Budget Allocation Patterns of American Household across Income Level in the 21 Century

Tullaya Boonsaeng
Research Assistant Professor
Department of Agricultural and Applied Economics, Texas Tech University
Lubbock, TX 79409-2132
tullaya.boonsaeng@ttu.edu

Carlos E. Carpio
Associate Professor
Department of Agricultural and Applied Economics, Texas Tech University
Lubbock, TX 79409-2132
carlos.carpio@ttu.edu

Selected Paper prepared for presentation at the Agricultural & Applied Economics Association's 2017 AAEA Annual Meeting, Chicago, Illinois, July 30-August 1, 2017

Budget Allocation Patterns of American Household across Income Level in the 21 Century

Abstract

This study examined the budget allocation patterns of poor and non-poor households in the United States during the 2000-2015 period. Data from the quarterly interview component of the BLS Consumer Expenditure Survey was used to calculate household's annual expenditures on seven commodity groups: food, utilities, apparel, transportation, medical care, other nondurables and durables. The sample included 12,023 poor households and 55,521 non-poor households. An Exact Affine Stone Index (EASI) demand system was used to estimate demand relationships (i.e., price, income elasticities and marginal effects). Overall, we find that trends in spending patterns, budget allocation, and responses to prices and income can be markedly different between poor and non-poor households. The use of representative or average household for demand analyses can mask substantial differences in economic behavior and status between these two income groups.

Introduction

The study of budget allocation patterns of American households among broad goods and services has been a subject of interest to economists for a long time since this type of analysis provides useful information about the effect of important factors affecting consumption (e.g., Houthakker and Taylor, 1970; Blanciforti, Green and King, 1986). A common limitation of the majority of previous studies in the subject is their focus on a representative (i.e., average) household. However, there is strong evidence indicating that the consumption behavior of households differs depending on the income level, education, ethnic background, and other household characteristics. For example, poor households tend to spend a far greater share of their income on basic needs, such as food and utilities, than do non-poor households. There are also several studies showing differences in the demand response of low and high income households to price and income changes (e.g., Park et al., 1996; Zhen et al., 2014).

Although some studies have analyzed budget allocations patterns of different groups of American households among broad groups of good and services, they also have several limitations. First, most of these studies use data previous to 2003 (Du and Kamakura, 2008; Nicol 2001; Fan and Zuiker, 1998; Fan and Lewis, 1999; Browning and Meghir, 1991; Manser, 1993; Barnes and Gillingham, 1984). Second, several of these studies fail to estimate and report price and income elasticities. For example, in a very comprehensive study covering 31 consumption categories, Du and Kamakura (2008) developed a model to investigate budget allocation decisions of different household types (e.g., different income levels, education and family composition). However, they do not provide estimates of price and income elasticities. Finally, different studies have focused on different households' categories and types. Fan and Zuiker (1998) and Fan and Lewis (1999) studies focused on the budget allocation of households

of different ethnic groups whereas Browning and Meghir (1991) and Manser (1993) concentrated on households that differ in the working status of their members. Barnes and Gillingham (1984) focused on the demographic effects in the demand system (e.g., housing tenure, household type and number of children).

The consideration of different consumer groups for budget allocation modeling and estimation purposes is also very important to increase the accuracy of welfare policy analyses. Just, Hueth and Schmitz (2004; p. 298) recommends the measurement and estimation of demand within consumer groups that are affected similarly by policy changes "*not only to increase distributional information available for policy-making purposes but also to increase accuracy.*" Thus, the objectives of this study are: 1) to assess and contrast general trends in budget allocation patterns of poor and non-poor U.S. households among seven broad categories of commodities: food, apparel, transportation, health care, utilities, other nondurable spending, and durable group; and 2) to calculate and compare price and income elasticities for the seven categories of commodities obtained from demand models estimated for poor and non-poor US households. We also review and summarize previous studies estimating price and income elasticities for broad categories of goods and services. We decided to focus on these two income groups given their importance for policy implementation and analyses. Results of this study can help to better understand the trade-offs poor and non-poor households make to meet their consumption needs.

Literature Review

Table 1 summarizes previous studies evaluating the sensitivity of demand for the goods considered in this study to changes in price and income. Most of the studies have focused on individual goods and very few have considered several goods simultaneously. Moreover, as discussed early, very few studies provide estimates for poor and non-poor households. In fact,

we only found 2 studies reporting price and elasticity values for poor and non-poor households and they both focus on the demand for food (Park et al., 1996; Raper et al., 2002).

We only identified four studies that used a demand system approach to consider the demand for several goods simultaneously (Blanciforti, Green and King 1986; Barnes and Gillingham 1984; Fan and Lewis 1999; Nicol 2001). Barnes and Gillingham (1984) estimated a demand system for four goods – food at home, food away from home, shelter, and clothing. Nicol (2001) estimated a demand system for nine commodity groups- food, alcoholic beverages, clothing, gasoline and fuel, other automobile expenditure, public transportation, household operation, personal care spending, and health care spending. These two studies classified households based on housing tenure status (home owners and renter households) and family size. Blanciforti, Green and King (1986) estimated a system of demand for 11 categories - food, alcohol plus tobacco, clothing, housing, utilities, transportation, medical care, durable goods, other nondurable goods, other services, and other miscellaneous goods. Fan and Lewis (1999) considered a demand system for 6 commodities – health care, transportation, apparel, fuel and utilities, food at home and food away from home. In contrast to Nicol (2001) and Barnes and Gillingham (1984), Fan and Lewis (1999) classify households based on race: African American and Caucasian Americans. Overall, the studies find some substantial differences in elasticities across households' groups and models. For example, Barnes and Gillingham (1984) found that whereas home owners' demand for food at home was price elastic it was inelastic for home renters. Fan and Lewis (1999) find that the own price elasticity for utilities for African Americans is 50% higher (in absolute value) than that for White Americans, although they are both found inelastic.

Regarding the values of own price elasticities for individual commodity groups, most of the studies report inelastic own price elasticities for food at home (e.g., Nayga and Capps 1992; Piggott 2003; Okrent and Alston 2011). There is more variability regarding own-price elasticities for food away from with some studies reporting inelastic values (Nayga and Capps 1992; Park et al. 1996; Reed et al. 2005) and other reporting elastic values (e.g., Fan and Lewis 1999; Piggott 2003; Orkent and Alston 2011). Own-price elasticities for utilities, in most cases, have been found to be inelastic in the short run and elastic in the long run (Lin et al. 1987; Dergiades and Tsoulfidis, 2008). Most studies reviewed reported elastic own price elasticities for transportation and health care (Fan and Lewis 1999, Nicol, 2001; Blanciforti, Green and King, 1986). Finally, demand for clothing has been found to be own price elastic in some cases and inelastic in other instances (Fadiga et al. 2005; Lee and Korpova 2011).

With respect to income/expenditures elasticities, the aggregate food group and the food at home group have been in most cases been identified as necessities (Nayga and Capps 1992; Park et al. 1996; Piggott 2003; Okrent and Alston 2011). On the other hand, food away from has been identified as a necessity in some cases (Nayga and Capps, 1992), Piggott 2003) and a luxury in others (Reed et al., 2005). In most previous studies, apparel and transportation were identified as luxuries and utilities and health care as necessities.

Model and Estimation Procedure

The parametric demand model used in this study is the Exact Affine Stone Index (EASI)(Lewbel and Pendakur, 2009). EASI allows for very flexible income expansion paths (Engel curves) and accounts unobserved preference heterogeneity (Lewbel and Pendakur, 2009). Lewbel and Pendakur (2009) propose both an exact nonlinear and an approximate linear version of the model

but find little empirical difference between the models; thus, we use the approximate linear version. The EASI budget share demand for good n can be written as:

$$w^n = \sum_{r=0}^{6} b_{rn}(lnx)^r + \sum_{k=1}^{N+1} A_{kn} lnp_k + \sum_{m=1}^{M} C_{mn} z_m + \sum_{m=1}^{M} D_{mn}(lnx) z_m + \sum_{k=1}^{N+1} B_{kn}(lnx) lnp_k + \varepsilon_n, \quad (1)$$

where *ln* refers to the natural log of a variable, lnx is real total income ($lnx = lnY - \sum_{n=1}^{N+1} lnp_n w_n$), Y is the total (nominal) income, w^n is the budget share allocated to the nth commodity (i.e. $w_n = p_n q_n / Y$), p_k is the price of commodity group k. The explanatory variables in this model include *M* different demographic characteristics ($z_m's$), *N*+1 prices and interaction terms of the forms $lnp_k lnx$, $z_m lnp_k$, and $z_m lnx$. This model is a sixth order polynomial in lnx (see Lewbel and Pendakur, 2009, equation (8) for details). The *N+1* good is a composite *numeraire* good that includes all other goods and services not modeled in the system which allow us the estimation of unconditional demand elasticities (Zhen et al., 2014).

The demand system in equation (1) was estimated using Seemingly Unrelated Regression (SUR) in SAS with the MODEL procedure.[1] Homogeneity and Symmetry restrictions were imposed in the demand system. The last equation was dropped from the demand system and its parameters were recovered using the adding up constraint (Lewbel and Pendakur, 2009; Zhen et al., 2011). Standard errors for parameters, elasticities, and marginal effect estimates were estimated using a non-parametric bootstrapping procedure with 599 samples (Wooldridge, 2002, p. 379). This procedure accounts for heteroskedasticity in the disturbances in the system of equations.

[1] Although several households report zero expenditures for some goods we ignore the censoring issue, as the main objective of this study was to determine the effects of prices, income, and socio-demographic characteristics on average demands (Deaton, 1997, p. 92).

Elasticities

Lewbel and Pendakur (2009; pages 12 and 44) provide formulas for the price and income semi-elasticities of the budget shares; thus, we derived formulas for the conventional Hicksian, Marshallian and expenditure elasticities. Hicksian price elasticities of good *n* with respect to price *k* (ε_{nk}^{*}) can be calculated as:

$$\varepsilon_{nk}^{*} = \frac{1}{w_n}(A_{kn} + B_{kn} lnx) + w_k - \delta_{nk} \quad (2)$$

where δ is the Kronecker delta, which is equal to 1 when $n = k$, and equals zero otherwise. Marshallian price elasticities of good *n* with respect to price *k* (ε_{nk}) can be calculated using:

$$\varepsilon_{nk} = \varepsilon_{nk}^{*} - w_k \eta_n. \quad (3)$$

The formula for the expenditure elasticity of good *n* (η_n) is:

$$\eta_n = \frac{1}{w_n}\left(1 - \sum_{k=1}^{N} w_k \log p_k (\eta_k - 1)\right)\left(\sum_{r=1}^{6} r b_{rn} lnx^{r-1} + \sum_{m=1}^{M} D_{mn} z_m + \sum_{k=1}^{N} B_{kn} \log p_k\right) + 1 \quad (4)$$

The system of simultaneous equations in equation (4) can be solved for η_n.

Marginal effects of the demographic characteristics on shares can be calculated using the formula $\partial w_n / \partial z_m = C_{mn} + D_{mn} lnx$. The effect of a demographic characteristic on group expenditures is then: $Y\, \partial w_n / \partial z_m$.

Demand Models of Poor and Non-Poor Households

As have been shown in the literature, consumption patterns and households responses to price and income changes vary considerably across households with different levels of income (Park et al., 1996; Raper et al., 2002); thus, we estimated separate models for low and high income groups. The groups were segmented using the 2000-2015 poverty guidelines issued by the U.S. Department of Health & Human Services (HHS) Households with gross income below 130% of the poverty line were classified as poor whereas households with gross income above 130% of the poverty line were classified as non-poor (Park et al., 1996; Raper et al., 2002).

Differences in the elasticities for poor and non-poor across were quantified using percentage differences.

Data

There were two main data sources for this project: 1) The Bureau of Labor and Statistics (BLS)'s Quarterly Interview component of the Consumer Expenditure Survey (CEX) and, 2) Monthly Consumer Price Index (CPI). Data was collected for the 2000 to 2015 period. The CEX Interview Survey is a rotating panel of about 7,000 households per calendar quarter. Households are in the panel for five consecutive quarters, and each exiting family is replaced. The CEX Interview Survey collects expenditure data on aggregate goods and services categories, including: food, utilities, apparel, transportation, medical care, other nonfood spending, and durable expenditure. The total observations for poor and non-poor groups are 12,023 and 55,621, respectively.

The CEX Interview Survey also collects information on demographics, family characteristics and income and income sources in the previous 12 months. Household characteristics variables from the CEX Interview Survey used in this study are age of household, household size, education of the household head, race and ethnicity of the household head, region of residence, and income (Table 2). These variables were selected based on the results of previous similar studies (Raper et al., 2002; Jensen and Yen, 1996; Stewart and Yen, 2004).

Another variable considered in the study are the general economic condition of the country. Two significant economy recession events are considered over the period of study. The first event occurs between year 2000 and 2001 and the second event happens from December 2007 to January 2010 (Kumcu and Kaufman, 2011). Therefore, the dummy variable for the period of 2000-2001 and 2008-2009 are used to capture the economy recession.

Stone Lewbel-Price Index

Following Hoderlein and Mihaleva (2008), we constructed household level prices (Stone-Lewbel (SL) price indexes) using regional price indices. As shown by these authors, if the between-group utility function is weakly separable and the within group sub-utility functions are Cobb Douglas, then it can be shown that the SL price (v_i^l) index corresponding to the commodity group *i* and household *l* is:

$$v_i^l = \frac{1}{k_i} \prod_{j=1}^{s_i} \left(\frac{p_{ij}}{w_{ij}^l} \right)^{w_{ij}^l} \quad (5)$$

with a scaling factor $k_{i,}$ given by $k_i = \prod_{j=1}^{s_i} \bar{w}_{ij}{}^{-\bar{w}_{ij}}$, where s_i is the number of goods in commodity group i, p_{ij} is the (regional) monthly price of the jth good in commodity group i, $w_{ij}^l = p_{ij}^l \, q_{ij}^l / y_i^l$ is household l within group budget share of the jth good in group i, $\bar{w}_{ij}$ is the budget share of good j in group i of the reference household[2]. Equation 5 implies that household level price indices for each commodity group can be calculated using individual goods budget shares (w_{lij}) and price indices (p_{ij}).

Since the SL price index is not defined when one or more of the sub-group commodity shares w_{ij}^l is equal to zero we used the regression imputation approach commonly employed in demand studies of cross-sectional data with missing prices (see Cox and Wohlgenant, 1986; Alfonzo and Peterson, 2006; Lopez, 2011). In a first step, estimates of the log of SL price indices for uncensored observations are obtained from Equation (5) and regressed on a set of demographic characteristics. The regression results are subsequently used to predict prices for households with censored observations (see Table 2).

[2] The reference household is the household with average budget shares.

SL prices were constructed using BLS regional CPIs. The BLS only provides national level monthly CPIs for commodities' sub-groups. Regional monthly CPIs for the Northeast, Midwest, West, and South census regions are provided only for more aggregate good categories (i.e., CPI for all expenditure items). Thus, to account for regional commodity group price variation, regional CPIs for the subgroups were constructed by deflating the national monthly commodity sub-groups CPIs using the corresponding regional (Northeast, Midwest, West, and South) CPIs for all expenditure items. The resulting CPIs incorporate all the price information made available by the BLS to reflect both temporal and regional price variation. The average CPI from 2000 to 2015 was used as the base period (2000-2015=100). The monthly CPI series used in this project were not adjusted seasonally. Table 1 shows the subgroups for the construction of SL group prices for the aggregate demand models.

Results

Summary statistics of the data used in the study are shown in Tables 4 and 5. Poor-households account for 17.8% of the sample and non-poor for 82.2% of the sample. These proportions are close to estimates obtained using Census data (DeNavas-Wal and Proctor, 2015). Table 4 compares shows socio-demographic characteristics of poor and non-poor households. Poor-households have a significantly higher proportion of non-college household heads and a significantly lower proportion of college-educated heads than non-poor households. Poor households also have a significantly larger proportion of Black and Hispanic head of households than non-poor households. There are also large differences in the proportion of households that own a house with mortgage (51% of non-poor households relative to only 19% of poor households).

Average total yearly expenditures for non-poor households ($44,073) are more than twice the corresponding yearly expenditures for poor households ($21,712). Moreover, average annual yearly expenditures for the non-poor are larger than expenditures for the poor in every commodity group; the largest differences in average annual expenditures between income groups are for the transportation ($5,682) and durable ($7,750) commodity group categories and the smallest for the apparel category ($565). In terms of average budget allocation across the period of study, relative to the non-poor group, the poor group is found to spend a larger share of their budgets in food, utilities and the durable group category. The largest differences in expenditures share allocation across incomes are on food and transportation. Poor households spend about 5% more of their budget on food relative to non-poor households. In contrast, non-poor households spend about 6% more of their budgets on transportation relative to poor households. It is also interesting to point out that relative to non-poor households a significantly large proportion of poor households report zero expenditures for apparel (6% versus 17%) and medical care (5% versus 19%). Finally, all household level price indices for the non-poor are higher than the price indices for the poor.

The patterns and trends of households' expenditures on the different commodity categories during the 2000-2015 period are presented in Graph 1. Figures on the left use nominal expenditures and figures on the right use real expenditure. It is important to note that since 82% of the sample are non-poor, trends for the average household follow very closely the trends of the non-poor group. Moreover, the expenditure values are also very similar in magnitude for both the average representative household and the average non-poor household. Thus, analyses conducted only for a representative or average household tend to reflect mainly the behavior of non-poor households.

Regarding trends in nominal expenditures, for both income groups, food and utilities show very clear upward trends during the period of observation. Similar trends in nominal expenditures for both income groups are also present for apparel which shows a very strong downward trend. Differing trends in nominal expenditures are present in medical care and transportation. Nominal expenditures in medical care show a strong upward trend for the non-poor and have remained relatively flat for the non-poor. Nominal expenditures in transportation and other non-durable goods show a slight upward trend for the non-poor and also a slight but downward trend for the poor. The nominal expenditures graphs also reveal increasing gaps in nominal expenditures on food, utilities, transportation, medical care, other non-durable goods and durable goods between poor and non-poor. Differences in nominal expenditures in apparel products between the poor and non-poor remained relatively stable during the period of observation. Thus, there has been an overall increase in the difference in total expenditures between poor and non-poor households.

In real terms, expenditures on food, utilities and durable goods or both income groups remained relatively stable, although in all cases real expenditures in the second part of the period were, on average, higher than in the first part of the period for the non-poor group and lower for the poor group. Apparel, transportation and other nondurable goods show downward trends in real expenditures during the period of observation, with apparel displaying the sharpest relative decline in real expenditures as it decreased, for example, for the average poor household, from about $900/year in 1999 to less than $400/year in 2015. Real expenditures in medical care, in contrast, shows an upward trend for the non-poor and an overall downward trend for the poor, although starting in 2011, the year after the passage of Affordable Care Act of 2010, medical expenditures for the poor started to increase again. An increase in the gap in real expenditures

between income groups is observed for food, utilities and transportation. For each of these commodities, the gap showed large increases until about 2005-2006 and has remained relatively stable. An overall continuous increase in the gap of real expenditures between poor and non-poor is observed for medical care. Overall, there is an increase in the gap in total real expenditures between poor and non-poor households with large gap increases observed mainly during the 2000-2005 period.

Graph 2 shows trends in the shares of spending on the different good categories. Overall, low-income families spent a greater share of their total expenditures on basic needs, such as food and utilities, than did upper-income families while higher-income families spent a greater share of their total expenditures on transportation, medical care, and other nondurable spending. Similar trends on shares of spending across time, for both income groups, are observed for all goods but medical care: shares of spending on food and utilities have remained relatively stable, the shares of spending on transportation, apparel and other non-durables have decreased, and the shares of spending on durables have trended upwards. On the other hand, whereas the shares of spending on medical care for the non-poor have consistently increases through time, they tended to decrease until about 2011 and increase slightly thereafter.

Demand Estimation Results

Table 6 shows estimated income elasticities. All the income elasticities corresponding to poor households were more elastic than the income elasticities for non-poor households, except for the transportation commodity group. For both income groups, income elasticities for food utilities are less than one which implies that they are necessary goods. In contrast, for both household groups, apparel, transportation and other expenditures are luxury goods since their income elasticities are greater than one. Income elasticities for medical care and durable

expenditures suggest that these good categories can be considered as luxury goods for poor households and necessary goods for non-food households. Finally, it is important to mention that in spite of the previously mentioned differences in income elasticities across income groups, the differences in the magnitudes were relatively small (mean absolute difference of 20%).

Table 7 shows price elasticities for non-poor and poor families. All own-price elasticities for poor households are more inelastic (i.e., lower in absolute value) than those obtained for non-poor households, except for the durable expenditure group. Thus, poor-income households are found to be less sensitive to own-price changes than higher-income households. Moreover, for the poor household group all own-price elasticities were found to be inelastic. In contrast, for the non-poor group two commodities were found to be price elastic (transportation and medical care). Percentage differences in own-price elasticities ranged from -79.99% to 14.17%, with a mean absolute percent difference of 41.44%. Thus, differences in own-price elasticities between poor and non-poor households are higher than the corresponding differences in income elasticities.

The comparison of cross-price elasticities for poor and non-poor households also revealed some differences across groups. First, most of the elasticities coincide in classifying goods as complements or substitutes (31 out of 42 cross price elasticities); however, as shown in Table 7 the magnitude of the observed differences are quite substantial with and average difference of 313% (i.e., cross price elasticities for the poor are 3.13 times larger than the corresponding price elasticities for the non-poor).

Summary and Conclusions

This study examined the budget allocation patterns of poor and non-poor households in the United States during the 2000-2015 period. Data from the quarterly interview component of the CEX was used to calculate households' annual expenditures on seven commodity groups: food, utilities, apparel, transportation, medical care, other nondurables and durables. The sample included 12,023 poor households and 55,521 non-poor households. An Exact Affine Stone Index (EASI) demand system was used to estimate demand relationships (i.e., price, income elasticities and marginal effects).

During the period of observation, non-poor households' expenditures in all good categories were higher than the expenditures of poor households. Moreover, the differences in expenditures (in real terms) between these two household groups increased across all good categories but apparel. Medical care experienced the largest increase in the differences in expenditures, in relative terms, between poor and non-poor households.

All of the own-price elasticities but those for the durable group were more inelastic for poor households than for non-poor households. Poor income households were also found to be less sensitive to income changes than higher income households, except for the transportation commodity group. The differences in the estimated price elasticity values across household income groups were also found to be quite substantial, especially regarding the cross price elasticities. The highest difference between poor and non-poor household in income elasticities corresponded to the medical care group and the second highest difference in own-price elasticities also corresponded to the medical care commodity group. Thus, some of the largest observed differences in budget allocation patters and demand responses between poor and non-poor correspond to medical care.

Overall, we find that trends in spending patterns, budget allocation, and responses to prices and income can be markedly different between poor and non-poor households. The use of representative or average household for demand analyses can mask substantial differences in economic behavior and status between these two income groups. We believe that results of this study can help to better understand the trade-offs poor and non-poor households make to meet their consumption needs.

References

Alberini, A., W., Gans, and D. Velez-Lopez. 2011. Residential consumption of gas and electricity in the U.S.: The role of prices and income. *Energy Economics* 33(5): 870–881.

Alfonzo, L., Peterson, H. H., 2006. Estimating food demand in Paraguay from household survey data. Agricultural Economics 34, 243-257.

Barnes, R., and R. Gillingham. 1984. "Demographic Effects in Demand Analysis: Estimation of the Quadratic Expenditure System Using Microdata." *The Review of Economics and Statistics* 66(4): 591-601.

Blanciforti, L.A., R.D., Green, and G.A. King. 1986. U.S. Consumer Behavior over the Postwar Period: An Almost Ideal Demand System Analysis. Giannini Monograph 40: Accessed online at http://escholarship.org/uc/item/3zh108k2 as of March 26, 2017.

Branch, E.R. 1993. Short Run Income Elasticity of Demand for Residential Electricity Using Consumer Expenditure Survey Data. *Energy Journal* 14(1): 111-121.

Browning, M., and C., Meghir. 1991. The Effects of Male and Female Labor Supply on Commodity Demands. Econometrica 59(4): 925-51.

Cox, T. L., Wohlgenant, M. K., 1986. Prices and quality effects in cross-sectional demand analysis. *American Journal of Agricultural Economics* 68, 908-919.

Dalhuisen, J.M., R,J.G.M., Florax, H.L.F., de Groot, and P. Nijkamp. 2003. Price and Income Elasticities of Residential Water Demand: A Meta-Analysis. *Land Economics* 79(2): 292-308.

Davis, L.W., and E., Muehlegger. 2010. Do Americans Consume Too Little Natural Gas? An Empirical Test of Marginal Cost Pricing. *RAND Journal of Economics 41* (4): 791-810

DeNavas-Walt, C. and B.D. Proctor. 2015. Income and Poverty in the United States: 2014, Current Population Reports. United States Census Bureau, U.S. Department of Commerce. Accessed online October 2016. http://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-252.pdf

Dergiades, T. and L., Tsoulfidis. 2008. Estimating residential demand for electricity in the United States, 1965–2006. *Energy Economics* 30(5): 2722–2730

Du, R.Y., and W.A. Kamakura. 2008. Where Did All That Money Go? Understanding How Consumers Allocate Their Consumption Budget. *Journal of Marketing* 72(6): 109–31.

Espey, M., J., Espey, and W.D., Shaw. 1997. Price elasticity of residential demand for water: a meta-analysis. *Water Resources Research* 33 (6), 1369–1374

Fadiga, M.L., S.K., Misra and O.A., Ramirez. 2005. US consumer purchasing decisions and demand for apparel. *Journal of Fashion Marketing and Management* 9(4): 367-379.

Fan, J. X., and J. K., Lewis. 1999. Budget allocation patterns of African Americans. *The Journal of Consumer Affairs* 33(1): 134–164.

Fan, J.X., and V. S., Zuiker. 1998. A comparison of household budget allocation patterns between Hispanic Americans and non-Hispanic White Americans. *Journal of Family and Economic Issues* 19(2): 151–172.

Fell, H., S. Li, and A. Paul. 2014. A new look at residential electricity demand using household expenditure data. *International Journal of Industrial Organization* 33: 37–47

Freeman. D.G. 2003. Is health care a necessity or a luxury? Pooled estimates of income elasticity from US state-level data. *Applied Economics* 35: 495–502.

Hoderlein, S. and S. Mihaleva. 2008. Increasing the Price Variation in a Repeated Cross Section. *Journal of Econometrics* 147(2): 316-325.

Houthakker, H. S. and L.D. Taylor. 1970. Consumer Demand in the United States 1929-1970, Analysis and Projections, second edition, Harvard University Press.

Howe, C.W. 2005.The Functions, Impacts and Effectiveness of Water Pricing: Evidence from the United States and Canada. *Water Resources Development* 21(1): 43-53/

Jensen H.H. and S.T. Yen. 1996. Food Expenditures Away from Home by Type of Meal. *Canadian Journal of Agricultural Economics* 44: 67-80.

Just, R.J., D.L. Hueth, and A. Schmitz. 2004. The Economics of Public Policy: A Practical Guide to Policy and Project Evaluation. Cheltenham, UK: Edward Elgar.

Kumcu, A. and Kaufman, P. 2011. "Food Spending Adjustments during Recessionary Times." *Amber Waves* 9(3): Available online at http://www.ers.usda.gov/AmberWaves/September11/PDF/FoodSpending.pdf.

Lin, W.T., Y.H., Chen, and R. Chatov. 1987. The demand for natural gas, electricity and heating oil in the United States. *Resources and Energy* 9: 233-258.

Manser, M.E. 1993. The Allocation of Consumption by Married-Couple Families in the U.S.: An Analysis Conditioning on Labor Supply. *Recent Advances in Economic Theory* 29:83-108

Park, J.L., Holcomb, R.B., Raper, K.C., and O. Capps. 1996. A Demand Systems Analysis of Food Commodities by U.S. Households Segmented by Income. *American Journal of Agricultural Economics* 78(2): 290-300.

Lee, J. and E.E. Karpova. 2011. The US and Japanese apparel demand conditions: implications for industry competitiveness. *Journal of Fashion Marketing and Management* 15(1): 76-90.

Lewbel, A. and Pendakur, K. 2009. "Tricks with Hicks: The EASI Demand System." *The*

American Economic Review 99(3): 827-863.

Lopez, J. A., 2011. A comparison of price imputation methods under large samples and different levels of censoring. Paper presented at the 2011 AAEA Annual Meeting, July 24-26, Pittsburgh, Pennsylvania.

Martins-Filho, C. and J.W., Mayo. 1993. Demand and Pricing of Telecommunications Services: Evidence and Welfare Implications. *The RAND Journal of Economics* 24(3): 439-454.

Moscone, F., and E., Tosetti. 2010. Health expenditure and income in the United States. *Health Economics* 19: 1385–1403.

Nayga, R.M. and O. Capps. 1992. Analysis of Food from Home and Food at Home Consumption: A Systems Approach. *Journal of Food Distribution Research* 23(6):1-10.

Nicol, C.J. 2001. "The Rank and Model Specification of Demand Systems: An Empirical Analysis Using United States Microdata." *The Canadian Journal of Economics* 34(1): 259-289.

Okrent, A.M., and J.M., Alston. 2011. Demand for Food in the United States. A Review of Literature, Evaluation of Previous Estimates and Presentation of New Estimates of Demand. Giannini Foundation Monograph 48. Accessed online at http://vinecon.ucdavis.edu/publications/cwe1002.pdf as of Mach 31, 2017.

Park, J.L., Holcomb, R.B., Raper, K.C. and Capps, O. 1996. "A Demand Systems Analysis of Food Commodities by U.S. Households Segmented by Income." *American Journal of Agricultural Economics* 78(2): 290-300.

Piggott, N.E. 2003. The Nested PIGLOG Model: An Application to U.S. Food Demand. *American Journal of Agricultural Economics* 85(1):1–15.

Raper, K.C., Wanazala, M.N. and Nayga, R.M. 2002. "Food Expenditures and Household

Demographic Composition in the US: A Demand Systems Approach." *Applied Economics* 34(8): 981-992.

Reed, A.J., J.W. Levedahl, and C. Hallahan. 2005. The Generalized Composite Commodity Theorem and Food Demand Estimation. *American Journal of Agricultural Economics* 87(1): 28–37.

Stewart H. and S.T. Yen. 2004. Changing Household Characteristics and the Away-from-Home Food Market: A Censored Equation System Approach. *Food Policy* 29: 643-658.

Zhen, C., E.A., Finkelstein, J.M., Nonnemaker, S.A., Karns, and J.E., Todd. 2014. Predicting the effects of sugar-sweetened beverage taxes on food and beverage demand in a large demand system. *American Journal of Agricultural Economics* 96(1):1–25.

Zhen, C., M.K. Wohlgenant, S. Karns, and P. Kaufman. 2011. "Habit Formation and Demand for Sugar-sweetened Beverages." *American Journal of Agricultural Economics* 93(1):175-193.

Table 1: Summary of Income and Own-Price Elasticity from Previous Studies

Author	Period	Type of data coverage	Sub-commodity	Own-Price Elasticities	Expenditure Elasticities (EE) or Income Elasticities (IE)
Food					
Blanciforti, Green and King[a] (1986)	1947-1978	-Annual time series data on consumption expenditure (PCE) and prices from a computer tape provided by the U.S. Department of Commerce (USDOC)	Food	LES -0.21 AIDS -0.51	LES (EE) 0.43 AIDS (EE) 0.35
Barnes and Gillingham[a] (1984)	1972-1973	-U.S. Consumer Expenditure Interview Survey -The BLS publishes city-specific retail price indexes in the 23 metropolitan areas	Food at home	Home Owners -0.813 to -0.996 Renters -1.190 to -1.571	Home Owners (EE) 0.686 to 0.818 Renters (EE) 0.737 to 1.033
			Food away from home	Home Owners -0.511 to -1.733 Renters -0.624 to -2.092	Home Owners (EE) 1.725 to 1.922 Renters (EE) 1.444 to 1.826
Nayga and Capps (1992)	1970-1989	-Agricultural Outlook Reports and National Food Situation Reports of the Economic Research Service -The Business Statistics and Survey of Current Business reports by the Bureau of Economic Analysis -CPI from The Bureau of Labor Statistics -Employment and Earnings Publications	Food at home Food away from home	-0.428 -0.745	0.185 (EE) 0.812 (EE)
Park et al. (1996)	1987-1988	U.S. Nationwide Food Consumption Survey	Food away from home	-0.9336	Non-Poor 1.1223 (EE) Poor 0.6092 (EE)
			Food	-0.9588	Non-Poor 0.6438 (EE) Poor 0.4276 (EE)

Fan and Lewis (1999)[a]	1980-1992	-U.S. Consumer Expenditure Interview Survey and CPI -1990 ACCRA Cost of Living Index	Food at home Food away from home	African Americans 0.04 Caucasian Americans 0.01-0.24 African Americans -1.03 Caucasian Americans -1.01 to -1.02	African Americans (EE) 0.45 Caucasian Americans (EE) 0.53 to 0.59 African Americans (EE) 1.72 Caucasian Americans (EE) 1.33 to 1.54
Nicol[a] (2001)	1980-1992	-U.S. Consumer Expenditure Interview Survey -The U.S. consumer price index (CPI), and American Chamber of Commerce Research Association (ACCRA) data	Food	Home owners -0.738 to -1.145 Renters -0.728 to -1.088	Home owners (IE) 0.773 to 0.875 Renters (IE) 0.643 to 0.890
Raper et al. (2002)	1992-1993	Diary Survey of the Consumer Expenditure Survey	Food away from home	Non-Poor -0.99 Poor -1.00	Non-Poor 1.04 (EE) Poor 0.93 (EE)
Reed et al. (2005)	1982-2000	Diary Survey of the Consumer Expenditure Survey	Food away from home	-0.692	1.379 (EE)
Piggott (2003)	1968-1999	-Annual Consumer Expenditure from The United States Department of Agriculture -Price Indexes from the Bureau of Labor Statistics -U.S. population data from the Bureau of Census	Food at Home Food away from home	-0.52 to -0.22 -2.03 to -1.16	0.332 (p.10) (EE) 0.813 to 0.930 (EE)
Okrent and Alston (2011)		Mean of 3 previous studies Mean of 8 previous studies	Food at Home Food away from home	Average -0.48 Average -1.02	
Utilities					
Blanciforti, Green and King[a] (1986)	1947-1978	-Annual time series data on consumption expenditure (PCE) and prices from a computer tape provided by the U.S. Department of Commerce (USDOC)	Utilities	LES -0.38 AIDS -0.67	LES (EE) 1.17 AIDS (EE) 0.64

Fan and Lewis[a] (1999)	1980-1992	-U.S. Consumer Expenditure Interview Survey and CPI -1990 ACCRA Cost of Living Index	Fuel and Utilities	African Americans -0.41 Caucasian Americans -0.27	African Americans (EE) 0.57 Caucasian Americans (EE) 0.47 to 0.61
Alberini et al. (2011)	1997-2007	U.S. Nationwide household-level data	Residential Electricity Residential Gas	-0.860 to -0.667 -0.693 to -0.566	0.02-0.05 (p. 877) (EE)
Branch (1993)		U.S. Consumer Expenditure Interview Survey	Residential Electricity	-0.20	0.23 (EE)
Dergiades and Tsoulfidis (2008)	1965-2006	U.S. annual time series from the World Development Indicators (WDI) database	Short Run Electricity Long Run Electricity	-0.386 -1.063	
Fell et al. (2014)	2006-2008	U.S. Consumer Expenditure Interview Survey	Residential Electricity	Approximately -0.50	0.006 to 0.018 (EE)
Dalhuisen et al. (2003)		64 articles reviewed for water use	Water	Mean -0.41 Median -0.35	Mean 0.43 (EE) Median 0.24 (EE)
Espey et al. (1997)		24 articles reviewed for water use in the United States	Water	-0.02 to -3.33 averaging -0.51	
Howe (2005)		Range of previous studies (page 49)	Water	-0.06 to -0.57	0.25 to 0.33 (EE)
Lin et al. (1987)	1960-1983	The Bureau of the Census regions and subregions	Residential Electricity Residential Natural Gas Residential heating oil	Short run -0.161 Long run -1.193 Short run -0.154 Long run -1.215 Short run -0.208 Long run -3.499	Short run 0.104 (EE) Long run 0.688 (EE) Short run 0.105 (EE) Long run 0.574 (EE) Short run 0.213 (EE) Long run 2.283 (EE)
Davis and Muehlegger (2010)	1991-2007	The Department of Energy, Energy Information Administration (EIA)	Residential Natural Gas	-0.278	

Martins-Filho and Mayo (1993)		South Central Bell on four major metropolitan areas in Tennessee	Telecommunications Services	-1.05 to -1.55	
Apparel					
Blanciforti, Green and King[a] (1986)	1947-1978	-Annual time series data on consumption expenditure (PCE) and prices from a computer tape provided by the U.S. Department of Commerce (USDOC)	Clothing	LES -0.24 AIDS -0.38	LES (EE) 0.58 AIDS (EE) 0.92
Barnes and Gillingham[a] (1984)	1972-1973	-U.S. Consumer Expenditure Interview Survey -The BLS publishes city-specific retail price indexes in the 23 metropolitan areas	Clothing	Home Owners -0.641 to -1.394 Renters -0.532 to -0.869	Home Owners (EE) 1.450 to 1.774 Renters (EE) 1.362 to 1.619
Fan and Lewis[a] (1999)	1980-1992	-U.S. Consumer Expenditure Interview Survey and CPI -1990 ACCRA Cost of Living Index	Apparel	African Americans -1.61 Caucasian Americans -1.66 and -1.78	African Americans (EE) 1.50 Caucasian Americans (EE) 1.48 and 1.53
Nicol[a] (2001)	1980-1992	-U.S. Consumer Expenditure Interview Survey -The U.S. consumer price index (CPI), and American Chamber of Commerce Research Association (ACCRA) data	Clothing	Home Owners -0.641 to -1.394 Renters -1.619 to -1.704	Home Owners (IE) 1.440 to 1.494 Renters (IE) 1.104 to 1.532
Fadiga et al. (2005)	1990-1999	American Shoppers Panel Survey	All Apparel Products	-0.327 to -3.383	0.415 to 1.195 (EE)
Lee and Korpova (2011)	1997-2006	-Current Industrial Reports, MP-1 Manufacturing Profiles -Census of Maufacturers, Report by Commodities -Boeki Tokei Database -Consumer Expenditure Survey	Domestic Apparel Imported Apparel	-0.48 -0.30	-1.64 (EE) 0.18 (EE)

Transportation					
Blanciforti, Green and King[a] (1986)	1947-1978	-Annual time series data on consumption expenditure (PCE) and prices from a computer tape provided by the U.S. Department of Commerce (USDOC)	Transportation	LES -0.38 AIDS -0.47	LES (EE) 1.09 AIDS (EE) 0.47
Fan and Lewis[a] (1999)	1980-1992	-U.S. Consumer Expenditure Interview Survey and CPI -1990 ACCRA Cost of Living Index	Transportation	African Americans -1.41 Caucasian Americans -1.27 and -1.37	African Americans (EE) 1.45 Caucasian Americans (EE) 1.04 and 1..24
Nicol[a] (2001)	1980-1992	-U.S. Consumer Expenditure Interview Survey -The U.S. consumer price index (CPI), and American Chamber of Commerce Research Association (ACCRA) data	Public Transportation	Home Owners -1.242 to -2.928 Renters -1.106 to -2.181	Home Owners (IE) 1.137 and 2.233 Renters (IE) 0.912 to 1.915
Health Care					
Blanciforti, Green and King[a] (1986)	1947-1978	-Annual time series data on consumption expenditure (PCE) and prices from a computer tape provided by the U.S. Department of Commerce (USDOC)	Medical Care	LES -0.61 AIDS -0.70	LES (EE) 1.99 AIDS (EE) 0.79
Fan and Lewis[a] (1999)	1980-1992	-U.S. Consumer Expenditure Interview Survey and CPI -1990 ACCRA Cost of Living Index	Health Care	African Americans -3.56 Caucasian Americans -2.77 and -2.81	African Americans (EE) 1.84 Caucasian Americans (EE) 1.10 and 1.24
Nicol[a] (2001)	1980-1992	-U.S. Consumer Expenditure Interview Survey -The U.S. consumer price index (CPI), and American Chamber of Commerce Research Association (ACCRA) data	Health Care	Home Owners -1.393 to -1.699 Renters -1.884	Home Owners (IE) 0.750 and 0.870 Renters (IE) 0.458 to 1.121

Freeman (2003)	1966-1998	Health Care Financing Administration (HCFA)	Health Care	0.817 to 0.844 (EE)
Wang (2009)	1999-2003	-Statistical Abstract of the U.S., United States Census Bureau -Cost of Living Survey data of the American Chamber of Commerce (ACCRA)	Health Care	0.7 at the state level (EE)
Moscone and Tosetti (2010)	1980-2004	The Centers of Medicaid and Medicare Services	Health Care	Less than one (EE)

[a]Based on the system of demand equations

Table 2: Aggregate Commodity Groups and Sub-Groups

Groups	Sub-groups
Food	1) Food at home 2) Food away from home
Utilities	1) Natural gas 2) Electricity 3) Telephone services 4) Water and other public service 5) Fuel oil and other fuels
Apparel	1) Clothing for men and boys 2) Clothing for women and girls 3) Footwear 4) Clothing for children under 2
Transportation	1) Motor vehicle maintenance and repair 2) Motor vehicle insurance 3) Motor vehicle fees 4) Public transportation 5) Gasoline and motor fuel
Medical care	1) Medical care commodities 2) Medical service 3) Health insurance
Other non-durable expenditures	1) Recreation 2) Other non-durable goods and services 3) Alcoholic beverages
Durable expenditures	1) Shelter and Household furnishings & Operations 2) Recreational reading materials 3) Education

Table 3: Description of Household Composition and Characteristics

Variable	Definition
Continuous Variables	
Age of household head[*·] (z1)	Age of household head
Family Size[*·] (z2)	Number of household numbers
Time trend[*] (z3)	
Dummy Variables (yes = 1, no = 0)	
Housing tenure status	
Renter households[*]	Households rents their home
Homeowners with mortgages[*] (z4)	Households own the house with mortgages
Homeowners without mortgages (z5)	Households own the house without mortgages
Education of the household head	
College-educated[*·] (z6)	Household head has at least college education
Non college-educated	Household head has less than college education
Race of the household head	
White[*·] (z7)	Household head is white
Black[*·] (z8)	Household head is black
Other race	Household head is other race
Region of residence	
Northeast[*·] (z9)	Household lives in the Northeast
Midwest[*·] (z10)	Household lives in the Midwest
South[*·] (z11)	Household lives in the South
West	Household lives in the West
Hispanic[*·] (z12)	Household head is Hispanic
Economy recession[*] (z13)	The dummy variable for the period of 2000-2001 and 2008-2009 are used to capture the economy recession
Year in which the survey was collected	
2000[·]	Household was interviewed in year 2000
2001[·]	Household was interviewed in year 2001
2002[·]	Household was interviewed in year 2002
2003[·]	Household was interviewed in year 2003
2004[·]	Household was interviewed in year 2004
2005[·]	Household was interviewed in year 2005
2006[·]	Household was interviewed in year 2006
2007[·]	Household was interviewed in year 2007
2008[·]	Household was interviewed in year 2008
2009[·]	Household was interviewed in year 2009
2010[·]	Household was interviewed in year 2010
2011[·]	Household was interviewed in year 2011
2012[·]	Household was interviewed in year 2012
2013[·]	Household was interviewed in year 2013
2014[·]	Household was interviewed in year 2014
2015	Household was interviewed in year 2015

[*]Refers to demographic variables used in the LA/EASI model.
[·]Refers to demographic variables used to regress and impute SL prices.

Table 4: Comparison of Socio-demographic Variables between Poor and Non-Poor Households

Variable	Poor Households	Non-Poor Households
Age of Household	53.966	51.742
Family size (persons)	2.541	2.584
	Percent of Poor Household Sample 2000-2015	Percent of Non-Poor Household Sample 2000-2015
College education or higher	11.49%	36.07%
No College education	88.51%	63.93%
White	72.15%	84.17%
Black	21.46%	9.20%
Other Races	6.39%	6.64%
Households own the house with mortgages	18.81%	51.31%
Households own the house without mortgages	27.99%	26.58%
Northeast	20.37%	20.83%
Midwest	19.07%	21.86%
South	36.20%	31.34%
West	24.36%	25.97%
Household head is Hispanic	19.45%	9.73%

Table 5: Comparison of Mean Budget Share, Average Yearly Household Expenditures, Mean Log of Price, and Level of Censoring for Poor and Non-Poor Households

Commodity group	Mean Budget Share		Mean Expenditures		Level of Censoring		Mean of Log Price	
	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor	Poor	Non-Poor
Food	0.233	0.181	4524.84	7187.44	0.22	0.03	-0.099	-0.014
Utilities	0.131	0.100	2471.48	3726.58	1.61	0.17	-0.328	-0.270
Apparel	0.023	0.024	567.47	1132.87	17.03	6.13	-0.477	-0.469
Transportation	0.133	0.191	3781.22	9463.14	9.33	1.02	-0.652	-0.552
Medical Care	0.075	0.084	1547.46	3328.59	18.78	5.27	-0.191	-0.160
Other non-durable expenditures	0.080	0.097	1803.45	4466.34	2.98	0.37	-0.226	-0.176
Durable expenditures	0.325	0.323	7015.90	14765.47	0.20	0.03	-0.075	-0.027

Table 6: Percent Differences in Expenditure Elasticities for Poor and Non-Poor Households (relative to Non-Poor Households)

Group Commodities	Poor Household	Non-poor Household	Percent Differences in Expenditure Elasticities between Poor and Non-Poor Household
Food	0.577	0.545	5.83
Utilities	0.565	0.397	42.31
Apparel	1.235	1.104	11.89
Transportation	1.701	1.857	-8.43
Medical Care	1.228	0.802	53.11
Other non-durable expenditures	1.155	1.105	4.56
Durable expenditures	1.085	0.946	14.70
Average Absolute Difference			20.12

Table 7: Marshallian Elasticities and Percent Differences in Marshallian Elasticities for Poor and Non-Poor Households (relative to Non-Poor Households)

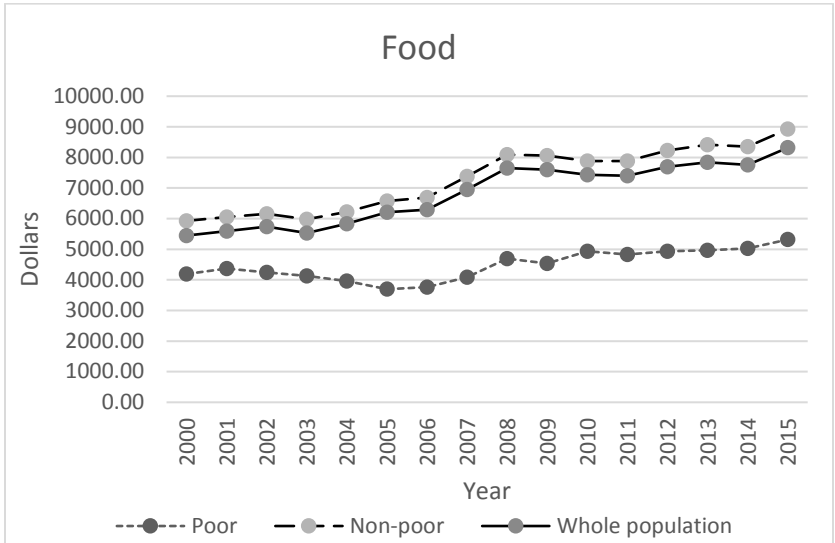
Quantity demanded	Poor Households (Prices)						
	Food	**Utilities**	**Apparel**	**Transportation**	**Medical Care**	**Other non-durable Expenditures**	**Durable Expenditures**
Food	**-0.494**	-0.107	0.125	0.039	0.001	0.141	-0.013
Utilities	-0.310	**-0.321**	-0.033	0.112	0.062	-0.094	-0.017
Apparel	0.256	-0.513	**-0.178**	-0.715	-0.006	-0.045	0.163
Transportation	-0.198	-0.039	-0.217	**-0.897**	-0.182	-0.132	0.014
Medical Care	-0.319	-0.008	-0.017	-0.173	**-0.485**	-0.171	0.054
Other non-durable expenditures	0.110	-0.260	-0.024	-0.077	-0.158	**-0.478**	-0.201
Durable expenditures	-0.108	-0.057	-0.016	0.016	-0.011	-0.074	**-0.944**
Quantity demanded	**Non-Poor Households (Prices)**						
Food	**-0.559**	-0.025	0.103	0.005	0.021	0.108	-0.075
Utilities	-0.135	**-0.656**	-0.005	0.056	0.162	0.044	-0.045
Apparel	0.150	-0.271	**-0.889**	-0.006	0.110	-0.074	-0.037
Transportation	-0.237	-0.166	-0.164	**-1.285**	-0.094	-0.100	-0.101
Medical Care	-0.114	0.137	0.049	0.174	**-1.080**	-0.023	-0.025
Other non-durable expenditures	0.037	-0.027	-0.028	0.117	-0.045	**-0.918**	-0.207
Durable expenditures	-0.071	-0.015	0.015	0.055	0.006	-0.042	**-0.827**
Commodity groups	**Percent Differences in Marshallian own-price Elasticities between Poor and Non-Poor Households**						
Food	**-11.63**	326.58	21.54	631.55	-93.05	30.89	-82.88
Utilities	129.44	**-51.09**	562.70	101.34	-61.70	-314.92	-61.84
Apparel	70.91	89.02	**-79.99**	11489.84	-105.68	-39.59	-544.13
Transportation	-16.25	-76.71	32.18	**-30.16**	92.30	31.91	-114.02
Medical Care	178.87	-106.13	-135.72	-199.57	**-55.08**	640.76	-315.28
Other non-durable expenditures	200.15	868.43	-14.92	-165.69	252.29	**-47.95**	-3.03
Durable expenditures	51.66	283.25	-206.81	-70.91	-275.88	77.51	**14.17**

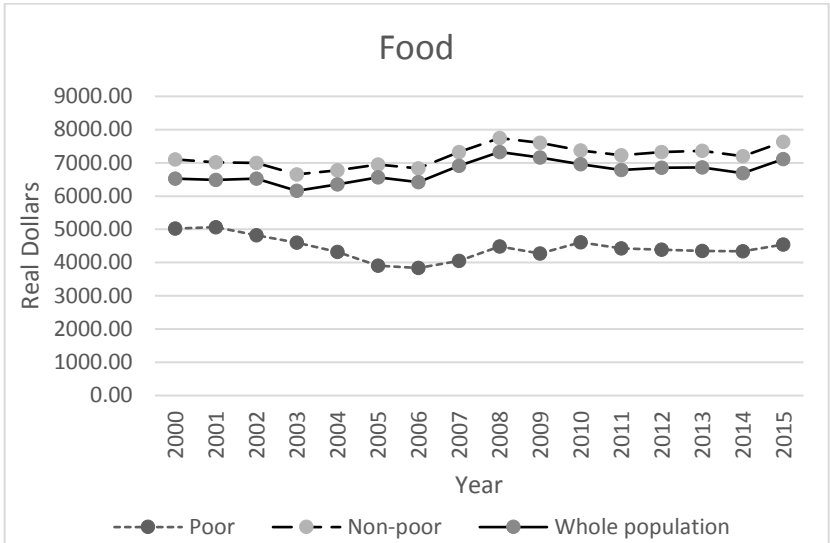
Table 8: Marginal Effects and Percent Differences in Marginal Effects for Poor and Non-Poor Households (relative to Non-Poor Households)

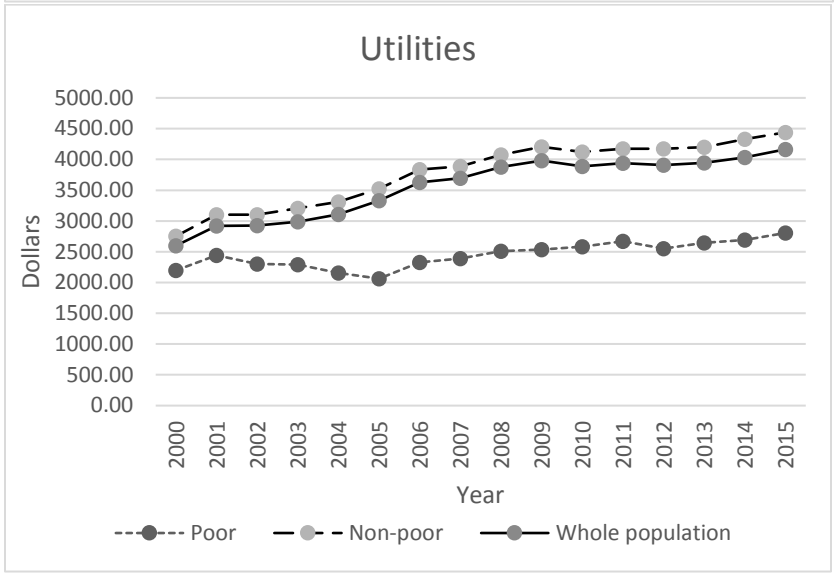
	Poor Households												
ME[a]	z1	z2	z3	z4	z5	z6	z7	z8	z9	z10	z11	z12	z13
Food	2.17	583.93	11.62	-170.85	565.82	-219.42	-288.63	16.74	189.17	-110.46	64.62	449.14	75.86
Utilities	-5.71	101.58	-0.70	1263.59	1465.46	-392.35	-41.43	829.33	405.01	469.10	744.16	110.21	-5.79
Apparel	-4.78	50.80	-5.09	-96.78	19.92	32.17	48.63	186.98	66.28	-8.20	-62.06	42.38	15.95
Transportation	-24.82	-109.88	-4.99	240.06	964.93	-247.42	-127.39	-359.46	-334.94	60.82	396.85	227.15	-29.16
Medical Care	38.58	-91.19	-17.16	-6.83	718.17	134.67	350.31	-177.07	-148.13	108.62	108.34	-526.96	20.12
Other non ex.[b]	-6.93	-68.69	4.21	-43.81	257.08	-214.28	496.50	131.74	54.82	129.21	-6.64	-681.65	72.03
Durable ex.[c]	1.49	-466.55	12.11	-1185.37	-3991.38	906.62	-437.97	-628.26	-232.20	-649.09	-1245.27	379.73	-149.01
	Non-Poor Households												
ME[a]	z1	z2	z3	z4	z5	z6	z7	z8	z9	z10	z11	z12	z13
Food	1.94	792.99	47.00	71.40	976.40	10.40	-94.58	-517.42	-16.25	-326.75	251.65	253.82	176.38
Utilities	-0.18	246.15	16.65	1233.98	1437.08	-435.28	-90.04	976.76	709.37	385.14	806.14	276.06	-18.76
Apparel	-7.89	56.30	-50.58	-26.85	142.41	132.05	76.75	329.61	90.44	76.07	-38.21	138.41	-0.95
Transportation	-48.59	-343.83	-39.35	-938.20	961.27	-1517.46	-75.88	485.10	-493.51	669.91	684.02	451.39	-162.24
Medical Care	81.40	32.50	57.28	-8.37	1219.42	-172.24	423.42	-361.41	-183.91	330.71	493.71	-821.98	-138.37
Other non ex.[b]	-14.98	-223.92	-48.22	162.08	839.18	-189.45	882.48	118.72	-186.62	34.63	-251.97	-1079.12	83.31
Durable ex.	-11.71	-560.19	17.21	-494.03	-5575.76	2171.98	-1122.14	-1031.36	80.47	-1169.71	-1945.34	781.42	60.63
	Percent Differences in Marginal Effects between Poor and Non-Poor Households												
	z1	z2	z3	z4	z5	z6	z7	z8	z9	z10	z11	z12	z13
Food	11.95	-26.36	-75.28	-339.29	-42.05	-2208.84	205.17	-103.23	-1264.46	-66.19	-74.32	76.95	-56.99
Utilities	3086.02	-58.73	-104.21	2.40	1.97	-9.86	-53.99	-15.09	-42.91	21.80	-7.69	-60.08	-69.15
Apparel	-39.38	-9.77	-89.94	260.41	-86.01	-75.64	-36.64	-43.27	-26.72	-110.78	62.44	-69.38	-1783.21
Transportation	-48.91	-68.04	-87.32	-125.59	0.38	-83.70	67.87	-174.10	-32.13	-90.92	-41.98	-49.68	-82.02
Medical Care	-52.60	-380.57	-129.96	-18.43	-41.11	-178.19	-17.27	-51.01	-19.45	-67.16	-78.06	-35.89	-114.54
Other non ex.[b]	-53.73	-69.32	-108.74	-127.03	-69.37	13.10	-43.74	10.96	-129.38	273.11	-97.36	-36.83	-13.54
Durable ex.[c]	-112.76	-16.72	-29.62	139.94	-28.42	-58.26	-60.97	-39.08	-388.56	-44.51	-35.99	-51.40	-345.76

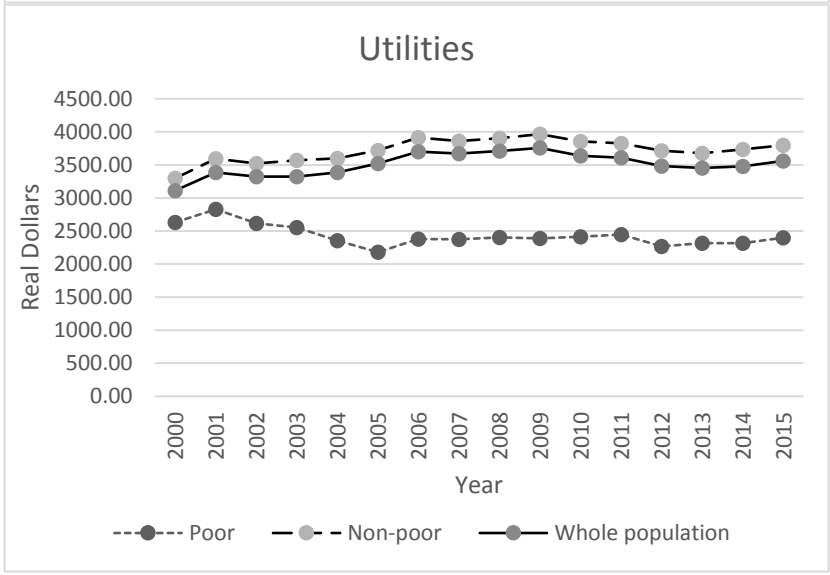
[a] Denoted marginal effect
[b] Denoted other non-durable expenditures
[c] Denoted durable expenditures

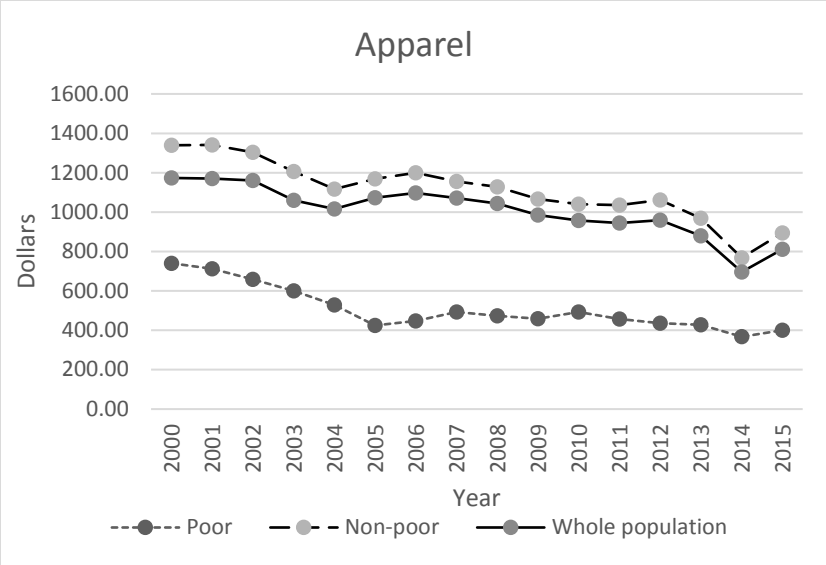
Graph 1: Household Expenditures Patterns between 2000 and 2015

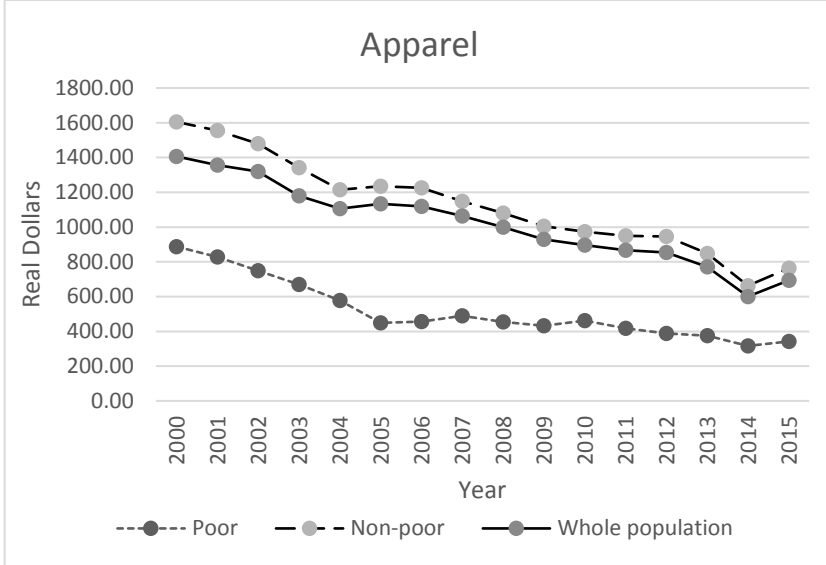


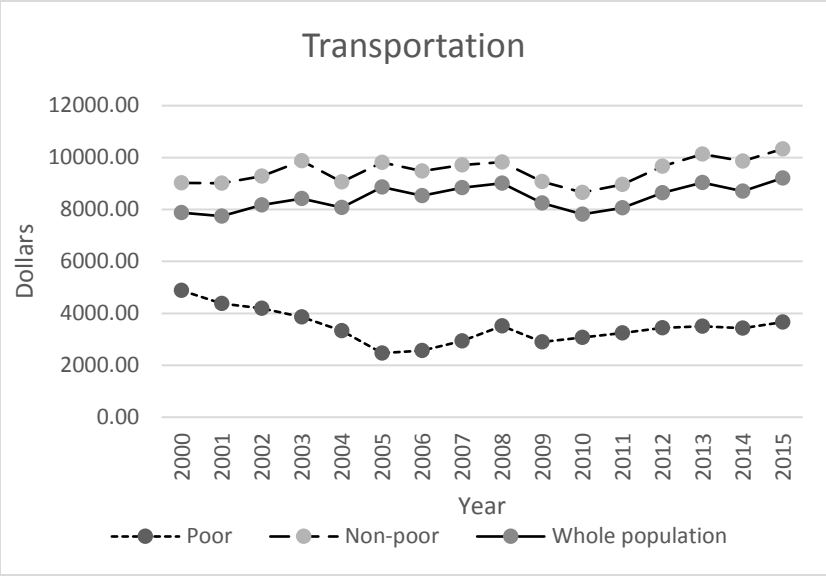


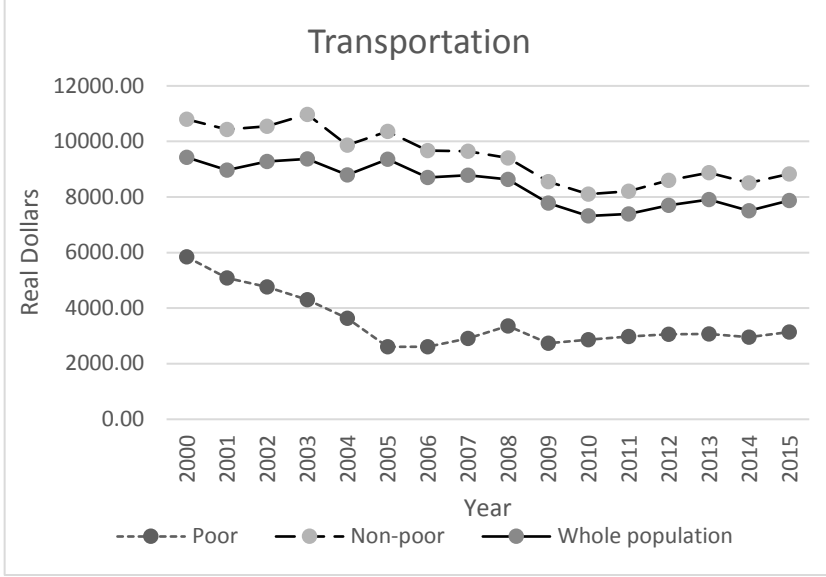


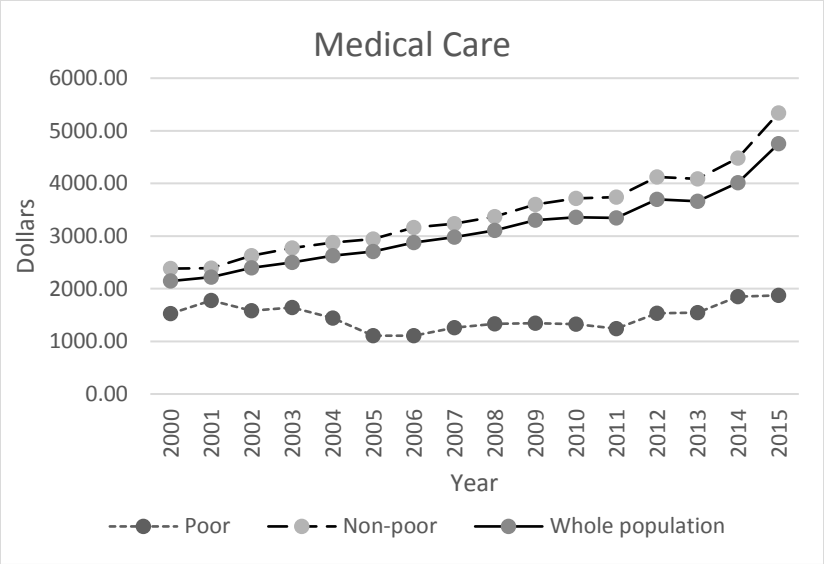


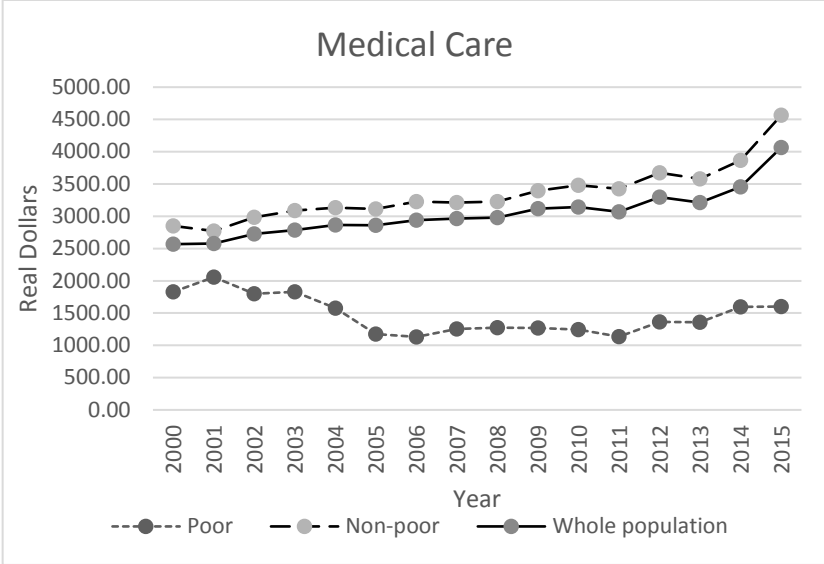

Apparel
1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

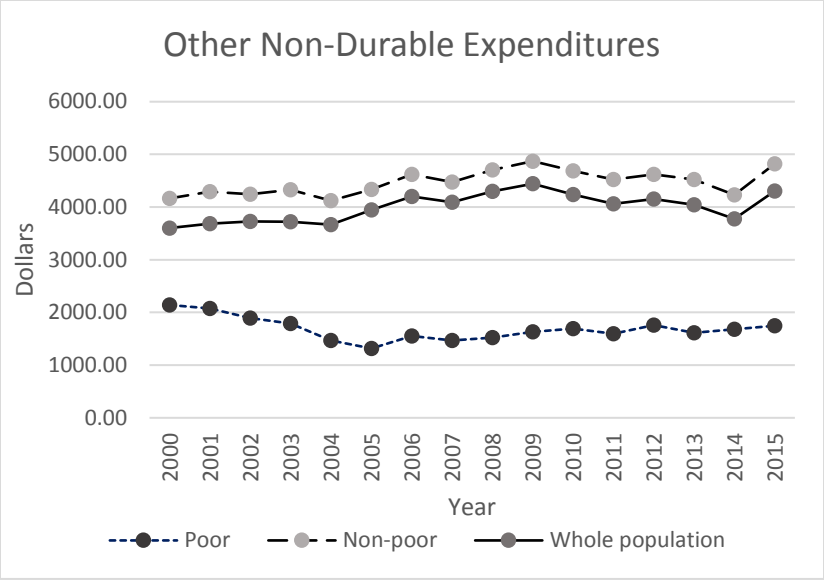

Apparel
1800.00
1600.00
1400.00
1200.00
1000.00
800.00
600.00
400.00
200.00
0.00
Real Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

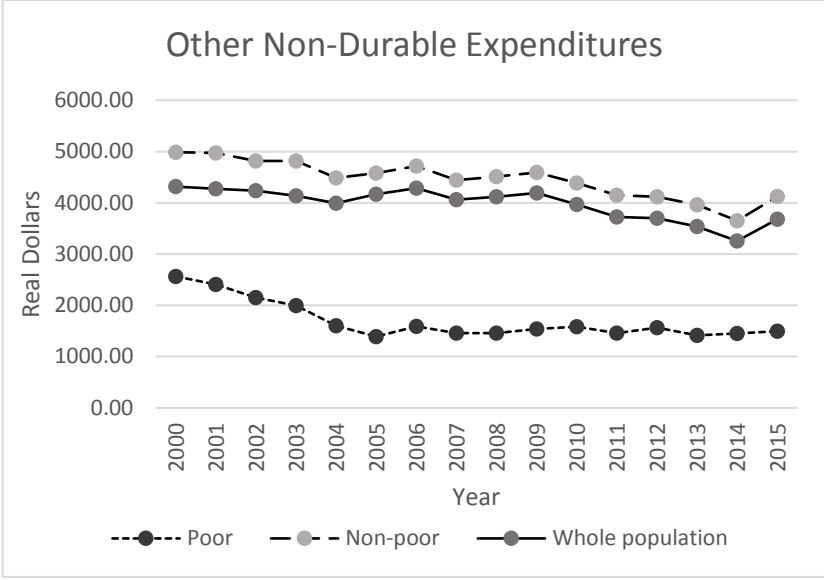

Transportation
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

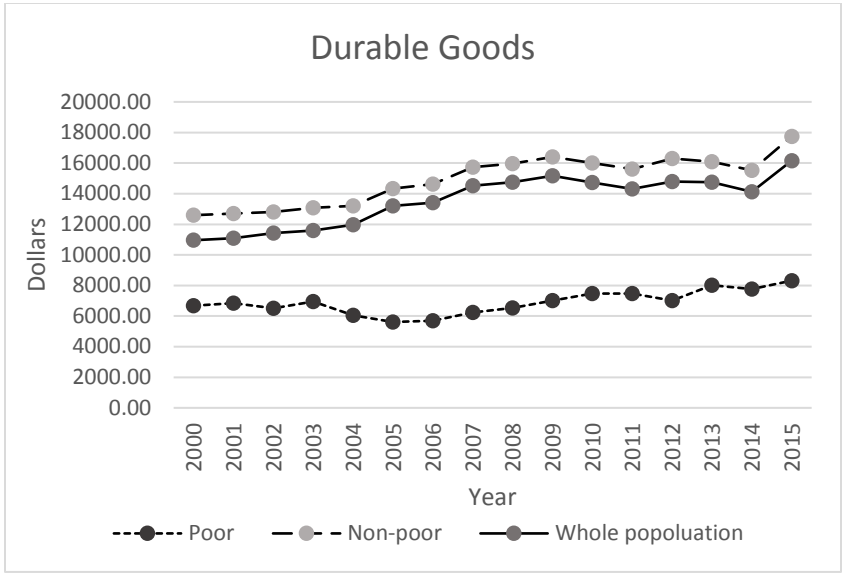

Transportation
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Real Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

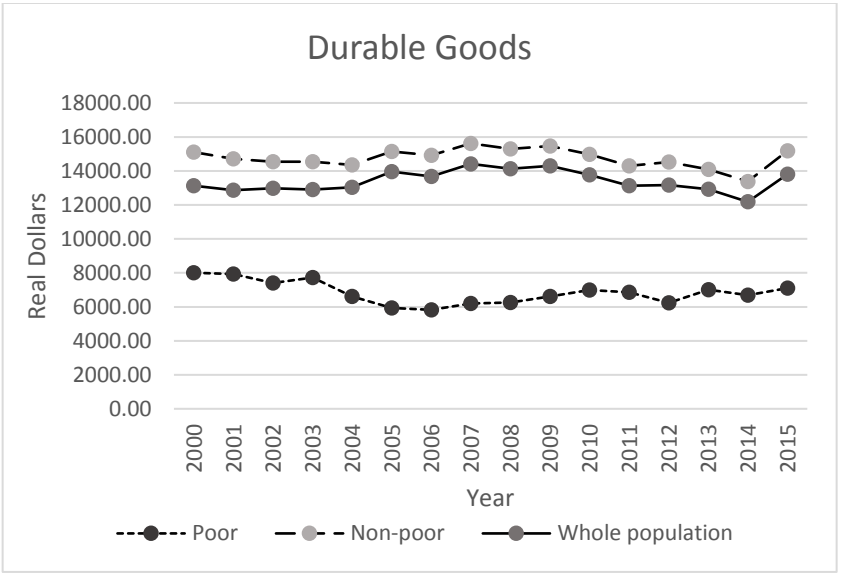

Medical Care
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

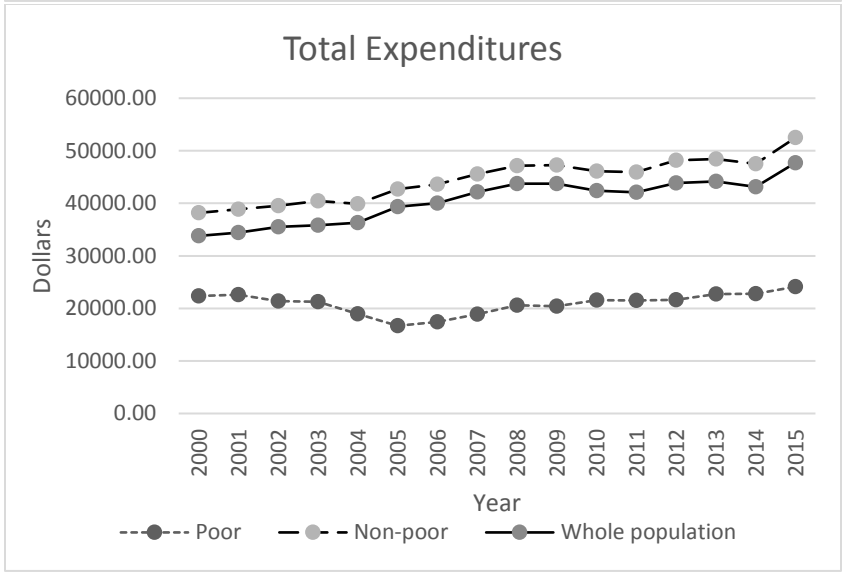

Medical Care
5000.00
4500.00
4000.00
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
Real Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

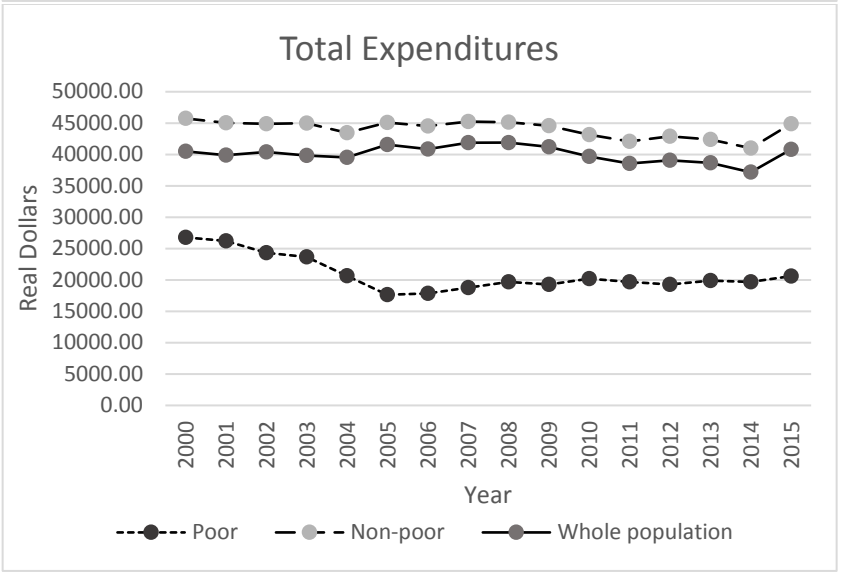

Other Non-Durable Expenditures
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population


Other Non-Durable Expenditures
6000.00
5000.00
4000.00
3000.00
2000.00
1000.00
0.00
Real Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

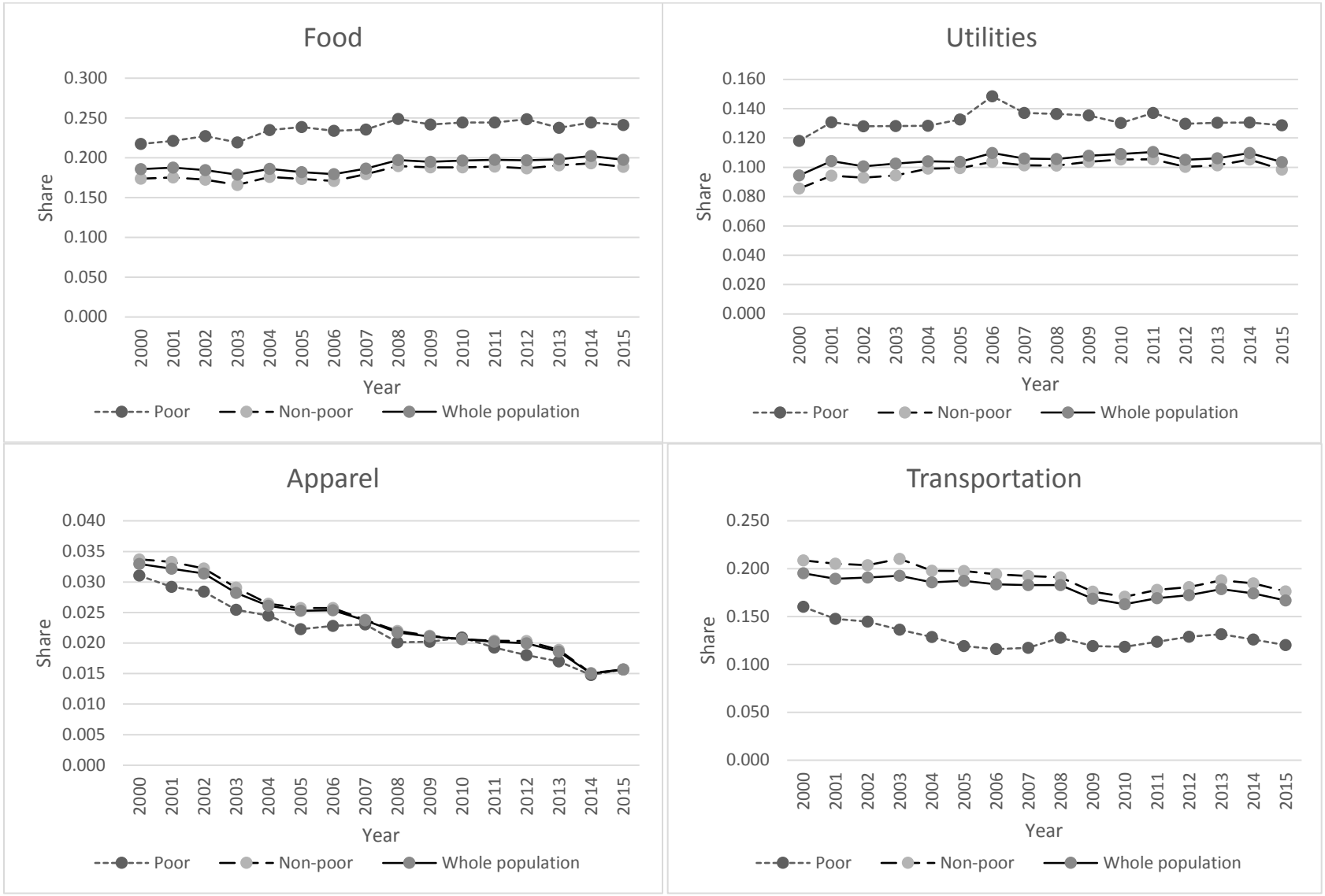

Durable Goods
20000.00
18000.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole popoluation

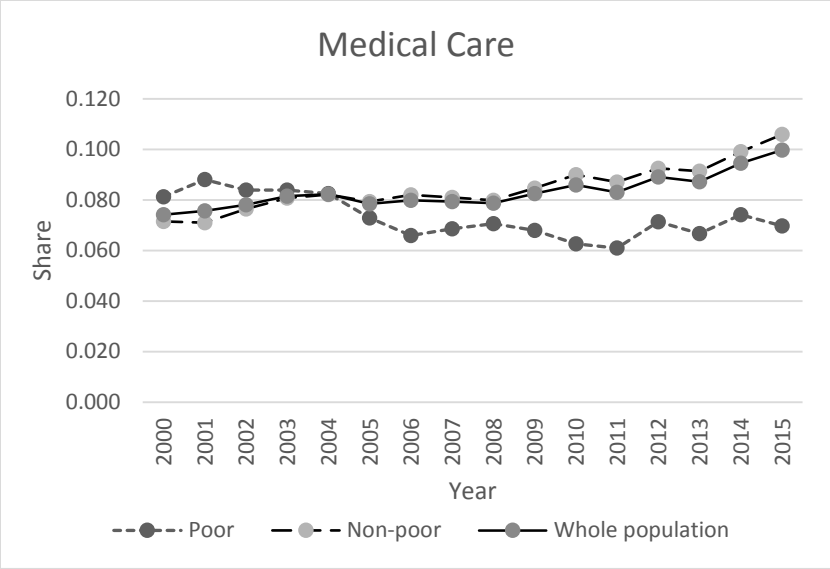

Durable Goods
18000.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Real Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

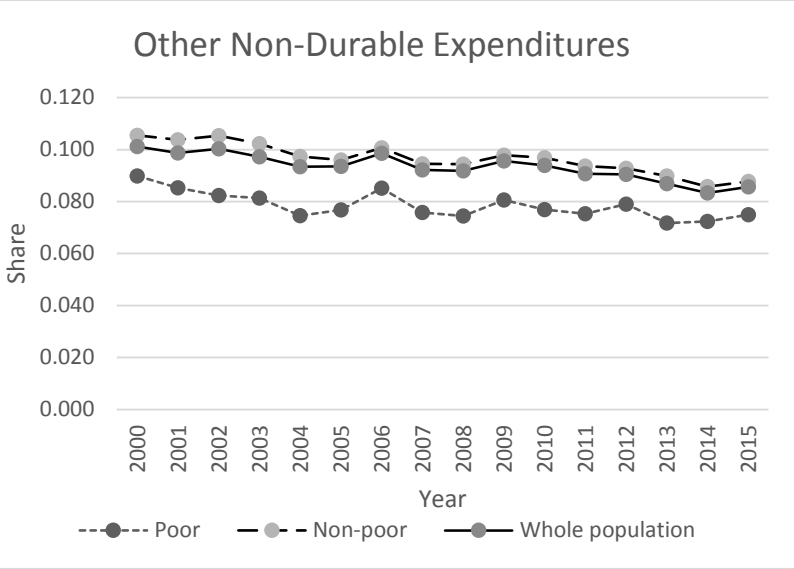

Total Expenditures
60000.00
50000.00
40000.00
30000.00
20000.00
10000.00
0.00
Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

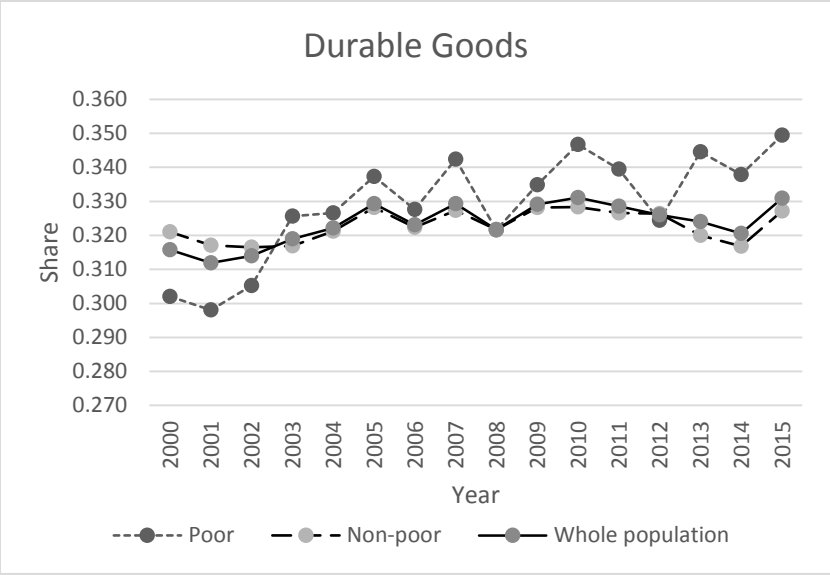

Total Expenditures
50000.00
45000.00
40000.00
35000.00
30000.00
25000.00
20000.00
15000.00
10000.00
5000.00
0.00
Real Dollars
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population

Graph 2: The Shares of Spending on Different Categories between 2000 and 2015




Medical Care
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Share
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population


Other Non-Durable Expenditures
0.120
0.100
0.080
0.060
0.040
0.020
0.000
Share
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population


Durable Goods
0.360
0.350
0.340
0.330
0.320
0.310
0.300
0.290
0.280
0.270
Share
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Poor
Non-poor
Whole population