.69	2500	200000
2007	451320	60252.48	37038.82	2500	200000
2008	440300	61790.70	37562.72	2500	200000

Year					
2009	426737	63023.82	38673.96	2500	200000
2010	413785	58068.66	28491.24	2500	100000
2011	356553	50444.23	24568.13	2500	84999.5
Household Size					
2006	440268	2.292	1.225	1	9
2007	719052	2.403	1.263	1	9
2008	704172	2.377	1.253	1	9
2009	696516	2.355	1.240	1	9
2010	697740	2.367	1.249	1	9
2011	696072	2.360	1.242	1	9
Ratio					
2006	276768	0.190	0.339	0	1
2007	451320	0.188	0.337	0	1
2008	440300	0.195	0.342	0	1
2009	426737	0.206	0.351	0	1
2010	414544	0.197	0.346	0	1
2011	420053	0.212	0.357	0	1

Table 2. Average Ratio by Household Group

Ratio (PL consumption/aggregate consumption)	Observation	Mean	Std. Dev.	Min	Max
Group1: Non-benefit households (n=108623)					
2006	274850	0.19	0.34	0	1
2007	446484	0.19	0.34	0	1
2008	435159	0.20	0.34	0	1
2009	422405	0.21	0.35	0	1
2010	410357	0.20	0.35	0	1
2011	415915	0.21	0.36	0	1
Group2: Benefit-household (n=1634)					
2006	1918	0.18	0.32	0	1
2007	4836	0.18	0.31	0	1
2008	5141	0.18	0.31	0	1
2009	4332	0.18	0.32	0	1
2010	4187	0.18	0.31	0	1
2011	4138	0.18	0.31	0	1

Table 3. Heckman Regression Results

	Coefficient	Std. Err.
Ratio		
WIC_participation	-0.0215***	0.0022
_cons	0.219***	0.0008
select		
Monthly_county_avg_p	-2.382***	0.0656
WIC_participation	0.124***	0.0067
White	0.102***	0.0036
African American	-0.0533***	0.0041
Asian	-0.158***	0.0053
Hispanic	0.0318***	0.0033
_cons	0.600***	0.0112
Observations	3,953,734	3,953,734

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1