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An Economic Analysis of the Impact of Food Prices and Other Factors on Adult Lifestyles: Choices of Physical Activity and Healthy Weight[♦]

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Abstract: This paper examines women's and men's decisions to participate in physical activity and to attain a healthy weight. These outcomes are hypothesized to be related to prices of food, drink and health care services and products, the respondent's personal characteristics (such as education, reading food labels (signaling a concern for good health), adjusted family income, opportunity cost of time, occupation, marital status, race and ethnicity) and his or her BMI at age 25. These decisions are represented by a trivariate probit model that is fitted to data for adults in the NLSY79 panel with geocodes that have been augmented with local area food, drink and health care prices. Separate analyses are undertaken for men and women due to basic physiological differences. Results include: Women and men who read food labels are more likely to participate in moderate and vigorous physical exercise, and women are less likely to be obese. Women with more education are more likely to be obese but educated men are less likely to be obesity. Higher prices for fresh fruits and vegetables and non-alcoholic drinks increase likelihood of obesity for females but not for males; and a higher price for processed fruits and vegetables reduce likelihood of obesity for females but not for males. A larger BMI at age 25 has wage effects later in life and also increases the probability of being obese.

Key Words: physical activity, obesity, food prices, adults, developed country

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An Economic Analysis of the Impact of Food Prices and Other Factors on Adult Lifestyles: Choices of Physical Activity and Healthy Weight

The objective of this study is to examine women's and men's decisions to participate in physical activity and to attain a healthy weight. Given that earlier studies have shown that light physical activity has little impact on an individual's later health status, the focus is on decisions to participate in moderate and vigorous physical activity.[1] To examine energy balance, the focus is on the individual's weight given height; a BMI of 20-24.9 is ideal, 25-29.9 indicates over-weight status and 30 and larger indicates obesity.[2] Good health is produced in the households using food, physical activity, and purchased health care. Household utility is derived from good health, leisure, and food consumption (Huffman et al. 2008). The household's demand for physical activity and supply of a healthly weight are explained by the educational attainment, opportunity cost of time, age, gender, and early health status of its adult members and the prices of food and drinks and health care that it faces in local markets. See Etilé (2008) for a somewhat similar analysis of French data.

Due to important gender-related physiological differences, the empirical analysis is undertaken on men and women separately. The primary data set for the study is the 2004 round of National Longitudinal Survey of the Youth 1979 Cohort (NLSY79) with geographic codes. The 2004 round is the first round in the NLSY79 panel where individuals are asked questions about the frequency and duration of different types of physical activity. Secondary data for food and drink and health care prices for major urban areas of the U.S. are obtained from the American Chamber of Commerce Researchers Association (ACCRA) Cost of Living Index

[1] Lee and Paffenbarger (2000) concluded that light activities were not associated with reduced mortality rates, moderate activities appeared somewhat beneficial, and vigorous activities clearly predicted lower mortality rates. Also, Khaw et al. (2008) have shown that a healthy lifestyle of middle-aged adults reduces mortality significantly.

[2] BMI = weight in kilograms divided by height in meters squared.

(CLI) 2004 report. They are grouped into seven food and drink groups and expressed in real terms. They are then merged with the NLSY data using location codes.

Empirical Model

Physical activity is associated with transportation, work at home or in the market and recreational activities, and it may be at light, moderate or vigorous intensity. However, only moderate and vigorous physical activities have been shown to significantly improve health. Diet is a key determinant of energy intake, and the amount of food and drink consumed is affected by the food prices, price of time, income and other factors. An index of a healthy weight is an individual's body mass index (BMI).[1]

Since the NLSY79 data set does not include nutritional information, the basic empirical model of this study examines decisions to participate in regular vigorous (Y_1) and moderate physical activity (Y_2) and to be obese (have a BMI of 30 or higher (Y_3)):

$$
\begin{aligned}
Y_k = {} & \beta_{k0} + \beta_{k1}\, RNI + \beta_{k2}\, EDU + \beta_{k3}\, V + \beta_{k4} \ln(WAGE) + \beta_{k5}\, BMI25 + \beta_{k6}\, PMF \\
& + \beta_{k7}\, PDAIRY + \beta_{k8}\, PFFV + \beta_{k9}\, PPFV + \beta_{k10}\, PALC + \beta_{k11}\, PNALC + \beta_{k12}\, PFF \\
& + \beta_{k13}\, PHC + \beta_{k14}\, MVOCCU + \beta_{k15}\, NOCCU + \beta_{k16}\, AGE + \beta_{k17}\, MARRIED \\
& + \beta_{k18}\, BLACK + \beta_{k19}\, HISPANIC + \beta_{k20}\, URBAN + \beta_{k21}\, NE + \beta_{k22}\, NC \\
& + \beta_{k23}\, SOUTH + \varepsilon_k \qquad \text{(1)-(3)}
\end{aligned}
$$

where k = 1,2,3, and ε_k is a random disturbance term representing other factors. See Table 1 for a brief description of each of the variables.

Moderate intense physical activity (walking, gardening, low speed bicycling) increases the human metabolic rate by 3 to 6 fold relative to the rate at a quite rest, and vigorous physical activity (jogging, climbing, race walking, tennis, high speed bicycling) increases the body's

[1] Height and weight for constructing BMI are self reported in the NLSY79. Cawley (2000) has shown that these self reported measures contain error, but generally are not of major consequence in regression analysis.

metabolic rate by 6 fold or more. Respondents are classified as participating in "regular" physical activity if they engage in such activities for at least thirty minutes three or more times per week. The dichotomous measure of regular physical activity has a major advantage when reported minutes of regular physical activity are believed to contain significant measurement error, i.e., individuals know whether they regularly engage in moderate or vigorous physical exercise, even if they cannot accurately recall exactly how much . Hence, we define $LP_1 = Y_1 = 1$ if the individual participates in vigorous physical activity regularly and 0 otherwise; $LP_2 = Y_2 = 1$ if the individual participates in moderate physical activity regularly and 0 otherwise; $OBESE = Y_3 = 1$ if the individual has a BMI of 30 or larger and 0 otherwise.

Assume that a system of latent variables LP_1^*, LP_2^*, and $OBESE^*$ exists, but only LP_1, LP_2, and *OBESE* are observed. Denote all the independent variables as a 24×1 vector[1] x and all the coefficients as a 24×1vector β_k where k=1, 2, 3:

$$\begin{aligned} LP_{1i}^* &= \beta_1' x_i - \varepsilon_{1i} \\ LP_{2i}^* &= \beta_2' x_i - \varepsilon_{2i}\,,\ LP_{ji} = \begin{cases} 1 & LP_{ji}^* > 0 \\ 0 & LP_{ji}^* \le 0 \end{cases} \quad j = 1,2 \ \text{ and } \ OBESE_i = \begin{cases} 1 & OBESE_i^* > 0 \\ 0 & OBESE_i^* \le 0 \end{cases} \\ OBESE_i^* &= \beta_3' x_i - \varepsilon_{3i} \end{aligned} \qquad (4)$$

where i refers to a particular individual. Assume the disturbances in (4) are joint normally distributed:

$$\begin{pmatrix} \varepsilon_{1i} \\ \varepsilon_{2i} \\ \varepsilon_{3i} \end{pmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho_{21} & \rho_{31} \\ \rho_{21} & 1 & \rho_{32} \\ \rho_{31} & \rho_{32} & 1 \end{bmatrix} \right)$$

Where ρ_{mj} will be positive if ε_{mi} and ε_{ji} are positively correlated and will be negative if ε_{mi} and ε_{ji} are negatively correlated, where m=*2, 3,* j =1, 2, $m > j$.

[1] When considering the working sample, all the observations have occupational information available, i.e. *NOCCU*=0 for all these observations, so this variable is excluded from equations fitted to the working sample.

Much debate exists about the importance of food labels in food choices and good health. However, an individual reading food labels is a healthy attitude signaling a concern for nutrient content of food, quality of diet and perhaps good health (Kim et al. 2001) . Also, an individual's education has been shown to create allocative or decision making skills and also to lower the cost of acquiring and interpreting information (Huffman 1977, Schultz 1975). Hence, the hypothesis is that adults who read food labels (*RNI*) and have more education (*EDU*) are more likely to engage in moderate and vigorous physical activity regularly and less likely to be obese (Zarkin et al. 1993).[1] Also, nonlabor income (*V*) represents income effects and the wage represents the impact of the opportunity cost of time on lifestyle choices (Thakur 2006). Lifestyles that are normal goods will increase with V; a higher probability of regular moderate and vigorous physical activity. Lifestyles that are time intensive will be chosen sparingly when an individual's time has a high price; lower probability of regular moderate and vigorous physical activity and more likely to be obese. An individual's BMI at age 25 reflects early tendencies for energy imbalance and an (un)healthy weight; and an individual with a higher BMI25 is less likely to engage in current regular moderate and vigorous physical activity and more likely to be obese. The prices of food and drink (*PMF*, *PDAIRY*, *PFFV*, *PPFV*, *PALC*, and *PNALC*) affect the costs of various lifestyles.[2] A high price for fresh fruits and vegetables increases the cost of a healthy diet and increasing the probability of being obese. The impact on the probability of regular moderate and vigorous physical activity is less certain. The price of medical care (*PHC*) affects the price of purchased inputs to health production; increasing the probability of regular moderate and vigorous physical exercise and reducing the probability of being obese.

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[1] We treat reading food labels as an indicator of a healthy attitude that then affects decisions on physical activity and obesity. Of course, they might be jointly determined. One could examine the impact of lagged food label reading on current decisions on physical activity and being obese.

[2] To eliminate the locational noise of the price data and to solve the problem of different units among purchased items, a real price for each food item was created by dividing an item's price in a particular area by its average price among all the participating area, and this real price was used to generate weighted prices for a price group.

Data

There are a total of 7,650 individuals, ages 39-47 years, in the 2004 round of the NLSY79. However, a number of these individuals were eliminated due to various reasons leaving a sample of 5,625 individuals—2,987 women and 2,638 men. There are 2,290 working women and 2,328 working men and they are the focus of much of the analysis.

The American Chamber of Commerce Researchers Association (ACCRA) collects data on prices of 63 different items in 300 U.S. cities quarterly. These price data are one of the few at this level and detail, and economist have found them to contain useful information for explaining behavior (Chou et al. (2004), Powell et al. (2006), Auld and Powell (2008) for the price of fast food, Keng and Huffman (2007) for the price of alcohol, and Auld and Powell (2008) for the price of fruits and vegetables). The ACCRA data are collected at the establishment level and the basket of goods reflects a mid-management standard of living. However, the weight for each item is derived from expenditure shares in the U.S. Bureau of Labor Statistics' 2002 Consumer Expenditure Survey. Hence, the ACCRA price data provide useful information on area level prices of individual food items and health care and expenditure weights.

The following prices for consumption commodity groups were created: price of meat and fish *(PMF)*, price of dairy foods *(PDAIRY)*, price of fresh fruits and vegetables (*PFFV*), price of processed fruits and vegetables (*PPFV*), price of alcoholic drinks (*PALC*), price of non-alcoholic drinks (*PNALC*), price of fast food (*PFF*), and price of health care (*PHC*). *PMF* was derived from prices for T-bone steak, ground beef or hamburger, sausage, frying chicken, and chunk light tuna. *PDAIRY* was derived from the prices for the whole milk, eggs, margarine, and grated parmesan cheese. *PFFV* was derived from prices of bananas, potatoes, and iceberg lettuce. *PPFV* was derived from prices of frozen corn, fresh orange juice, canned peaches, canned tomatoes, and canned sweet peas. *PALC* is derived from prices for beer, wine, and liquor. *PNALC* was derived from prices for vacuum-packed coffee, and Coca Cola. *PFF* was derived from prices for a McDonald's Quarter-Pounder with cheese, an 11"-12" thin crust cheese pizza at Pizza Hut or Pizza Inn, and fried chicken (thigh and drumstick) at Kentucky Fried Chicken or Church's Fried Chicken. And *PHC* was derived for the prices from optometrist visit, doctor visit, dentist visit, and price for ibuprofen. (See Appendix III for more details on the list of items included in each component and the units priced.)

To eliminate locational noise in the price data and to solve the problem of different units among purchased items, a *real price for each item* was created by dividing an item's price in a particular area by its average price among all the participating areas, and this real price was used to generate weighted consumer prices for each commodity group. Let P_{ki} denote the price of consumption category k in city i, P_{kji} denotes the price of consumption item j in category k in city i, and $avgP_{ki}$ denotes the average price of consumption item j in category k in city i across all participating cities in ACCRA. W_{kj} denotes the expenditure weight of consumption item j in category k in city i where $\sum_j W_{kj} = 1$ for any k. Then the price of consumption category k in city i is:

$$P_{ki} = (P_{k1i} / avgP_{k1})\ W_{k1} + (P_{k2i} / avgP_{k2})\ W_{k2} + \ \ldots\ldots + (P_{kJ} / avgP_{kJ})\ W_{kJ} \qquad (5)$$

where J is the total number of items belonging to consumption category k. See Appendix IV for an example showing how the weighted price for a food group is created.

Not all NLSY respondents lived in an ACCRA cost of living index (CLI) participating cities, so a different strategy was developed for obtaining prices for respondents who lived in these areas. First, the price index was calculated for all ACCUR CLI participating cities in the same state as the respondent's residence, and then a simple average price was created across them. This average price for a commodity group was then used for the price respondents faced in all non ACCRA participating cities in that state. This methodology has been successfully applied by Keng and Huffman (2007) for the price of alcohol.

Real adjusted family income is computed as total family income less the respondent's earnings (in $100,000) divided by the ACCRA cost of living index for the area when the respondent resides. The NLSY computes the average hourly wage, earned at the primary job, of a respondent in each year of the survey. The real wage is the average hourly wage (annual earning divided by annual hours of work) divided by the ACCRA cost of living index for the area where the respondent resides. However, to take account of measurement errors and potential endogeneity of individuals' wage, we fit hedonic wage equations for all working respondents, and account for dynamic effects of past health status by including an individual's BMI at age 25 (*BMI25*) and its square as regressors. This is new, although Cawley (2004) experimented with including a 7-year lagged value of BMI in wage equations for men and women in the NLSY survey. To account for selection of working samples, probit labor force participation equations are fitted and the predicted values from these equations are used to control for possible sample selection bias in the wage equations (Heckman 1979). Prior studies have shown that women's and men's wage equations differ significantly, and hence, they and all other equations are fitted separately for women and men.

For individuals who specialize in housework or market work, their job requires a certain amount of effort, and the energy requirement ratings are reflected in *MVOCCU.* A high *MVOCCU* increases the probability that an individual engages in moderate or vigorous physical activity and lowers the probability that he/she is obese.

Table 1 contains further information on the definition of the variables used in this study, and Table 2 reports sample means and standard deviations for theses variables. For the working females, 35 percent report both vigorous and moderate physical exercise regularly, and 32 percent report being obese. For working men, 51 percent report vigorous and 42 percent report moderate physical exercise regularly. Thirty-one percent of the working males are obese. There is a claim that of a skip pattern in the reporting of time allocated to physical activity in the 2004 NLSY survey, but none for the working men and women. Even in the complete sample, only 23 percent of women and 12 percent of men have missing data for the physical activity rating of their occupation.

Results

Results for the female and male labor force participation decisions are reported in Table 2. The probability that an individual is in the labor force declines as their adjusted real family income increases up to $291,000 for women and up to $58,000 for men thereafter increases. Probability of working is increased as a female's or male's own education increases. Also, an increase in mother's education also increases daughter's and son's labor force participation probabilities. However, an increase in father's education reduces the probability of his daughter's and son's labor force participation. Also, if father's education is missing, this also lowers the probability of labor force participation by daughters and sons. However, if mother's education is missing, it has a positive and significant effect on her son's probability of labor force participation. For women, a larger BMI at age 25 increases the probability of her later labor force participation up to a *BMI25* of 26 and thereafter a larger *BMI25* reduces her participation. For men, a larger BMI at age 25 increases their later labor force participation, provided *BMI25* is larger than 25. However, these effects are not significantly different from zero at the 5 percent level. Among price effects on labor force participation, the impact of the price of fast food (PFF) is noteworthy. As the price of fast food increases, the probability of labor force participation of women and men declines. An individual being married increases his or her probability of labor force participation. Black males are less likely to be in the labor force. Women residing in the

Northeast, North Central and South Regions are more likely to be in the labor force than women residing in the Western Region.

Estimates of ln wage equations, controlling for selection, are reported in Table 3. As reported in other studies, an individual's own education has a positive and significant effect on his/her wage—a 10.3% increase per year of schooling for women and 7.8% for men. Our results provide new information about the impact of past/early health status—BMI at age 25 (*BMI25*) on wage rates. We find that the impact of early BMI is not linear on the ln wage at a later date. A larger early BMI (*BMI25*) reduces the later wage of women up to a *BMI25* of 32, and thereafter, larger *BMI15* increases her wage. A larger *BMI25* for men increases their later wage up to a *BMI25* of 25, but thereafter, a larger *BMI25* reduces their wage. These finding are somewhat different from results than include current BMI in the (current) wage equation because current BMI and the current wage are likely to endogenous (Cawley 2004).[1] Married men earn 24% more than non-married men. Black women earn 12% less than white women, and black men earn 19% less than white men. Women's wages are about 9% higher in urban than rural areas. Wage rates are lower in the West than in other regions. As the probability of not working increases for men, their wage offer declines. There is not significant effect of the probability of not working on women's wage rates.

The parameters of the trivariable probit model of lifestyle choices are estimated by the method of simulated maximum likelihood (SML) using the Geweke-Hajivassiliou-Keane (GHK) smooth recursive simulator. See Greene (2003, pp 932-933) for a description of the simulation algorithm used here.

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[1] Clearly current BMI does not cause *BMI25*, but there could be some unmeasured component that the two have in common. Including *BMI25* as a regressor in the wage equation does introduce some dynamics of past health status on later wage rates and does clean up the interpretation of the estimated coefficients of other regressors in the wage equation.

Women's choice of lifestyles. The discussion of the results in Table 4 places primary emphasis on working women. If females read nutrition labels on food packages when shopping, they are more likely to participate in regular vigorous and moderate physical activity and less likely to be obese. Women who have more years of schooling are more likely to be obese. A female with higher real adjusted family income is more likely to participate in vigorous physical activity regularly and less likely to be obese, but her household income has no effect on her decision to participate in regular moderate physical activity. A female's real hourly wage and BMI at age 25 do not have significant effects on her decisions to participate in either type of physical activity regularly, but a woman with a higher opportunity cost of time is less likely to be obese, other things equal, and women with higher BMIs at age 25 are more likely to be currently obese.

Prices of food and drink matter for women's health choices. If the price of fresh fruits and vegetables is higher, a woman is more likely to participate in regular vigorous physical activity. If the price of dairy foods and price of alcoholic drinks are higher, the likelihood of females' being obese is reduced, whereas if the price of fresh fruits and vegetables and price of nonalcoholic drinks are higher, the probability of being obese is higher. Results from the overall sample show that the higher the price of processed fruits and vegetables is, the lower is the likelihood of women being obese, because these foods tend to have added fat and sweetening ingredients during processing. If the price of health care is higher, the probability of females' being obese is reduced. Moreover, a joint test of the null hypothesis that all of the estimated coefficients of the food and drink price variables are zero is rejected. Sample values of the chi-square statistics from the likelihood ratio test are shown in the table (LRT2), and the critical value is 12.02 at the 10% significance level.

A woman who is employed in an occupation requiring moderate or vigorous physical activity is more likely to report participating in moderate physical activity regularly. Results from the overall sample show that women without occupational information tend to be less likely to partake in regular vigorous physical activity, and more likely to partake in regular moderate physical activity. It is well known that BMI rises with age, until late in life, and older women respondents are more likely to be obese.

Marital status does not affect the likelihood of a female's partaking in regular vigorous or moderate physical activity. However, married women are more likely to be obese. Race/ethnicity do not have a significant impact on women's decisions to participate in regular moderate or vigorous physical activity or on the likelihood of them being obese. In the overall sample, Hispanic women are more likely to be obese than white women. Women who live in urban areas are less likely to participate in regular vigorous or moderate physical exercise and are more likely to be obese. These outcomes may reflect greater crime risks of outdoor exercise for women in urban than other areas. Compared to the West, women living in the NE are less likely to participate in both types of physical activity regularly, and women living in the NC are less likely to participate in regular moderate physical activity, but region of residence does not impact the probability of women being obese.

Estimates of the cross-equation correlation of the random disturbance terms in the trivariate probit model seem plausible. The correlation of disturbances between women's participating in regular moderate and vigorous physical exercise is positive, but correlation between both types of physical exercise and being obese is negative. A test of the null hypothesis that all of the correlation coefficients are zero, i.e., $\rho_{21} = \rho_{31} = \rho_{32} = 0$ is rejected. Sample values of the chi-squared statistics are shown in each table (LRT1), and the critical value is 7.82 at the 5% significance level. Finally, the results for the overall female sample match in sign those of the working sample where estimated coefficients have sizeable z-values.

Men's choice of lifestyles. The discussion of the results in Table 5 places primary emphasis on working men. If men read nutrition information on food labels, they are more likely to participate in regular vigorous and moderate physical activity, but reading labels has no effect on their probability of being obese. Contrary to the results for women, men with more years of schooling or higher real adjusted family income are less likely to be obese, but family income has no effect on their probability of participating in regular physical activity. Men with a higher opportunity cost of time are more likely to participate in regular vigorous physical activity but also are more likely to be obese. If at age 25, they had a larger BMI, they are more likely later to be obese. But a male's early BMI does not have a significant effect on his decision to participate in either type of regular physical activity.

If the price of meat and fish is higher in the place of residence, working men are more likely to participate in vigorous physical activity regularly. But other prices do not have significant affect men's probability of participating in physical activity or likelihood of being obese. Moreover, a joint test of the null hypothesis that all of the estimated coefficients on the food and drink prices are jointly zero cannot be rejected. Sample values of the chi-square statistic from the test are shown in the table (LRT2), and the critical value is 12.02 at the 10% significance level.

Men who are employed in more physically demand occupations are more likely to report that they engage in regular vigorous physical activity. In addition, results from the overall sample show that men who do not have occupational information are less likely to engage in regular vigorous and moderate physical activity. Also, as expected older men are more likely to be obese.

Black males or Hispanic males are more likely to be obese than white males, and Hispanic men and men living in an urban area are less likely to participate in regular moderate physical activity (than those living rural areas), but this does not translate into a higher probability of being obese.

Estimates of the cross-equation correlation of the random disturbance terms in the trivariate probit model show the correlation of men's participating in regular moderate and vigorous physical exercise is positive, but the correlation of disturbances between vigorous physical exercise and being obese is negative. A test of the null hypothesis that all three correlation coefficients is zero, i.e., $\rho_{21} = \rho_{31} = \rho_{32} = 0$ is rejected. Sample values of the chi-squared statistics are shown in the table (LRT1), and the critical value is 7.82 at the 5% significance level. Finally, the results for the overall male sample match in sign those of the working sample where estimated coefficients have sizeable z-values.

Conclusion

The paper provides new evidence that early health status, as reflected in BMI at age 25, affects future wage rates significantly, and the results are different from those obtained from including current BMI. Our study also provides an economic explanation for adults' decisions to participate in physical activity and to attain a healthy weight. Individuals who have a higher adjusted real family income have a lower likelihood of being obese; older individuals within our cohort have a higher likelihood of being obese; living where prices for fresh fruits and vegetables and non-alcoholic drinks are higher increase the likelihood of women being obesity but not men; and a higher prices for processed fruits and vegetables reduce the likelihood of obesity for women but not men. In a joint test of the null hypothesis of no food and drink price effects on obesity status, the hypothesis was rejected for women but not for men. Hence, we find some major differences in the economic factors that are affecting women's and men's decisions to engage in healthy lifestyles.

Body mass index at age 25 does not significantly affect the probability of working or engaging in moderate or vigorous physical exercise for women and men, but it does significant affect their wage rate and probability of being obese in later life. Given the long reach of BMI at age 25, it is socially desirable to develop new policies that target BMI at an early age. Also, programs to encourage consumers to read food labels are promising for not only affecting food purchases but also to stimulate choice of a physically active lifestyle for women and men.

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Table 1. Variables Definition

Variable	Short Definition
Dependent Variables:	
LP1	=1 if the individual participates in vigorous physical activities regularly; =0 otherwise.
LP2	=1 if the individual participates in moderate physical activities regularly; =0 otherwise.
OBESE	=1 if the individual is currently obese(BMI$\geq$30); = 0 otherwise
Explanatory Variables	
RNI	=1 if the individual often reads nutritional information when shopping for food; = 0 otherwise.
EDU	Highest grade completed by the individual
V[1]	Real adjusted family income (in 100,000 dollar)
V SQ	Square of *V*
ln(*WAGE*)	Log of real hourly rate of pay (in cents)
*BMI*25	Body Mass Index at age 25
*BMI*25*SQ*	Square of *BMI*25
PMF	Real price of meat and fish
PDAIRY	Real price of dairy food
PFFV	Real price of fresh fruits and vegetables
PPFV	Real price of processed fruits and vegetables
PALC	Real price of alcoholic drinks
PNALC	Real price of nonalcoholic drinks
PFF	Real price of fast food
PHC	Real price of health care
MVOCCU	=1 if the individual is employed in an occupation rated as requiring moderate or vigorous physical activity; and =0 if occupation is rated as requiring light or very light physical activity
NOCCU	=1 if there is no occupational information available for this individual;=0 otherwise
AGE	Age of the individual
K5	Number of children in the household with ages under 6 years old
K12	Number of children in the household with ages between 6 and 12
K18	Number of children in the household with ages between13 and 18
MARRIED	=1 if the individual is married and spouse present; =0 otherwise.
BLACK	=1 if the individual is black; = 0 otherwise.
HISPANIC	=1 if the individual is Hispanic; = 0 otherwise.
URBAN	=1 if the individual lives in urban area; = 0 otherwise.
NE	=1 if the individual lives in northeast; = 0 otherwise.
NC	=1 if the individual lives in north central; = 0 otherwise.
SOUTH	=1 if the individual lives in south; = 0 otherwise.
WEST	=1 if the individual lives in west; = 0 otherwise.
FATHER'S EDU	Highest grade completed by the individual's father
MOTHER'S EDU	Highest grade completed by the individual's mother
NO_FEDU	=1 if father's education is missing; = 0 otherwise
NO_MEDU	=1 if mother's education is missing; = 0 otherwise

[1] Adjusted family income in the last year is calculated as the total net family income in the last year subtracted by the individual's earnings in the last year.

Table 2 Summary Statistics of Variables[1]

Variable	Female				Male			
	Working (N=2130)		Overall Sample (N=2775)		Working (N=2056)		Overall Sample (N=2341)	
	Mean	**S.D**	**Mean**	**S.D.**	**Mean**	**S.D**	**Mean**	**S.D.**
LP1	0.35	0.48	0.34	0.48	0.51	0.50	0.50	0.50
LP2	0.35	0.48	0.36	0.48	0.42	0.49	0.41	0.49
OBESE	0.32	0.47	0.33	0.47	0.31	0.46	0.31	0.46
RNI	0.53	0.50	0.53	0.50	0.38	0.49	0.38	0.49
EDU	13.59	2.38	13.40	2.45	13.32	2.52	13.19	2.56
V	0.31	0.43	0.36	0.55	0.22	0.37	0.21	0.36
Ln(*WAGE)*[2]	6.94	1.15	6.92	1.15	7.34	0.89	7.33	0.90
BMI25	23.80	4.67	24.00	4.99	25.09	3.75	25.08	3.80
PMF	1.03	0.13	1.03	0.14	1.03	0.13	1.04	0.13
PDAIRY	1.02	0.13	1.03	0.13	1.02	0.13	1.03	0.13
PFFV	1.03	0.15	1.04	0.15	1.04	0.15	1.04	0.16
PPFV	1.03	0.13	1.03	0.14	1.03	0.14	1.03	0.14
PALC	1.00	0.07	1.00	0.07	0.99	0.07	1.00	0.07
PNALC	1.01	0.10	1.01	0.10	1.01	0.10	1.02	0.10
PFF	1.00	0.05	1.00	0.05	1.01	0.05	1.01	0.05
PHC	1.03	0.12	1.03	0.12	1.04	0.12	1.04	0.12
MVOCCU	0.10	0.30	0.08	0.27	0.21	0.41	0.19	0.39
NOCCU			0.23	0.42			0.12	0.33
AGE	43.13	2.26	43.12	2.27	42.96	2.22	42.95	2.21
K5	0.08	0.29	0.09	0.32	0.14	0.41	0.13	0.41
K12	0.31	0.61	0.32	0.63	0.31	0.62	0.29	0.61
K18	0.65	0.81	0.65	0.83	0.51	0.80	0.48	0.79
MARRIED	0.54	0.50	0.54	0.50	0.59	0.49	0.56	0.50
BLACK	0.28	0.45	0.29	0.46	0.26	0.44	0.28	0.45
HISPANIC	0.19	0.39	0.18	0.39	0.18	0.38	0.18	0.38
URBAN	0.78	0.46	0.78	0.47	0.78	0.48	0.79	0.48
NE	0.14	0.35	0.14	0.35	0.14	0.35	0.15	0.35
NC	0.25	0.44	0.25	0.43	0.27	0.45	0.26	0.44
SOUTH	0.42	0.49	0.43	0.49	0.39	0.49	0.39	0.49
WEST	0.18	0.39	0.19	0.39	0.19	0.39	0.20	0.40
FATHER'S EDU	9.39	5.12	9.39	5.12	9.99	5.15	9.99	5.15
MOTHER'S EDU	10.33	3.82	10.33	3.82	10.51	3.98	10.51	3.98
NO_FEDU	0.14	0.34	0.14	0.34	0.12	0.32	0.12	0.32
NO_MEDU	0.05	0.21	0.05	0.21	0.05	0.22	0.05	0.22

[1] Here, working sample is actually the working with occupational information sample.
[2]This is the log of real actual wage, and the sample size is 2087 for female and 2056 for male. The summary statistics for the predicted log of real wage are 7.15 (0.28) and 7.12 (0.29) for female working and overall sample, and 7.43 (0.30) and 7.41 (0.31) for male working and overall sample, with standard deviation in the parenthesis.

Table 3: Maximum Likelihood Estimates of the Labor Force Participation Probit Model[1]

Variable	Female Sample (N =2133)		Male Sample (N =1898)	
	Coeff.	z-value	Coeff.	z-value
FATHER'S EDU	-0.026	-1.760	-0.038	-2.030
MOTHER"S EDU	0.018	1.060	0.069	3.240
NO_FEDU	-0.219	-1.160	-0.509	-2.250
NO_MEDU	-0.073	-0.300	0.832	2.780
EDU	0.069	3.520	0.047	1.970
V	-0.599	-2.570	-0.991	-1.820
V SQ	0.103	1.540	0.844	1.620
BMI25	0.0618	1.070	-0.1395	-1.020
BMI25SQ	-0.0012	-1.170	0.0028	1.090
PMF	0.407	0.550	0.767	0.800
PDAIRY	1.820	1.820	0.414	0.350
PFFV	-0.432	-0.690	0.795	0.990
PPFV	-2.356	-2.590	-0.931	-0.890
PALC	0.223	0.280	-0.881	-0.950
PNALC	1.818	1.660	-1.048	-0.790
PFF	-2.060	-1.900	-3.489	-2.450
PHC	0.729	1.300	0.333	0.460
K5	-0.046	-0.340	-0.042	-0.320
K12	0.031	0.450	-0.004	-0.040
K18	-0.018	-0.380	0.085	1.140
MARRIED	0.320	2.720	0.247	1.690
BLACK	-0.116	-1.090	-0.280	-2.190
HISPANIC	0.020	0.160	0.021	0.120
URBAN	0.090	1.000	0.028	0.260
NE	0.645	2.550	0.005	0.020
NC	0.544	2.380	0.187	0.670
SOUTH	0.439	1.760	-0.137	-0.460
Intercept	-0.826	-0.510	6.449	2.600
Pseudo R Square	0.039		0.081	
-Log Likelihood	620.037		370.430	

[1] The dependent variable is a dichotomous variable WORK, =1 if the individual is currently working; = 0 otherwise.

Table 4. Least Square Regression Estimates of the ln Wage Equation with Selection

Variable	Female Sample (N=2286)		Male Sample (N =2140)	
	Coeff.	t-value	Coeff.	t-value
AGE	-0.002	-0.470	0.004	0.710
FATHER'S EDU	0.008	2.090	0.013	3.810
NO_FEDU	0.007	0.140	0.106	2.080
EDU	0.103	17.020	0.078	14.390
BMI25	-0.0388	-2.330	0.0405	1.590
BMI25SQ	0.0006	2.010	-0.0008	-1.800
MARRIED	0.003	0.140	0.242	9.630
BLACK	-0.124	-4.180	-0.192	-5.930
HISPANIC	0.059	1.730	-0.042	-1.170
URBAN	0.092	3.640	-0.029	-1.170
NE	0.087	2.070	0.010	0.250
NC	0.137	3.550	0.059	1.560
SOUTH	0.145	4.310	0.105	3.090
PNWORK[1]	0.236	0.720	-0.582	-1.750
Intercept	6.178	17.640	5.487	13.180
R Square	0.204		0.261	

[1] This is the predicted probability of not working from the labor participation regression (refer to Table 2). This variable controls for selection into labor force participation.

Table 5. Simulated Maximum Likelihood Estimates of the Trivariate Probit Model with an Instrument for the Wage: NLSY 2004 Female Sample

Variable	*Working Sample (N=2290)*						*Overall Sample (N=2987)*					
	LP1		***LP2***		***OBESE***		***LP1***		***LP2***		***OBESE***	
	Coeff.	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**
RNI	0.438	7.700	0.242	4.330	-0.150	-2.160	0.422	8.410	0.214	4.370	-0.142	-2.330
EDU	-0.024	-0.320	-0.046	-0.640	0.237	2.320	0.005	0.080	-0.013	-0.210	0.332	3.760
V	0.151	2.040	-0.026	-0.350	-0.440	-2.920	0.180	3.520	0.016	0.310	-0.342	-3.460
ln(*WAGE*)	0.555	0.830	0.526	0.800	-2.313	-2.450	0.306	0.550	0.270	0.490	-3.006	-3.690
BMI25	0.004	0.540	0.004	0.530	0.231	18.880	-0.003	-0.560	-0.006	-0.980	0.215	21.290
PMF	-0.407	-0.790	-0.143	-0.280	-0.072	-0.110	-0.540	-1.190	-0.412	-0.930	0.181	0.330
PDAIRY	-0.788	-1.230	-0.440	-0.700	-1.669	-2.120	-0.986	-1.740	-0.589	-1.060	-1.644	-2.390
PFFV	0.860	2.090	0.331	0.820	1.433	2.800	0.876	2.380	0.236	0.660	1.084	2.400
PPFV	-0.016	-0.030	-0.208	-0.340	-1.158	-1.520	0.528	0.970	0.308	0.580	-1.227	-1.880
PALC	-0.059	-0.110	0.294	0.550	-1.182	-1.750	-0.028	-0.060	0.474	0.990	-1.140	-1.910
PNALC	0.484	0.670	-0.103	-0.150	2.239	2.510	0.281	0.440	-0.309	-0.500	2.527	3.320
PFF	0.301	0.410	-0.368	-0.510	-0.265	-0.290	0.696	1.080	-0.542	-0.860	-0.303	-0.380
PHC	0.332	0.850	0.357	0.930	-0.906	-1.870	0.116	0.340	0.498	1.480	-0.697	-1.640
MVOCCU	0.015	0.160	0.219	2.420	0.024	0.220	0.027	0.290	0.246	2.750	0.068	0.620
NOCCU							-0.105	-1.730	0.127	2.150	-0.037	-0.490
AGE	-0.016	-1.300	0.013	1.110	0.046	3.000	-0.017	-1.590	0.005	0.510	0.053	3.930
MARRIED	-0.050	-0.750	0.032	0.490	0.264	2.900	-0.050	-0.880	0.075	1.350	0.240	3.250
BLACK	-0.101	-0.800	0.030	0.250	0.026	0.160	-0.108	-1.010	-0.066	-0.630	-0.059	-0.410
HISPANIC	-0.033	-0.380	0.035	0.420	0.157	1.490	0.027	0.360	0.057	0.770	0.195	2.130
URBAN	-0.133	-1.490	-0.136	-1.540	0.286	2.410	-0.049	-0.650	-0.018	-0.240	0.328	3.150
NE	-0.384	-2.210	-0.361	-2.120	-0.161	-0.750	-0.336	-2.220	-0.294	-2.000	0.036	0.190
NC	-0.169	-0.990	-0.342	-2.030	0.131	0.590	-0.090	-0.600	-0.239	-1.640	0.250	1.290
SOUTH	-0.147	-0.790	-0.289	-1.580	0.053	0.220	-0.090	-0.550	-0.223	-1.410	0.257	1.230
Intercept	-4.135	-1.030	-3.714	-0.950	6.595	1.170	-2.880	-0.860	-1.868	-0.570	9.783	2.010
Rho21	0.372	12.430					0.376	14.410				
Rho31	-0.063	-1.550					-0.069	-1.900				
Rho32	-0.046	-1.160					-0.016	-0.440				
-Log Likelihood	3714.247						4836.450					
LRT1	136.227						181.099					
LRT2	13.830						17.270					

Table 6. Simulated Maximum Likelihood Estimates of the Trivariate Probit Model with and Instrument for the Wage: NLSY 2004 Male Sample

Variable	***Working Sample (N=2328)***						***Overall Sample (N=2638)***					
	LP1		***LP2***		***OBESE***		***LP1***		***LP2***		***OBESE***	
	Coeff.	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**	**Coeff.**	**Z-Value**
RNI	0.201	3.620	0.171	3.080	-0.050	-0.720	0.211	4.030	0.196	3.730	-0.048	-0.740
EDU	-0.069	-1.470	-0.045	-0.960	-0.151	-2.420	-0.039	-0.880	-0.041	-0.940	-0.090	-1.550
V	0.087	1.120	0.013	0.160	-0.322	-2.880	0.086	1.140	0.034	0.460	-0.294	-2.770
ln(*WAGE*)	1.060	1.970	0.138	0.260	1.548	2.160	0.782	1.550	0.121	0.240	0.855	1.280
BMI25	-0.004	-0.500	-0.005	-0.590	0.302	24.050	-0.003	-0.390	-0.004	-0.590	0.291	25.150
PMF	1.011	2.010	-0.012	-0.020	0.095	0.150	0.775	1.640	-0.017	-0.040	0.213	0.360
PDAIRY	-0.143	-0.230	-0.165	-0.260	1.105	1.440	0.005	0.010	0.431	0.730	0.983	1.380
PFFV	-0.206	-0.510	-0.371	-0.900	-0.527	-1.040	-0.027	-0.070	-0.137	-0.360	-0.369	-0.770
PPFV	0.309	0.510	0.054	0.090	-0.914	-1.190	0.301	0.540	-0.315	-0.560	-0.651	-0.920
PALC	-0.312	-0.600	-0.099	-0.190	-0.619	-0.950	-0.426	-0.880	-0.289	-0.590	-0.420	-0.700
PNALC	-0.947	-1.330	0.476	0.660	0.790	0.900	-0.839	-1.260	0.297	0.440	0.134	0.160
PFF	-0.276	-0.390	-0.728	-1.020	0.899	1.020	0.176	0.270	-0.224	-0.340	1.052	1.280
PHC	-0.154	-0.410	0.198	0.520	0.029	0.060	-0.232	-0.660	-0.218	-0.610	-0.217	-0.500
MVOCCU	0.153	2.320	0.037	0.560	-0.118	-1.410	0.167	2.550	0.054	0.830	-0.118	-1.430
NOCCU							-0.211	-2.560	-0.142	-1.730	0.114	1.140
AGE	-0.014	-1.160	0.001	0.100	0.047	3.090	-0.005	-0.460	0.001	0.100	0.048	3.400
MARRIED	-0.322	-2.270	-0.077	-0.540	-0.030	-0.160	-0.263	-1.970	-0.083	-0.620	0.121	0.690
BLACK	0.138	1.010	-0.114	-0.820	0.729	4.000	0.049	0.380	-0.137	-1.070	0.582	3.460
HISPANIC	0.047	0.500	-0.225	-2.350	0.208	1.750	-0.051	-0.570	-0.246	-2.750	0.179	1.610
URBAN	0.007	0.120	-0.127	-2.160	0.007	0.100	-0.004	-0.080	-0.148	-2.640	-0.019	-0.280
NE	-0.171	-1.080	0.136	0.850	0.208	1.080	-0.191	-1.300	0.045	0.300	0.101	0.570
NC	-0.279	-1.990	0.068	0.480	0.105	0.600	-0.253	-1.920	0.073	0.550	0.125	0.770
SOUTH	-0.127	-0.780	0.063	0.390	0.214	1.060	-0.085	-0.560	0.052	0.340	0.191	1.020
Intercept	-5.386	-1.530	0.147	0.040	-20.867	-4.450	-4.597	-1.400	0.066	0.020	-16.163	-3.710
Rho21	0.463	17.590					0.477	19.300				
Rho31	-0.057	-1.480					-0.039	-1.090				
Rho32	0.019	0.470					0.024	0.660				
-Log Likelihood	3970.726						4492.247					
LRT1	241.177						285.064					
LRT2	7.400						5.12					

APPENDIX I

Table A1: Metabolic expenditure values used for calculating intensity of leisure-time physical activity, by activity—Behavioral Risk Factor Surveillance System, United States, 1990-1998[12]

Activity	Metabolic Expenditure	Activity	Metabolic Expenditure
Aerobics class	6.5	Painting, papering	3.0
Backpacking	7.0	Racquetball	7.0
Badminton	4.5	Raking lawn	4.3
Basketball	6.0	Rope skipping	10.0
Bicycle machine	7.0	Rowing machine	7.0
Biking (pleasure)	6.0	Running	8.0
Boating (pleasure)	2.5	Scuba diving	7.0
Bowling	3.0	Skating(any)	7.0
Boxing	9.0	Sledding	7.0
Calisthenics	3.5	Snorkeling	5.0
Canoeing (competitive)	3.5	Snow blowing	4.5
Carpentry	3.0	Snow shoeing	8.0
Dancing	4.5	Snow shoveling	6.0
Fishing (bank or boat)	3.5	Snow skiing	7.0
Gardening	4.0	Soccer	7.0
Golf	4.5	Softball	5.0
Handball	10.0	Squash	12.0
Health club exercise	5.5	Stair climbing	8.0
Hiking	6.0	Stream fishing	6.0
Home exercise	5.5	Surfing	3.0
Horseback riding	4.0	Swimming laps	6.0
Hunting	5.0	Table tennis	4.0
Jogging	7.0	Tennis	7.0
Judo, Karate	10.0	Touch football	8.0
Mountain climbing	8.0	Volleyball	4.0
Mowing lawn	5.5	Walking	3.5
Other	4.5	Water skiing	6.0
Paddleball	6.0	Weightlifting	3.0

[12] Source: Physical Activity Trends — United States, 1990—1998. Morbidity and Mortality Weekly Reports (MMWR), March 09, 2001 / 50(09);166-9

Table A2: Estimated MET levels for selected physical activities in the compendium of physical activity[13]

METs	CATEGORY	SPECIFIC ACTIITIES
0.9	Inactivity	Sleeping
1.0	Inactivity	Sitting quietly and watching television
2.0	Transportation	Driving an automobile or light truck (not a semi)
3.0	Walking	Walking very slowly,strolling, household walking
4.0	Lawn and Garden	Raking the lawn, general gardening
5.0	Home Repair	Cleaning gutters, painting outside of home
6.0	Occupation	Using heavy power tools (jackhammer)
7.0	Conditioning	Stationary bicycle, ski or rowing machine
8.0	Sports	Competitive basketball game, touch football
9.0	Walking	Climbing hills with a 42 lb. backpack
10.0	Water	Freestyle lap swimming, vigorous effort
11.0	Running	Running at 9 minutes/mile
12.0	Bicycling	Road cycling 14-16 mph, fast or general racing
13.0/14.0	Running	Running at 7-7.5 minutes/mile
15.0	Winter	Competitive speed skating

[13] Source: Ainsworth, B. E. 2003. The Compendium of Physical Activities. Presidents Council on Physical Fitness and Sports Research Digest, Series 4, No. 2

Table A3. Physical Activity Diary Coding Guide for Occupations

Code 1 – very light/light occupations
Code 2 – moderate occupations
Code 3 – hard occupations

VERY LIGHT/LIGHT OCCUPATIONS - AVERAGE 1.5 METS– OCCUPATION ACTIVITY CODE 1

Very light occupations involve mainly sitting, including office or clerical work, the U.S.e of light tools, light assembly or repair.
Chemistry lab work
Factory work – very light (involving mainly sitting)
Office or clerical work
Printing
Student – including subjects with no aspect of physical activity, mainly attending lectures and reading or studying
Typing – including electrical, manual or computer

Light occupations involve mainly standing or walking, but no heavy lifting or carrying, including operating automated machinery.
Cleaning – light (including mainly dusting, straightening up, emptying rubbish bins)
Cooking or food preparation
Factory work – light (involving mainly standing or walking)
Machine tooling, working with sheet metal
Laundry work
Repair work (including electrical)
Shoe repair
Tailoring – including cutting, hand or machine sewing

MODERATE OCCUPATIONS - AVERAGE 4.0 METS– OCCUPATION ACTIVITY CODE 2
Occupations that involve mainly walking, lifting or carrying light loads
Carpentry
Cleaning work – hard (including mainly scrubbing floors, sweeping, washing windows, mopping)
Delivery work – light (mainly driving and the lifting of light loads)
Electrician
Factory work – moderate (involving mainly lifting, carrying light loads or operating heavy machinery)
Locksmith
Masseuse
Painting and decorating, including hanging wallpaper
Plumbing
Police work
Farming – light (including feeding small animals, shoveling grain)

HARD OCCUPATIONS - AVERAGE 6.0 METS– OCCUPATION ACTIVITY CODE 3
Occupations that involve mainly hard physical labor
Coal mining
Delivery work – hard (mainly walking, lifting and carrying heavy loads)
Factory work – hard (involving mainly carrying heavy loads, shoveling, rolling steel)

Farming – hard (including baling hay, poultry work, forking straw bales)
Fire fighter
Laborer – any job involving carrying heavy loads, shoveling, digging
Road or house construction (including driving heavy machinery)
Using heavy power tools e.g. pneumatic drill

APPENDIX II

Survey Questions on Physical Activity and Reading Food Labels:

1. Vigorous Activity

(1) FREQUENCY R ENGAGES IN VIGOROUS ACTIVITIES FOR AT LEAST 10 MINUTES

How often do you do vigorous activities for at least 10 minutes that cause heavy sweating or large increases in breathing or heart rate?

FREQUENCY:________________ (Enter a number)

SELECT TIME UNIT:

1 Per day
2 Per week
3 Per month
4 Per year
5 Unable to do this activity

(2) LENGTH OF TIME OF VIGOROUS ACTIVITIES EACH TIME

About how long do you do these vigorous activities each time?

LENGTH: ________________ (Enter a number)

SELECT TIME UNIT:

1 Minutes
2 Hours

2. Moderate Activity

(1) FREQUENCY R ENGAGES IN LIGHT OR MODERATE ACTIVITIES FOR AT LEAST 10 MINUTES

How often do you do light or moderate activities for at least 10 minutes that cause only light sweating or slight to moderate increase in breathing or heart rate?

FREQUENCY:________________ (Enter a number)

SELECT TIME UNIT:

1 Per day
2 Per week
3 Per month
4 Per year
5 Unable to do this activity

(2) LENGTH OF TIME OF LIGHT OR MODERATE ACTIVITIES EACH TIME

About how long do you do these light or moderate activities each time?

LENGTH: ________________ (Enter a number)

SELECT TIME UNIT:

1 Minutes
2 Hours

3. Reading Food Labels

When you buy a food item for the first time, how often would you say you read the nutritional information about calories, fat and cholesterol sometimes listed on the label - would you say always, often, sometimes, rarely or never?

0 Don't buy food
1 Always
2 Often
3 Sometimes
4 Rarely
5 Never

APPENDIX III

1. Food and Drink Items in Each Food Group and Unit Prices

Price Categories	Items
PMF	T-bone Steak, Ground Beef or Hamburger, Sausage, Frying Chicken, Chunk Light Tuna
PDAIRY	Whole Milk, grated Parmesan Cheese, Eggs, Margarine
PFFV	Fresh Bananas, Fresh Potatoes, Fresh Iceberg Lettuce
PPFV	Frozen Corn, Canned Peaches, Orange Juice, Canned Tomatoes, Canned Sweet peas
PALC	Liquor, Beer, Wine
PNALC	Vacuum-packed Coffee, Coca Cola
PFF	Hamburger Sandwich, Pizza, Fried Chicken
PHC	Office Visit, Optometrist; Office Visit, Doctor; Office Visit, Dentist; Ibuprofen

Price per Unit

Category	Item No.	Item	Description
PMF	1	T-bone steak	Price per pound
	2	Ground beef or hamburger	Price per pound, lowest price
	3	Sausage	Price per pound; Jimmy Dean or Owens Brans, 100% pork
	4	Frying chicken	Price per pound, whole fryer
	5	Chunk light tuna	6.0 oz. can, Starkist or Chicken of the Sea
PFFV	1	Bananas	Price per pound
	2	Potatoes	10 lb., white or red
	3	Iceberg lettuce	Head, approximately 1.25 pounds
PPFV	1	Frozen corn	16 oz. whole kernel, lowest price
	2	Peaches	29 oz. can, Hunt’s, Del Monte, Libby’s or Lady Alberta, halves or slices
	3	Fresh Orange Juice	64 oz. (1.89 liters) Tropicana or Florida Natural brand
	4	Tomatoes	14.5 oz. Can, Hunt’s or Del Monte
	5	Sweet peas	15-17 oz. can, Del Monte or Green Giant

Category	**Item No.**	**Item**	**Description**
PDAIRY	1	Whole milk	Half-gallon carton
	2	Eggs	One dozen, Grade A, Large
	3	Margarine	One pound, cubes, Blue Bonnet or Parkay
	4	Parmesan cheese, grated	8 oz. canister, Kraft brand
PALC	1	Liquor	J&B Scotch, 750-ml.bottle
	2	Beer	Heineken's, 6-pack, 12-oz. containers, excluding the deposit
	3	Wine	Livingston Cellars or Gallo Chablis or Chenin Blanc, 1.5-liter bottle
PNALC	1	Coffee, vacuum-packed	11.5 oz. can, Maxwell House, Hills Brothers, or Folgers
	2	Soft drink	2 liter Coca Cola, excluding any deposit
PFF	1	Hamburger sandwich	¼-pound patty with cheese, pickle, onion, mustard, and catsup. McDonald's Quarter-Pounder with cheese, where available
	2	Pizza	11"-12" thin crust cheese pizza. Pizza Hut or Pizza Inn where available
	3	Fried chicken	Thigh and drumstick, with or without extras, whichever is less expensive, Kentucky Fried Chicken or Church's where available

APPENDIX IV

Example: Relative Price of Meat and Fish (*PMF*) in San Francisco

	T-bone Steak	Ground Beef or Hamburger	Sausage	Frying Chicken	Chunk Light Tuna
Price	9.32	3.14	4.78	1.55	0.99
Mean Price	8.91	2.3	3.38	1.1	0.69
Weight	0.17357513	0.17357513	0.22228	0.217098	0.213472

$$PMF = \frac{9.32}{8.91}\cdot 0.17 + \frac{3.14}{2.3}\cdot 0.17 + \frac{4.78}{3.38}\cdot 0.22 + \frac{1.55}{1.1}\cdot 0.22 + \frac{0.99}{0.69}\cdot 0.21$$
$$=1.35$$