

American University Honors Program Senior Capstone:  
Analysis of Program Effectiveness in the WIC Farmers' Market Nutrition Program

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## I. Introduction

In 2008 over 17 million American households were “food insecure” according to the USDA in that they do not meet the definition of “access... at all times to enough food for an active and healthy lifestyle” (Nord, Andrews et al. November 2009). Considering the recession that hit late that year, the number is probably much higher by now. Though we live in the richest country on earth, there are many who still struggle to afford food. Unsurprisingly, food insecurity is negatively related to health status (Kropf, Holben et al. 2007). In his international development work, Nobel laureate Amartya Sen considers adequate nutrition a key “functioning” that helps determine the scope of human freedom (Sen 1989).

In light of the persistent shortfall in adequate nutrition among the poor in America, and with special concern for the health of pregnant mothers and young children, Congress created the Special Supplementary Nutrition Program for Women, Infants and Children (WIC). The WIC program provides participants with coupons redeemable for specified high-nutrition foods such as peanut butter and infant formula (when applicable). These packages are generally worth in the range of \$35 per month (Bitler, Currie et al. 2003). WIC began operation in 1977, serving just shy of 1 million women and children. The program grew steadily and by 1999 it served more than 7 million women and children at an annual cost of nearly \$4 billion (Bitler, Currie et al. 2003). Subsequent research has shown WIC to have a positive impact on participating infants’ health, and that this effect significantly offsets program expenditures through reduced healthcare costs (Bitler, Currie et al. 2003). Importantly, WIC is not an entitlement program on par with Medicare, and therefore there is no guarantee that states will receive adequate resources to serve all who have need (Bitler, Currie et al. 2003).

In the late 1980s Congress experimented with an expansion of the WIC program beyond the limited range of foods typically available in supermarkets. The result was the implementation of the WIC Farmers' Market Nutrition program in 1992. Through this program, the federal government gives grants to state, tribal, and territorial governments to subsidize fresh fruit and vegetable consumption for a subset of WIC participants. These local authorities distribute the grants to pregnant and postpartum women—as well as to their children under five years of age—in the form of vouchers redeemable for fresh, local fruits and vegetables (F&V) at participating registered farmers' markets and roadside F&V stands (Just and Weninger 1997). The program has grown rapidly: in FY1993 the program served 341,098 recipients in eleven states; in FY2010 the FMNP served 2,242,321 recipients in 45 jurisdictions and provides extra income to over 14,000 farmers who sell their produce more than 2,700 farmers' markets and over 2,000 roadside stands nationwide (Just and Weninger 1997; USDA 2010).

The FMNP has two goals: first, to increase F&V consumption among nutritionally at-risk women and children enrolled in WIC; and second, to increase income for participating farmers (USDA Mar. 11, 1994). There is strong evidence that the FMNP is effective at both goals, and that there is scope to increase the

I plan to assess the factors effecting grant allocation among states. Existing evidence supports increasing FMNP funding on both economic and humanitarian bases. Congress has held program funding essentially constant at approximately \$22 million annually for the last several years; this represents a miniscule portion of the general WIC budget (USDA 2010). Increased overall funding is not likely in the current budget climate. Instead, to increase overall welfare effects, jurisdictions must strive to do the best with what is available. Importantly, those localities most

effectively serving their recipients should (and in practice do) receive a greater share of program funding.

The relationship between the USDA and the states is governed by a mutually negotiated and agreed *Plan and Agreement* for each state (USDA Mar. 11, 1994). In general, however, FMNP funds are provided to the disbursing jurisdictions on a matching-fund basis. States are required to furnish not less than 30 percent of total administrative costs of their state's program.

Administrative costs, in turn, are capped at 17 percent of total state program costs. (USDA Mar. 11, 1994). Typically, voucher redemption rates are significantly less than 100 percent.

Anticipating this, the value of state-issued FMNP vouchers is always greater than the federal grant level in that state. In considering allocation of unused funds, the USDA considers whether the state used at least 80 percent of its food grant in the previous year though there is some discretion to consider anomalies (USDA Mar. 11, 1994). In the case of unanticipated overspending due to higher-than-expected redemption rates, states are allowed to use up to 5 percent of the next year's funds to cover the shortfall (USDA Mar. 11, 1994). Presumably, this unanticipated high demand would also constitute a strong claim on other states' unused funds and an argument for increased funding in the next year. What we see, therefore, is a competitive political economy in which states are encouraged to increase program effectiveness (measured via redemption rates) in order to gain the largest share of a limited benefit for their own citizens.

## II. Literature Review

The literature dealing specifically with the WIC Farmers' Market Nutrition Program is somewhat sparse. There is only one survey of existing FMNP studies. In that survey, the

researchers found just seven FMNP studies conducted between 1980 and 2009. Another five articles looked at the related Senior Farmers' Market Nutrition program (McCormack, Laska et al. 2010). Only one article examines FMNP from a pure economic perspective. Seven more articles look at the effectiveness of FMNP in increasing F&V consumption. Two articles examine the potential for states to increase program effectiveness. One article deals with a large-scale FMNP-type intervention at much higher benefit levels than currently obtain. Three tangentially related articles examine: the history of American farmers' markets; the related Senior Farmers' Market Nutrition Program; the third deals with the implications for the broader WIC program on food expenditures. I also include an article that provides a theoretical basis for the economic effectiveness of in-kind transfer programs. These articles are discussed individually below.

#### A. Economic Perspective on the FMNP

The most-cited FMNP study conducted to date is Just & Weninger (1997). This is the only article in the literature to approach the program from a purely economic perspective. Their analysis uses a consumer and producer surplus modeling to analyze the net economic benefit from the program. Just & Weninger balance the potential benefits—increased F&V consumption among at-risk women and children; increased F&V valuation (via information effects) in the same; increased purchasing power via income effects of the subsidy; and increased producer surplus to growers—against the potential negatives; the taxpayer costs of the program and price effects causing consumers paying more for F&V. The authors report that price effects of food assistance programs are generally small (on the order of 0.4 percent) and find that both receiving

FMNP coupons and nutrition information have significant positive effects on F&V consumption in participants (Just and Weninger 1997).

Using survey data, the authors identify approximate increases in participating farmers' profit of 8 percent of coupon redemption. WIC FMNP participants gain approximately 123 percent of coupon redemption while Non-FMNP customers lose 8 percent of coupon redemption through price effects. Taxpayers who pay for the program, of course, lose 100 percent of coupon redemption. Taken as a whole, net economic benefit to society in the range of 20 to 30 percent, depending on local market conditions (Just and Weninger 1997). The authors state that "the relative magnitudes of results suggest a considerable robustness of conclusions" and, importantly, "the magnitude of benefits depends heavily on the benefits of information distributed along with the coupons" (Just and Weninger 1997). These results are important, given that most government aid programs for the needy cause economic inefficiency. The authors cite information effects as the substantive difference in this case (Just and Weninger 1997).

#### B. FMNP Role in Increasing F&V Consumption

Beyond this, the literature is relatively impoverished. Kropf and colleagues (Kropf, Holben et al. 2007) performed a cross-sectional survey analysis of 829 WIC-only and 246 WIC FMNP participating women in one county in rural Appalachian Ohio. The study concludes that FMNP participation is correlated with higher vegetable consumption ( $2.2 \text{ servings/day} \pm 1.2$ ) compared to WIC-only participants ( $1.9 \text{ servings/day} \pm 1.0$ ). There was no significant difference between the two cohorts regarding fruit consumption or perceived food security status. In short, the FMNP participation does improve diets, though it fails to eliminate the structural factors behind food insecurity. FMNP participating women reported higher education levels than WIC-

only participants. This reflects either self-selection bias in program utilization, survey response, or both. Additionally, perceptions of program benefits were greater among FMNP women (83.1 percent perceive maximum benefit) versus WIC-only participants (69.2 percent registering the maximum). The authors reasonably conclude that the small level of FMNP benefit (just \$18 in the county observed) is unlikely to “alleviate or substantially improve household food insecurity” (Kropf, Holben et al. 2007).

The National Association of Farmers’ Market Nutrition Programs conducted a large national survey of program participants (n=24,800) and participating farmers (n=2,561) in 2002 (McCormack, Laska et al. 2010). This survey revealed that 73 percent of participants ate more F&V as a result of the program, and that 79 percent plan to eat more F&V year round. 73 percent of recipients reported plans to continue buying from farmers’ markets even after exhausting their benefit vouchers, and 90 percent of farmers reported increased sales (McCormack, Laska et al. 2010).

Galfond and colleagues analyzed the WIC Farmers’ Market Nutrition Program Demonstration Project prior to nationwide implementation in 1991 (Galfond, Thompson et al. 1991). Telephone surveys of WIC FMNP recipients (n=1,503) and non-recipient WIC women (n=1,126) reveal 5 percent higher F&V consumption among FMNP voucher recipients. Among recipients 80 percent indicated desire to continue shopping at markets, and 69 percent preferred the F&V selection and quality at the farmers’ market to their local supermarket (Galfond, Thompson et al. 1991).

Anderson and colleagues compared effects of three different “treatments” on F&V consumption in Michigan WIC participants (Anderson, Bybee et al. 2001). Survey participants in the FMNP treatment group received a one-time \$20 F&V voucher. Pre- and post-assessment

surveys (n=564 and 455 respectively) were conducted. The coupon treatment was effective at increasing F&V consumption, but had no impact on attitudes about F&V. Education, however, increased both consumption and attitudes towards F&V (Anderson, Bybee et al. 2001).

Anliker and colleagues interviewed 411 WIC FMNP women and 78 WIC-only women in Hartford, Connecticut. FMNP participants (the “treatment” group) received five \$2 farmers’ market vouchers. Coupon recipients were more likely to patronize a farmers’ market, but showed no evidence of increase in total F&V consumption (Anliker, Wine et al. 1992). This is not surprising given the negligible \$10 one-time subsidy. Almost 80 percent of recipients spent some or of their coupons and 57.6 percent used the entire subsidy. Additionally, 33.8 percent of recipients spent their own money on top of the coupons at the markets, which suggests that demand for fresh F&V among low income women is not saturated by a \$10 subsidy. Return trips to the farmers’ market were reported by 30.9 percent of women. Tellingly, 62.5 percent of recipients who did not redeem their coupons cited distance to the market as the primary reason they declined to use their coupons (Anliker, Wine et al. 1992).

Farrell and colleagues surveyed 535 WIC FMNP participants in Washington, DC. Follow-up interviews were successful with 212 participants. Results showed that WIC participants consumed less fresh F&V than the USDA recommends. Despite this deficit FMNP participants had more information about recommended F&V consumption than the national average. Because of FMNP 57.4 percent of recipients indicated they tried a fruit or vegetable they otherwise would not have purchased (Farrell, Wilson et al. 1995).

Fox and colleagues surveyed 49 WIC FMNP participants in northern California. Of this group, 33 received one half-hour class on nutrition and F&V preparation. Unsurprisingly, the treatment group showed greater knowledge of the benefits of F&V than the non-treatment group.



Among the treatment group, 54 percent indicated increased F&V consumption following the class. Of the 33 women, all indicated desire to continue shopping at farmers' markets and 96 percent plan to eat more F&V all year round (Fox, Kirks et al. 2001).

Walker and colleagues conducted a cross-sectional mail survey among WIC FMNP and WIC-only women in Athens County, Ohio (n=235 and 170 respectively). Their study revealed that participant self-perceptions of health status did not significantly differ between groups. However, FMNP women reported lower levels of perceived social capital (Walker, Holben et al. 2007). This suggests that—at least in this one county—the FMNP program either attracts or is directed towards those women most nutritionally at-risk in society.

### C. Large-Scale FMNP-Type Intervention

Herman and colleagues studied 602 postpartum WIC participants in Los Angeles, California. These women were given \$10 per week in FMNP-like coupons (they could also be redeemed for F&V at chain grocery stores) delivered biweekly over a 6-month period (Herman, Harrison et al. 2006). This represents a significant increase in benefit and longevity compared to once-annual seasonal benefits provided under WIC FMNP. By statute, WIC benefits range between \$10 and \$30 per growing season, though a few states increase this amount using their own funds (USDA Mar. 11, 1994). The voucher redemption rate (percentage of vouchers issued which are converted to F&V by recipients) was nearly 90 percent over the course of the experiment. Among the 10 percent of vouchers unused, recipients indicated that 2 percent were being saved for later use (Herman, Harrison et al. 2006). This 92 percent overall redemption rate is almost 40 percent higher than in standard FMNP programs. The study authors set the benefit level “unrealistically high” partially to prove that increased FMNP subsidies would in fact be

utilized (Herman, Harrison et al. 2006). In addition to the generous benefit, the authors consciously chose WIC program offices within walking distance of both chain supermarkets and year-round farmers' markets (common in California) to ensure easy access to F&V outlets (Herman, Harrison et al. 2006).

#### D. Potential for States to Increase FMNP Program Effectiveness

Conrey and colleagues examine the conscious efforts of New York State to increase voucher redemption in their WIC FMNP program. Low participation rates can negative potential program benefits: in 2001 Ohio cited its 60 percent participation rate (actually higher than the national average of 57 percent) as the main reason it cut its program (Conrey, Frongillo et al. 2003). This study indicates that conscious decisions on the part of state agencies can increase participation rates (Conrey, Frongillo et al. 2003). In this case New York State hired a Cooperative Extension officer based at Cornell University to coordinate FMNP promotion efforts across agencies. This person coordinated primarily between the Department of Agriculture and Markets and the State Department of Health. Through meetings with local extension agencies (responsible for farmers' market promotion at the county level) and creation and distribution of nutrition education materials to the local extension agencies New York reversed its previous year-on-year decline in redemption rates and actually increased participation by 2.2 percent beyond expectation (Conrey, Frongillo et al. 2003). This increased farmer income between \$122,931 and \$316,754 and presumably increased F&V consumption in participants (Conrey, Frongillo et al. 2003).

Dollahite (a collaborator on Conrey's work) and colleagues examine the same New York interventions from a community capacity-building perspective. The study found that those

jurisdictions within New York that actuated the most successful interventions in terms of increased redemption rate also moved beyond strict FMNP issues to focus larger issues of food security and poverty. As such, the authors stress farmers' markets, encouraged to form and supported by FMNP voucher redemption, as vehicles for development of social capital and community development (Dollahite, Nelson et al. 2005).

#### E. Theoretical Foundation for In-Kind Transfer Programs

Thurow (1974) establishes a foundation Just & Weninger by showing how government transfers—which normally disrupt market action and decrease total economic surplus—can actually lead to increased total surplus if they are made in-kind and according to principles of the inherent value of equitable distribution. The author argues that if we move beyond a private-personal utility concept towards a societal-social framework, then equitable distribution of goods can be a direct argument in the utility function (Thurow 1974). This can be seen positively in the social attitude towards healthcare, which is not distributed (solely) according to market principles of the ability to pay. Thurow makes an interesting negative argument about the market for drugs; society has associated negative utility with drug consumption, and thus seeks to spread non-consumption to all members (Thurow 1974). Fresh F&V consumption can be seen as an opposite situation and the FMNP as a small step towards generalizing behavior with positive effects on society.

#### F. Related and Miscellaneous Literature

Allison Brown traces the evolving role of farmers' markets in American society (Brown 2001). At the turn of the 20<sup>th</sup> century farmers' markets were an essential component of the urban

food environment; without national road networks small farmers were confined to selling their produce in the nearest town or city. The post-World War II period and the rise of efficient highway networks allowed for producer consolidation and out-of-region sales. This, combined with supermarket ascendancy, led to a virtual collapse of farmers' markets by the early 1960s. Then, beginning perhaps in the late 1960's (data is missing for much of the decade) and continuing through to the present, farmers' markets have made a robust comeback. Brown records only 342 markets operating in 1970. By 1990 she finds 1,890 markets in operation, and by the year 2000 that increased to 2,842 (Brown 2001). Brown notes that "surviving smaller farms have been able to exist, for the most part, on the outskirts of urban areas. These farmers have not been forced to sell out partly because they have been able to change their production systems and markets strategies to take advantage of local conditions" (Brown 2001).

Kunkel et al. analyzed the impact of the related Senior Farmers' Market Nutrition Program (funded by the USDA and administered by local Councils on Aging instead of WIC offices) in South Carolina. In 2001 South Carolina received \$750,000 to conduct a pilot SFMNP program. The state disbursed \$50 worth of vouchers (in 5 \$10 increments, no change given) to 15,000 recipients statewide (Kunkel, Luccia et al. 2003). This voucher benefit is nearly double the highest subsidy under the WIC FMNP. While the SFMNP population differs significantly from their WIC counterparts, the difference in redemption rate is striking. The seniors redeemed over 85 percent of their vouchers, compared to 55 percent nationwide redemption in WIC FMNP programs. While other factors may influence this effect (e.g. not having to worry about childcare or work schedules, greater knowledge or valuation of F&V, differential access to markets) receiving larger subsidies may also play a role.

Arcia and colleagues examine effects of WIC (non-FMNP) subsidies on household food expenditures and consumption patterns. Using 24 hour dietary recall surveys of 4,219 WIC and 785 non-WIC women, researchers determined that WIC participants consume more nutrient-dense foods than others, and that WIC participants spend much less on meals outside the home than comparable non-WIC women, suggesting more efficiency in food budget allocations (Arcia, Crouch et al. 1990). WIC participation does not increase total food expenditures, rather the restrictive nature of the subsidy drives consumption in a more nutritious direction subject to the same food budget (Arcia, Crouch et al. 1990).

#### G. Summary of Literature

Virtually all the FMNP studies dealt with survey data of WIC participants in a single WIC jurisdiction at one point in time. Only one (Just and Weninger 1997) approached the program from a purely economic viewpoint. The rest concerned themselves primarily with nutrition and dietetics, and relied on Just & Weninger's work to assure readers that—by the way—farmers' markets are good for the community bottom line as well. It has been nearly 15 years since a national econometric analysis of USDA WIC FMNP has been conducted. My research hopes to partially fill that void. Methods and goals for this research are discussed below.

### III. Economic Model

The economic modeling for my research is based on the concept of budget constraints. There is strong evidence—from economics, nutrition, geography, and sociology—which suggests that farmers' markets are positive institutions in our society. Based on this it makes sense to invest in

our farmers' markets, as through FMNP subsidies. However, given the tight budget situation at all levels of government, increased program funding on a national scale seems unlikely. With this in mind, it is important that states use existing funding in the best manner possible.

Each state wishes to get the largest share of funds possible, within the confines of the program budget. I argue that, to a large extent, the USDA allocates funding based on program effectiveness as measured by voucher redemption rates. The main tool the states have at their disposal is setting voucher benefit level. Given budget limitations, states are already unable to serve all those who are eligible, even at the lowest allowable level. States must balance serving the greatest number of eligible women and children with the reality that as participation increases, the value of subsidy possible decreases. Given that redemption rates likely increase with voucher level, and that program funding is conditioned on redemption levels, states must choose between less effectively serving more women and children, or focusing benefits on fewer recipients to maximize program effectiveness.

#### IV. Empirical Strategy

This model predicts that benefit levels will be positively related to changes in states' shares of the national FMNP budget, controlling for other influences on program effectiveness. In this section I estimate size of this relationship.

##### A. Econometric Model

Given this hypothesis, it is essential test the link between voucher benefits and program effectiveness. I have endeavored to create an OLS regression specification that clarifies this link in the context of available data. As stated below, efforts to use voucher redemption rates as the

dependent variable failed due to lack of data. In the end I created a proxy measure for program effectiveness to replace this missing variable (discussed below). For independent variables, the most important is obviously the voucher benefit level, as determined by the states. I also considered it important to control in some way for the level of agricultural and farmers' market activity in the state. States with large agricultural sectors and well-established farmers' market systems are likely to display higher levels of measured program effectiveness regardless of the benefit level chosen by the state. Race and ethnicity were also considered, but again comprehensive data on program participants were not available, and this factor ultimately proved insignificant for my research.

## B. Description of Data

Public electronic records regarding FMNP are inconsistent and often difficult to interpret. Redemption rates are, as I have mentioned previously, the standard metrics of program effectiveness in the literature. Redemption rates allow researchers to infer how accessible and desirable researchers consider F&V. Increased F&V consumption is, at the core, what FMNP is all about. Unfortunately, the USDA Food and Nutrition Service do not maintain a comprehensive database of FMNP redemption rates across jurisdictions or time. Various strategies to remedy this defect, including FOIA requests, were rejected as excessively costly or time-consuming within the scope of this research. Instead, this research relies on data publicly available through the FNS website and the U.S. Census bureau.

For the dependent variable in my regression, I have created a proxy variable (called "*index*") for program effectiveness in each state. This variable is a ratio whose numerator is the percentage of annual funding granted to each state, and whose denominator is the percentage of the national recipient population served by each state. The proxy effectiveness index is thus

equal to 1.0 for the nation as a whole for each year. This data comes from the Food & Nutrition Services data series “WIC Farmers’ Market Program Profiles” which are available from 2004-2009 inclusive (USDA 2010). The percentage of annual program funding is calculated by summing the grant allocations to each state, then dividing each state’s allocation by this sum. A directly analogous procedure was followed for program recipient data. “*Index*” is simply the ratio of the former to the latter. All calculations were conducted using the STATA-11 software package.

The main independent variable, voucher benefit level, is readily available from the same FNS data series. This data is as nearly ideal as can be hoped for. Again, this data comes straight from the Food & Nutrition Services data series “WIC Farmers’ Market Program Profiles” which are available from 2004-2009 inclusive (USDA 2010).

Access is a major factor in determining market usage. Ideally, we would have individual level data on awareness of farmers’ market locations and hours or perhaps even self-reporting data of the length of time it takes recipients to reach an FMNP participating market. Unfortunately these data do not exist, and a large-scale national survey to obtain them is impractical. Instead I amalgamated existing data to construct a reasonable substitute I term “*access*.” This variable is the sum of all participating farmers, farmers’ markets, and roadside F&V stands in a state, divided by the land area in square miles of that state. The producer and vendor data comes from the Food & Nutrition Services data series “WIC Farmers’ Market Program Profiles” which are available from 2004-2009 inclusive (USDA 2010). The land area data come from the U.S. census bureau (USCB 2011). Again, the calculations occurred within the STATA-11.1 software package.



The literature suggests that there may be important differences in program use between ethnic groups. An analysis of the impact of race is important and potentially helpful. Unfortunately the USDA only publishes Program & Participant Characteristics data biennially. Additionally, they stopped reporting usable ethnic data after their 2006 report. Therefore, racial data was only available for 2004 and 2006 (USDA 2004; USDA 2006). In none of the considered regression specifications were these limited data significant, and they have been omitted in the final analysis.

After considering several regression specifications using the preceding data, I have decided to use the following semi-log specification:  $index = cons. + \beta_0 \ln(benefit) + \beta_1 \ln(access) + err.$  “*Index*” is already normalized to 1.0, so it is unnecessary to convert to natural log form in order to consider percentage changes. An increase of 0.15 in “*index*” represents a 15 percent increase.

Using the log-forms for “*benefit*” and “*access*” reflects the fact that increasing these variables is likely to have less effect at higher initial levels. Increasing “benefit” from \$12 to \$13 ought to have a higher impact on “index” than increasing from \$29 to \$30. The same logic applies to “access;” adding an additional market to a highly market-saturated state should have less effect than opening the same market in a low-saturation state. Analyzing the effects of these variables in log-form allow us to consider the effects of percentage increases, rather than merely nominal increases. See Table 2 below for summary statistics. Heteroscedasticity is strongly suspected in the data. To counter this, heteroscedasticity-robust procedures were used in the OLS regression.

### C. Results of Statistical Analysis

The results indicate that there is a connection between benefit level and index. The mean voucher benefit level in the data is \$20.57. For the 163 observations with a voucher benefit less than \$20.57 the mean “index” value is 1.25. For the 66 observations with voucher benefit greater than \$20.57 the mean “index” value is 1.80 (See Table 3).

Table 1 shows that a regression analysis verifies this result. The coefficient on  $\ln(\textit{benefit})$  is 0.294, ( $P < 0.143$ ). The coefficient on  $\ln(\textit{access})$  is -0.385, significant at the ( $P < 0.036$ ). The constant in the regression is -2.05 ( $P < 0.13$ ). The regression R-squared is 0.17.

#### D. Interpretation

These results are important. The significant positive coefficient on  $\ln(\textit{benefit})$  indicates that a one percent increase in voucher benefit levels leads to a 0.294 point increase in the proxy index of program effectiveness. This means that for a one percent increase in voucher benefit level will increase program effectiveness by 0.294, holding all else constant. If a state increases their voucher benefit from \$20 to \$21 (a 5 percent increase) they could increase their effectiveness index by 1.47, holding all else constant. This means that a state wishing to better serve its population (and incidentally increase the share of money it gets from the feds) would be well-served by increasing the per-recipient voucher allocation.

The negative coefficient on  $\ln(\textit{access})$  was surprising at first. However, this result suggests that the USDA considers market access in funding allocations. Jurisdictions that have already have better-than-average access to farmers’ markets do not need as much help developing and maintaining their market base. On the contrary, states that have lower than average access measures are assisted in developing and maintaining markets to better serve their food-insecure populations.

## V. Conclusions and Directions for Further Research

Based on my research I conclude that states wishing to receive a larger share of federal resources would be well-advised to increase their voucher benefit levels. Unfortunately this may come at least partially at the expense of the ability to fund the same number of beneficiaries at this increased level. Research on the elasticity of the tradeoff between increasing federal grant share and ability to provide larger subsidies is warranted.

Based on the literature, funding fewer recipients at a higher level makes sense in my opinion. The Los Angeles intervention proves that a significant voucher investment and education over time can positively influence F&V consumption in low income communities (Herman, Harrison et al. 2006). While wide diffusion of benefits makes sense from an equity standpoint, it must be balanced against diffusion of resources. As much of the literature testifies, a large factor in FMNP success is the educational component. The ability of the FMNP to increase familiarity with and appreciation of F&V among low income women decreases in proportion as the F&V subsidy declines.

Throughout the literature, access is a major factor cited in the ability of voucher recipients to actually enjoy the benefits of fresh, local F&V. It is encouraging that market access equity appears built into the funding mechanism employed by USDA. States with robust farmers' market systems receive less help than those with more fragile market infrastructure. Factors such as climate, growing season, crop diversity, and state agricultural policy may all affect the ability of farmers to capitalize on FMNP receipts. Grain, dairy, meat, and nut producers (all significant in various regions) are excluded from the program. Regions with a

preponderance of these activities may be precluded from participating. Whether it is worthwhile for wheat farmers or ranchers to convert some acreage to vegetable cultivation may depend in large part on the indirect subsidy provided by FMNP.

A major realm for research lies in my original research design. Consumer-level research on the interaction between benefit level and redemption rates would be valuable. At the moment existing literature and my research suggests that increasing the benefit level has positive effects on jurisdictional program funding share. Redemption rate is the most common measurement of program effectiveness in existing FMNP studies. Analyzing the redemption rate elasticity of benefit level would help states better understand the impact of the choices they face in voucher allocation along their program budget constraint.

Despite our beloved “fruited plains” and “amber waves of grain” America remains a nation plagued by unnecessary hunger. Our altruistic impulse as a nation, combined with a desire to preserve our nation’s agricultural way of life have prompted the federal government to take a small step towards alleviating that danger for a particularly vulnerable portion of our citizens. Though the program does not solve the root problems of poverty, substandard education, discrimination, and urban segregation facing large numbers of the poor, it does help a few people eat a little better for a few months of the year. As the saying goes “half a loaf is better than no bread.” Learning how policy choices affect those our money is meant to assist is vital to avoiding missteps and waste. The WIC Farmer’s Market Nutrition Program should not be exempt from that process. Overall, however, the record shows FMNP to be important and beneficial to both those who grow and those who consume our national bounty.

## VI. References

- Anderson, J., D. Bybee, et al. (2001). "5 A Day Fruit and Vegetable Intervention Improves Consumption in Low Income Population." Journal of the American Dietetic Association **101**: 195-202.
- Anliker, J. A., M. Wine, et al. (1992). "An Evaluation of the Connecticut Famers' Market Nutrition Program." Journal of Nutrition Education **24**(4): 185-191.
- Arcia, G. J., L. A. Crouch, et al. (1990). "Impact of the WIC Program on Food Expenditures." American Journal of Agricultural Economics **72**(1): 218-226.
- Bitler, M. P., J. Currie, et al. (2003). "WIC Eligibility and Participation." The Journal of Human Resources **38**(Special Issue on Income Volatility and Implications for Food Assistance Programs): 1139-1179.
- Brown, A. (2001). "Counting Farmers Markets." Geographical Review **91**(4): 655-674.
- Conrey, E. J., E. A. Frongillo, et al. (2003). "Integrated Program Enhancements Increased Utilization of Farmers' Market Nutrition Program." Journal of Nutrition **133**(6): 1841.
- Dollahite, J. S., J. A. Nelson, et al. (2005). "Building Community Capacity through Enhanced Collaboration in the Farmers Market Nutrition Program." Agriculture and Human Values **22**(3): 339-354.
- Farrell, M. M., J. F. Wilson, et al. (1995). ""'Get Fresh' Gets Results:" Farmers' Market Nutrition Program Enhances Nutrition Knowledge in Low Income Community." Journal of the American Dietetic Association **95**(9, Supplement 1): A57-A57.
- Fox, L. L., B. A. Kirks, et al. (2001). "Evaluation of a farmers' market nutrition curriculum for participants of the butte county special supplemental nutrition program for women, infants, and children." Journal of the American Dietetic Association **101**(9, Supplement 1): A-51.
- Galfond, G., J. Thompson, et al. (1991). "Evaluation of the Farmers' Market Coupon Demonstration Project." USDA Food and Nutrition Service
- Herman, D. R., G. G. Harrison, et al. (2006). "Choices Made by Low-Income Women Provided with an Economic Supplement for Fresh Fruit and Vegetable Purchase." Journal of the American Dietetic Association **106**(5): 740-744.
- Just, R. E. and Q. Weninger (1997). "Economic Evaluation of the Farmers' Market Nutrition Program." American Journal of Agricultural Economics **79**(3): 902-917.

Kropf, M. L., D. H. Holben, et al. (2007). "Food Security Status and Produce Intake and Behaviors of Special Supplemental Nutrition Program for Women, Infants, and Children and Farmers' Market Nutrition Program Participants." Journal of the American Dietetic Association **107**(11): 1903-1908.

Kunkel, M. E., B. Luccia, et al. (2003). "Evaluation of the South Carolina Seniors Farmers' Market Nutrition Education Program." Journal of the American Dietetic Association **103**(7): 880-883.

McCormack, L. A., M. N. Laska, et al. (2010). "Review of the Nutritional Implications of Farmers' Markets and Community Gardens: A Call for Evaluation and Research Efforts." Journal of the American Dietetic Association **110**(3): 399-408.

Nord, M., M. Andrews, et al. (November 2009). Household Food Security in the United States, 2008. E.R.R.-83, U.S. Dept. of Agriculture, Econ. Res. Serv.

Sen, A. (1989). "Development as Capability Expansion." Journal of Development Planning **19**: 41-58.

Thurow, L. C. (1974). "Cash Versus In-Kind Transfers." The American Economic Review **64**(2): 190-195.

USCB (2011). "US Census Bureau State & County Quickfacts." from <http://quickfacts.census.gov/qfd/index.html>.

USDA (2004). "WIC Program Racial/Ethnic Enrollment by Region and State." Retrieved April 22, 2011, from <http://www.fns.usda.gov/wic/racial-ethnicdata/2004table1.htm>.

USDA (2006). "WIC Program Composition of Ethnic Participant Enrollment." Retrieved April 22, 2011, from <http://www.fns.usda.gov/wic/racial-ethnicdata/2006table3.htm>.

USDA (2010). "WIC Farmers' Market Nutrition Program 2009 Profile (as of September 2010)." from <http://www.fns.usda.gov/wic/fmnp/FMNP2009.htm>.

USDA (2010). "WIC Farmers' Market Nutrition Program Grant Levels by State FY 2005-2010." Retrieved April 16, 2011, from <http://www.fns.usda.gov/wic/fmnp/FMNPgrantlevels.htm>.

USDA (Mar. 11, 1994). Part 248--WIC Farmers' Market Nutrition Program (FMNP), 59 FR 11517.

Walker, J. L., D. H. Holben, et al. (2007). "Household Food Insecurity Is Inversely Associated with Social Capital and Health in Females from Special Supplemental Nutrition Program for Women, Infants, and Children Households in Appalachian Ohio." Journal of the American Dietetic Association **107**(11): 1989-1993.

## VII. Tables

| Table 1.      | (1)<br>Semi-Log     | (2)<br>Log-Log    | (3)<br>Race-Included |
|---------------|---------------------|-------------------|----------------------|
| Constant      | -2.05<br>(1.32)     | -2.32<br>(0.92)   | -2.47<br>(1.47)      |
| Benefit       | 0.294*<br>(0.196)   | 0.142<br>(0.113)  | 0.0591<br>(0.163)    |
| Access        | -0.385**<br>(0.177) | -0.323<br>(0.132) | -0.311<br>(0.118)    |
| Black         |                     |                   | 4.62<br>(4.65)       |
| Hispanic      |                     |                   | -0.204<br>(0.0881)   |
| R-squared     | 0.173               | 0.196             | 0.2235               |
| N             | 227                 | 227               | 73                   |
| Year Effects? | Yes                 | Yes               | Yes                  |

\*\* statistically significant at the 5% level

Table 2.

| Variable    | Mean  | N   |
|-------------|-------|-----|
| Index       | 1.41  | 229 |
| Ln(Benefit) | 2.99  | 228 |
| Ln(Access)  | -6.24 | 228 |
| Hispanic    | 0.252 | 77  |
| Black       | 0.226 | 77  |



Table 3.

| Benefit Level        | Index | N   |
|----------------------|-------|-----|
| Less than \$20.57    | 1.25  | 163 |
| Greater than \$20.57 | 1.80  | 66  |

