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## Budget Allocation Patterns of African Americans

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The Consumer Expenditure Survey (1980-1992), Consumer Price Index (1980-1992), and ACCRA Cost of Living Index (1990) are used to construct annual household expenditure data from 1980 to 1992 to compare household budget allocation patterns of African Americans to Asian Americans, Caucasian Americans, and Hispanic Americans. Using the LA/AIDS demand system, researchers found that African American households have statistically significantly different budget allocation patterns in more than half of the 13 expenditure categories investigated in this study, after controlling for other socioeconomic and demographic characteristics.

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This study constructs a large household level expenditure data set with income, prices, and demographic information to compare the budget allocation patterns of African Americans to the budget allocation patterns of three other ethnic groups: Asian-Pacific Americans, Caucasian Americans, and Hispanic Americans.

The percentage increase in the African American population in the United States has been greater than that of the total U.S. population from 1980 to 1992 (11.9 percent and 11.2 percent, respectively). In 1992, the total population of African Americans was approximately 31.6 million, representing 12.4 percent of the United States population (U.S. Bureau of the Census 1994). Not only has the African American population increased over the past decade, but the African American consumer market also has increased. Morris (1993) noted that African Americans spend approximately \$213 billion annually, and millions are spent on advertising to this population.

The fast growing African American population and consumer market are creating a need for information on the effects of ethnicity on expen-

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ditures. Marketers need this information to design ways to better meet the needs of African Americans. The knowledge gained from this study can fine tune marketing strategies beyond the simple niche advertising efforts. The knowledge also can begin to provide extension experts and government officials with better information for developing education programs and government policies to effectively serve the African American population. In addition, economists can use this information when further developing economic theories of consumer behavior (Wagner and Soberon-Ferrer 1990).

Several researchers have examined the effects of income and other socioeconomic and demographic characteristics on household expenditures for various products and services, but few studies have examined the effect of ethnicity on household budget allocation patterns, according to Wagner and Soberon-Ferrer (1990). Wagner and Soberon-Ferrer (1990) offered two reasons for the lack of research in this area: "First, the effect of ethnicity on household behavior did not emerge as an important research issue until the Civil Rights movement of the 1960s and the explosive growth of the Hispanic population during the 1970s. Second, expenditure data classified by ethnicity only recently have become available" (181). Further, when data first became available, the sample size for some ethnic groups was too small to provide the base for sophisticated statistical analyses.

Our study on the expenditure patterns of African Americans is unique in the following ways. First, the data set constructed in this study is the largest cross-sectional data set ever used to study minority expenditure patterns. The inclusion of price information makes it possible for us to estimate price elasticities for different commodities. Second, we take into consideration that household expenditure decisions on different expenditure categories are made simultaneously and estimated a demand system to systematically investigate African American household expenditure patterns in 13 expenditure categories. Third, we compare African American households with not only Caucasian households, but also Hispanic households and Asian American households. Fourth, our method of analysis is consistent with neoclassical economic theory. Theoretical restrictions are imposed after statistical testing.

#### REVIEW OF LITERATURE

Using different Consumer Expenditure Survey (CE) data, several researchers have found statistically significant relationships between eth-

nicity and expenditure patterns. Ethnic variables have been identified regarding expenditures on food (Bae 1992; Bellante and Foster 1984; Foster 1988; Hanna and Carter 1986; Wagner and Soberon-Ferrer 1990), fuel and utilities (Bae 1992), apparel (Dardis, Derrick, and Lehfeld 1981; DeWeese 1989; Wagner and Soberon-Ferrer 1990), entertainment (Bae 1992), transportation (Bae 1992; Lino 1990), education (Bae 1992), health care (Bae 1992), alcohol (Bae 1992), tobacco (Bae 1992), and personal care (Bellante and Foster 1984).

In her 1992 study, Bae found that African American households spent statistically significantly more of their incomes than other ethnic households on food at home. On the other hand, Foster (1988) found that African American households spent less on food at home than Caucasian households. Wagner and Soberon-Ferrer (1990) compared African American households to only European-American households and found no difference in the amount of money spent on food at home.

When examining the amount of money households spent on food away from home, several researchers found that African Americans spent less than other ethnic households (Bae 1992; Bellante and Foster 1984; Hanna and Carter 1986; Wagner and Soberon-Ferrer 1990). Foster (1988) also found that expenditures on food away from home was lower for African American households in which the wives were employed than other ethnic households in which the wives were employed.

African American households spent more on fuel, utilities, and apparel compared to other ethnic households (Bae 1992; Dardis, Derrick and Lehfeld 1981; DeWeese 1989; Wagner and Soberon-Ferrer 1990). On the other hand, African American households spent less on education, health care, and alcoholic beverages than other ethnic groups (Bae 1992). Moreover, minority, single-parent households spent less on transportation compared to Caucasian, single-parent households (Lino 1990).

Bellante and Foster (1984) found that lower-income African American households with employed wives spent more on personal care than other ethnic households with wives who worked. However, their study indicated that the relationship was nonlinear because the interaction variable (African American \* family income) was also statistically significant. Thus, at higher income levels, the relationship could be the opposite. At sample mean levels, African American households with employed wives spent less on personal care than other ethnic households.

As the literature reveals, inconsistent results have been found between ethnicity and various expenditure categories. These inconsistent findings may be the result of different data and methods used by the researchers.

In addition, the classification of ethnic groups, which may vary in different studies, may play an important role in determining the significance of the ethnic effects on household expenditure and budget allocation.

#### DATA AND DESCRIPTIVE STATISTICS

The three major data sources used in this study are the 1980-1992 Consumer Expenditure Survey (CE) (U.S. Bureau of Labor Statistics [BLS] 1980-1989; 1990-1992), the 1980-1992 Consumer Price Index (CPI) (U.S. Bureau of Labor Statistics 1992), and the 1990 ACCRA Cost of Living Index (ACCRA) (American Chamber of Commerce Researchers Association 1990). The CE data set, collected yearly since 1980 by the BLS, provides detailed information on household expenditures and household demographic characteristics. Households that completed the interview for an entire calendar year are selected for this study. All expenditure categories of interest are constructed or modified following the category definitions used in 1990.

The price data coming from the CPI, published by the BLS since 1913, are compatible and consistent with the CE because the CPI data use expenditure weights obtained from the CE data. While the CPI provides price data over time, the ACCRA publishes price differences among standard metropolitan statistical areas (SMSAs) for major expenditure categories, and are, therefore, used as a supplement to the CPI price data in this study.

After a careful examination of the expenditure categories available in all three data sources, we select 13 mutually exclusive summary expenditure categories. They are (1) food at home; (2) food away from home; (3) shelter; (4) fuel and utilities; (5) household operation, household equipment, and furnishing; (6) apparel and upkeep; (7) entertainment; (8) transportation; (9) education; (10) health care; (11) alcoholic beverages; (12) tobacco and tobacco-related products; and (13) personal care. Commodities and services included in each category are summarized in Appendix Table A.1. A more detailed description is provided in the 1990 CE EXPN file on-tape documentation.

The first step in data construction is to use the CPI area sample and population weights and ACCRA data price information to obtain 1990 region/city-size price indices for the 13 commodities and for the 14 region/city-size classifications. The second step is to use the CPI region/city-size price indices, combined with the 1990 region/city-size price indices created in step one, to construct region/city-size price

indices for the 13 commodities, for the 14 region/city-size classifications, and for the years 1980 to 1992. Each commodity has 182 different price indices (14 region/city-size classifications each year for 13 years). The third step is to incorporate the created price indices into the 1980-1992 CE data using the region and city size information for households in the CE sample. Because the CE does not provide city size information for households living in the west region, regional indices are constructed for the west region. In the final data, each commodity has 156 different prices.

Because the CPI does not provide price index information for households in rural areas, rural households are excluded in this study. For details of the data construction process and a discussion of strengths and weaknesses of this approach, see Fan (1996).

The total sample size is 10,400 households who were interviewed for a calendar year during 1980 to 1992. The sample includes 1,146 African American households, 222 Asian American households, 8,444 Caucasian households, and 588 Hispanic American households. A household is classified as fitting into a particular group if the reference person reported having that particular ethnic background. Households not belonging to any of the four ethnic groups (such as native American Indians) are excluded from this study because their sample size is too small to form an independent group.

During the 13-year sample period, household income, expenditure and budget shares, and market prices experienced many changes. Generally speaking, prices increased over time, but the rate of increase for different commodity categories was different. On average, tobacco and tobacco related products had the highest price increase (209 percent) during the 13-year sample period, followed by education (177 percent) and health care (158 percent). Household equipment and operation had the lowest price increase during the 13 years (37 percent), followed by apparel (45 percent).

There are also price differences among regions and cities. For example, in 1980, the housing price in northeastern cities with a population of more than 1.2 million was about 124 percent higher than the housing price in southern cities with a population of less than 50,000, whereas in 1992, the percentage differences increased to 166 percent. On the other hand, the price of food at home was only 12 percent higher for northeastern cities with a population of more than 1.2 million than southern cities with a population of less than 50,000 in 1980, and the percentage difference was increased to about 22 percent in 1992.

For all households in the sample, the mean unadjusted dollar amount of total expenditure has increased from \$10,989 in 1980 to \$22,915 in 1992, a 109 percent increase during the 13 years. However, the simultaneous inflation canceled out most of the income growth. The mean budget shares for shelter and health care increased over the years, while the budget shares for food at home, transportation, and alcoholic beverages declined. The budget shares for other expenditure categories show ups and downs during 1980-1992, and no consistent pattern can be established.

Demographic profiles for all four ethnic groups are provided in Table 1. Note that not all of the variables listed in the demographic profiles are used in later stages of the analysis.

Two-sample t-tests are performed to test whether the observed budget allocation patterns for African American households are statistically significantly different from that of other ethnic groups. The results of the unadjusted t-tests support the existence of statistically significant differences in household budget allocation patterns among African American households and the other three ethnic groups. The test results indicate that members of African American households allocate a statistically significantly smaller proportion of their budget to food away from home and entertainment and a larger share to fuel and utilities, apparel, tobacco products, and personal care than all other ethnic groups. Keeping in mind that t-tests are not adjusted for households' economic and demographic characteristics, we conclude that the observed budget allocation patterns are different among the four ethnic groups.

#### THEORETICAL BACKGROUND AND ANALYTICAL METHODS

The neoclassical consumer demand theory provides a theoretical framework for the analysis of household budget allocation patterns by formulating expenditure functions for goods and services. Given a budget constraint and a utility function representing consumer preferences, the bundles of commodities that maximize consumer utility subject to the budget constraint can be expressed as a function of relative prices of goods, household income, and household preferences. To ease operation, empirically, the expenditures ( $E$ ) or budget shares ( $W$ ) rather than the quantities ( $Q$ ) are often used as a function of relative prices of goods  $P$ , household income ( $M$ ), and household demographic characteristics  $D$ . Demographic characteristics include ethnicity, household composition, household lifecycle stage, education level, residence area, and region. The assumption behind these categories is that consumers with similar

TABLE 1  
*Demographic Profiles by Ethnicity*

| Characteristics                 | Ethnic Groups                   |                                     |                                    |                           |
|---------------------------------|---------------------------------|-------------------------------------|------------------------------------|---------------------------|
|                                 | Asian<br>Americans<br>(n = 222) | African<br>Americans<br>(n = 1,146) | Hispanic<br>Americans<br>(n = 588) | Caucasians<br>(n = 8,444) |
| Total expenditure:              |                                 |                                     |                                    |                           |
| Mean (in 1992 dollars)          | 26,745                          | 16,251                              | 19,850                             | 23,811                    |
| (Standard Deviation)            | (15,188)                        | ( 9,846)                            | (12,115)                           | (13,832)                  |
| Age of reference person:        |                                 |                                     |                                    |                           |
| Mean                            | 47.67                           | 47.18                               | 43.61                              | 49.67                     |
| (Standard Deviation)            | (15.97)                         | (16.30)                             | (15.54)                            | (17.35)                   |
| Gender of reference person:     |                                 |                                     |                                    |                           |
| Female                          | 28.8%                           | 49.1%                               | 33.3%                              | 30.8%                     |
| Male                            | 71.2%                           | 50.9%                               | 67.7%                              | 69.2%                     |
| Education of reference person:  |                                 |                                     |                                    |                           |
| Less than high school           | 23.4%                           | 40.7%                               | 57.0%                              | 21.2%                     |
| High school graduate            | 24.8%                           | 30.6%                               | 20.4%                              | 32.2%                     |
| Some college                    | 20.3%                           | 18.8%                               | 12.6%                              | 21.8%                     |
| College graduate or more        | 31.5%                           | 9.9%                                | 10.0%                              | 24.8%                     |
| Occupation of reference person: |                                 |                                     |                                    |                           |
| White collar                    | 41.4%                           | 24.3%                               | 18.9%                              | 35.7%                     |
| Self-employed                   | 6.3%                            | 2.4%                                | 3.9%                               | 5.3%                      |
| Others                          | 52.2%                           | 73.3%                               | 77.2%                              | 61.0%                     |
| Family size:                    |                                 |                                     |                                    |                           |
| Mean                            | 3.39                            | 2.90                                | 3.69                               | 2.57                      |
| (Standard Deviation)            | (1.95)                          | (1.77)                              | (2.03)                             | (1.40)                    |
| Number of earners:              |                                 |                                     |                                    |                           |
| Mean                            | 1.75                            | 1.20                                | 1.55                               | 1.39                      |
| (Standard Deviation)            | (1.22)                          | (0.98)                              | (1.10)                             | (1.03)                    |
| Family type:                    |                                 |                                     |                                    |                           |
| Husband and wife only           | 14.9%                           | 10.0%                               | 9.2%                               | 25.8%                     |
| Husband/wife with children      | 40.1%                           | 20.8%                               | 39.7%                              | 33.4%                     |
| All other husband/wife families | 12.6%                           | 6.4%                                | 12.2%                              | 3.4%                      |
| Single parent with child < 18   | 3.7%                            | 17.5%                               | 8.5%                               | 4.1%                      |
| Single consumers                | 15.3%                           | 24.7%                               | 12.9%                              | 24.7%                     |
| Other families                  | 13.5%                           | 20.7%                               | 17.3%                              | 8.6%                      |
| Tenure choice:                  |                                 |                                     |                                    |                           |
| Renters                         | 35.1%                           | 50.6%                               | 51.6%                              | 25.4%                     |
| Home-owner with mortgage        | 48.2%                           | 33.2%                               | 34.5%                              | 47.3%                     |
| Home-owner without mortgage     | 16.7%                           | 16.2%                               | 13.9%                              | 27.3%                     |
| Region:                         |                                 |                                     |                                    |                           |
| Northeast                       | 9.5%                            | 18.8%                               | 16.8%                              | 25.8%                     |
| Midwest                         | 4.5%                            | 24.8%                               | 5.6%                               | 30.0%                     |
| South                           | 7.2%                            | 46.7%                               | 36.1%                              | 24.3%                     |
| West                            | 78.8%                           | 9.7%                                | 41.5%                              | 20.0%                     |

characteristics have similar preferences. The demand functions for commodity  $i$  can be expressed mathematically as follows:

$$Q_i = q_i(M, P, D); \quad (1a)$$

$$E_i = e_i(M, P, D); \quad (1b)$$

$$W_i = w_i(M, P, D). \quad (1c)$$

While this study only deals with monetary budget allocation of households at a given time, it should be recognized that household monetary budget allocation decisions may interact with many other simultaneous decisions, such as labor supply, life cycle consumption allocation, time allocation, etc. For example, studies have shown that household labor supply behavior has statistically significant effects on expenditure on food away from home and apparel (Dardis et al. 1981; Foster 1988). However, it is not feasible to include every possible decision process in one study. Consequently, in order to justify the construction of a complete demand system for household monetary budget allocation at a given time period, a weak separability assumption is required. In this study, it is assumed that the household budget allocation decision at a given time is weakly separable from other household decisions. This assumption forces any wage effects to have income effects only. So long as the substitution effects are relatively small, the error introduced by the weak separability assumption is not large. Swofford and Whitney (1987) showed that consumption goods and leisure meet necessary and sufficient conditions for weak separability using nonparametric methods. Therefore, the substitution effects of wage rate on consumption should not be substantial.

Given the large number of expenditure categories and demographic variables involved in the demand system, it is important to select a simple but flexible demand system to execute the analysis. The Almost Ideal Demand System (AIDS) and its linear approximation form LA/AIDS, first introduced by Deaton and Muellbauer in 1980, have gained popularity in the past 15 years. The AIDS model has several advantages:

... [it] gives an arbitrary first-order approximation to any demand system; it satisfies the axioms of choice exactly; ... it has a functional form which is consistent with known household-budget data; it is simple to estimate, largely avoiding the need for non-linear estimations; and it can be used to test the restrictions of homogeneity and symmetry through linear restrictions on fixed parameters. Although many of these desirable properties are possessed by one or other of the Rotterdam or translog models, neither possesses all of them simultaneously" (Deaton and Muellbauer 1980).

We settle on the AIDS model for our analysis because of the claimed advantages over the Rotterdam and translog models and because the AIDS model offers a comparatively parsimoniously parameterized model relative to other more general models, such as the Lewbel model (Lewbel 1989).

Due to the number of variables and commodities involved in this study, the full AIDS model is still too complicated to warrant system convergence. Therefore, the LA/AIDS model is used in this study. In the 1980s, the LA/AIDS system was criticized for causing bias in price elasticity estimates because of its use of the Stone index, but this problem was tackled and resolved by Alston, Forster and Greene (1994), and Pashardes (1993). The corrected formulas for price elasticity estimates are used in this study to correct for the estimation bias.

According to Deaton and Muellbauer (1980), the LA/AIDS is defined by

$$W_i = \alpha_i + \sum_j \gamma_{ij} \log P_j + \beta_i \log(M/P^*), \quad (2)$$

where  $w$ ,  $p$ , and  $M$  are budget share, price, and total expenditure, respectively;  $\alpha$ ,  $\beta$ , and  $\gamma$  are parameters; and  $i$  and  $j$  are expenditure categories.  $P^*$  is a price index, commonly computed using the Stone index, which is defined by

$$\log P^* = \sum W_i^* \log P_i. \quad (3)$$

To avoid statistical problems, the Stone index is created using mean budget share for each region/city-size combination and can, thus, be treated as exogenous.

Two statistical issues are addressed in this study. The first issue is the incorporation of demographic variables into the demand system. The oldest and most commonly used methods of introducing demographic variables into a demand system are demographic translating and demographic scaling (Pollak and Wales 1981). While demographic translating assumes a close relationship between the effects of changes in demographic variables and the effects of changes in total expenditure, demographic scaling assumes that the effects of changes in demographic variables are closely related to the effects of price changes.

The so-called Gorman specification (1976) combines both demographic translating and scaling and is, thus, more flexible. In 1985, Lewbel extended the model described by Gorman (1976) to develop a general method of incorporating demographic effects into a demand system. The general method is to introduce functions of demographic

variables, prices, and expenditures into the expenditure function of a demand system. This generalized technique permits complicated interactions of demographic variables with prices and expenditure. It encompasses demographic translating, demographic scaling, and generalized Gorman form as specific cases. Empirically, however, the general form has to be reduced to a specific form to be computationally feasible.

Various computational problems have occurred in empirical estimations so that some of the theoretically desirable and flexible functional forms have been difficult, if not impossible, for researchers to execute. After many attempts to empirically execute some of the flexible forms, including the Gorman form and demographic scaling, and to incorporate demographic variables into the LA/AIDS system without achieving computational convergence, final convergence is reached using a method close to Blundell, Pashardes, and Weber's (1993) specification, which is a form of demographic translating. This specification is realized by allowing only the parameters  $\alpha$  and  $\beta$  in the LA/AIDS budget share system to vary with the demographic variables. More specifically, the budget share system with demographic variables (Ds) is specified as

$$W_i = a_{i0} + \sum_{h=1}^m \alpha_{ih} D_h + \sum_j \gamma_{ij} \log P_j + (\beta_{i0} + \sum_{h=1}^m \beta_{ih} D_h) \log(M/P^*), \quad (4)$$

where  $D_1 \dots D_m$  are demographic variables.

The second issue is the problem of limited dependent variables, which often occurs when household expenditure data are used due to zero expenditure on some commodities by some households during the sampling period. After a comparison of several available statistical procedures for handling this problem, including the two-stage probit, one-stage tobit, and two-stage tobit, researchers selected the two-stage tobit procedure. The two-stage tobit method is utilized by estimating a probit equation for each expenditure category at the first stage:

$$\text{Prob}(E_i > 0) = \tau_i(M, P, D), \quad (5)$$

then incorporating the estimated  $\phi_i$  (the density function of the standard normal distribution evaluated at  $\tau_i[M, P, D]$  for commodity  $i$ ) and  $\Phi_i$  (the cumulative probability function of the standard normal distribution evaluated at  $\tau_i[M, P, D]$  for commodity  $i$ ) into the second stage demand analysis to correct for the limited dependent variable problem (Maddala 1983; Greene 1990).

Specifically, the LA/AIDS system with correction for limited dependent variable is then specified as<sup>1</sup>

$$W_i = a_{i0} + \sum_{h=1}^m \alpha_{ih} D_h + \sum_j \gamma_{ij} \log P_j + (\beta_{i0} + \sum_{h=1}^m \beta_{ih} D_h) \log(M/P^*) + \sigma_i [\phi_i - (1 - \Phi_i) \sum_{h=1}^n \tau_{ih} X_h], \quad (6)$$

The two-stage tobit method is chosen over the two-stage probit because all of the observations can be used in the same equation system in the second stage demand system analysis, and further model complications can be avoided. The method also allows for enough degrees of freedom for relatively robust parameter estimation. Single equation tobit (one stage) is ruled out because of the infeasibility of including it in the structural equation system where cross-equation parameter restrictions are imposed.

To maintain the theoretical properties of the demand system, including adding-up, homogeneity, and symmetry, the following cross-equation parameter restrictions apply:<sup>2</sup>

For adding-up,

$$\sum_i \alpha_{i0} = 1, \sum_i \alpha_{ih} = 0, \sum_i \beta_{i0} = 0, \sum_i \beta_{ih} = 0, \sum_i \gamma_{ij} = 0, \sum_i \sigma_i = 0, \quad (7)$$

$$i, j = 1, 2, \dots, k, \quad h = 1, 2, \dots, m.$$

For homogeneity,

<sup>1</sup>From page 222 (Maddala 1983), we have

$$\begin{aligned} E(y_i) &= \text{Prob}(y_i > 0) * E(y_i | y_i > 0) + \text{Prob}(y_i \leq 0) * E(y_i | y_i \leq 0) = \Phi_i \sum \beta_{ih} X_h + \sigma_i \phi_i \\ &= \sum \beta_{ih} X_h (1 - (1 - \Phi_i)) + \sigma_i \phi_i = \sum \beta_{ih} X_h - \sigma_i (1 - \Phi_i) (\sum \beta_{ih} X_h / \sigma) + \sigma_i \phi_i \\ &= \sum \beta_{ih} X_h + \sigma_i [\phi_i - (1 - \Phi_i) \sum_{h=1}^n \tau_{ih} X_h], \end{aligned}$$

using  $\sum_{h=1}^n \tau_{ih} X_h$  as an estimate for  $\sum \beta_{ih} X_h / \sigma$ . This approach is similar to Greene (1990, 729, 732).

However, Greene's formula appears to contain a mistake.

<sup>2</sup>Asymptotic  $\chi^2$  tests are performed to test the homogeneity and symmetry restrictions (Judge *et al.*, 1988, 458; SAS/ETS User's Guide, 64-65). Both restrictions are not rejected (p-values are 0.5 for homogeneity and 0.5 for symmetry).

$$\sum_j \gamma_{ij} = 0, \quad i, j = 1, 2, \dots, K. \quad (8)$$

For symmetry,

$$\gamma_{ij} = \gamma_{ji} \text{ for all } i, j, \quad i, j = 1, 2, \dots, k. \quad (9)$$

Following the same notation, the expenditure elasticity for commodity  $i$  is formulated as

$$e_i = 1 + \partial \ln(W_i) / \partial \ln(M) = 1 + 1/W_i \left[ (\beta_{i0} + \sum_{h=1}^m \beta_{ih} D_h) + \sigma_i \tau_{i(\log M)} (\Phi_i - 1) \right], \quad (10)$$

where  $\tau_{ih}$  is the probit coefficient for variable  $h$  from the probit equation for commodity  $i$  (e.g.,  $\tau_{i(\log M)}$  is the probit coefficient for the variable  $\log M$  for commodity  $i$ ).

Following the recent literature on the correct computation of price elasticities when LA/AIDS is used (Alston, Forster, and Greene 1994; Pashardes 1993), the price elasticity of commodity  $i$  with respect to commodity  $j$  adjusted for bias is formulated as

$$e_{ij} = -\delta_{ij} + \partial \ln(W_i) / \partial \ln(P_j) = -\delta_{ij} + 1/W_i \left[ \gamma_{ij} - \beta_{i0} + \sum_{h=1}^m \beta_{ih} D_h \right] W_j + \sigma_i \tau_{i \log P_j} (\Phi_i - 1), \quad (11)$$

where  $\delta_{ij}$  is the Kronecker delta, and  $\delta_{ij} = 1$  when  $i = j$ , 0 otherwise.

To test the significance of the ethnicity variables, researchers estimated several reduced models of the LA/AIDS by excluding a certain ethnic variable. Joint F-tests are performed to test the significance of ethnic effects on household budget allocation patterns after adjusting for other economic and demographic differences. Specifically, the F-statistics are formulated as follows:

$$F = \frac{(SSE_R - SSE_F) / (df_R - df_F)}{SSE_F / df_F}, \quad (12)$$

where  $SSE_F$  is the sum square errors of the full model, in which all independent variables are included. The  $SSE_R$  is the sum square errors of the reduced model, in which the ethnic variable tested is dropped out of the

model. The degrees of freedom are denoted as *df*.

To further our understanding, budget allocation patterns for African Americans are simulated as if they were Asian Americans, Caucasian Americans, and Hispanic Americans. The simulation results can provide more insights into the expenditure patterns of African Americans compared to three other ethnic groups in the United States.

The income variable used in this study is annual total expenditure defined by subtracting social security tax, cash contribution, life insurance payment, and net vehicle outlay from the BLS defined total expenditure and is a sum of the 13 expenditure categories discussed in the data section. Because price variables are included as explanatory variables, the total expenditure does not need to be adjusted for the Consumer Price Index.

Besides ethnic variables, 20 other demographic variables are used in the analysis, including age, gender, family composition, number of earners, education level, employment status, housing tenure situation, region, and a continuous time variable.

#### RESULTS AND DISCUSSION

The LA/AIDS demand system is estimated using an iterative seemingly unrelated regression (ITSUR) method. The  $R^2$ 's range from 0.10 to 0.47, with food at home, shelter, utilities, transportation, and health care having  $R^2$ 's higher than 0.30, and education having the lowest  $R^2$  (0.10) followed by alcohol (0.11). Due to space limitations, researchers reported only selected results in this paper. Full estimation results of the LA/AIDS demand system are available from the authors upon request.

In Table 2, the estimated mean income and own-price elasticities for African American households are presented. As a reference, two sets of elasticities for Caucasian American households are also reported: one with other variables controlled and the other without other variables controlled. Caution needs to be exercised when comparing the ethnic differences in these elasticities. This is because, first, due to model complexity, we are not able to perform formal tests to test whether differences in elasticities are statistically significant; second, demographic translating does not allow direct interaction of demographic variables with the price variables, so our model is not particularly good in capturing ethnic differences in price elasticities. Therefore, our discussion will focus on the income and own-price elasticities for African American households without attempting to compare those with that of Caucasian Americans.

For African American households, food at home, fuel and utilities, and

TABLE 2

*Estimated Mean Income and Own-Price Elasticities for African American Households and Caucasian American Households<sup>a</sup>*

| Expenditure Category              | Income Elasticity               |                          |                              | Own-Price Elasticity            |                          |                              |
|-----------------------------------|---------------------------------|--------------------------|------------------------------|---------------------------------|--------------------------|------------------------------|
|                                   | Caucasian Americans             |                          |                              | Caucasian Americans             |                          |                              |
|                                   | African Americans (Sample Mean) | Other Factors Controlled | Other Factors Not Controlled | African Americans (Sample Mean) | Other Factors Controlled | Other Factors Not Controlled |
| Food at home                      | 0.45                            | 0.59                     | 0.53                         | 0.04                            | 0.01                     | 0.24                         |
| Food away from home               | 1.72                            | 1.54                     | 1.33                         | -1.03                           | -1.02                    | -1.01                        |
| Shelter                           | 1.13                            | 1.10                     | 1.13                         | -0.53                           | -0.55                    | -0.55                        |
| Fuel and utilities                | 0.57                            | 0.61                     | 0.47                         | -0.41                           | -0.27                    | -0.17                        |
| Household equipment and operation | 1.96                            | 2.13                     | 1.84                         | -1.10                           | -1.11                    | -1.05                        |
| Apparel                           | 1.50                            | 1.53                     | 1.48                         | -1.61                           | -1.78                    | -1.66                        |
| Entertainment                     | 1.80                            | 1.94                     | 1.62                         | -0.00                           | -0.19                    | -0.46                        |
| Transportation                    | 1.45                            | 1.24                     | 1.04                         | -1.41                           | -1.37                    | -1.27                        |
| Education                         | 2.30                            | 1.50                     | 1.34                         | -3.16                           | -2.94                    | -2.62                        |
| Health care                       | 1.84                            | 1.24                     | 1.10                         | -3.56                           | -2.81                    | -2.77                        |
| Alcohol                           | 1.40                            | 1.50                     | 1.34                         | -0.90                           | -0.92                    | -1.01                        |
| Tobacco                           | 0.41                            | 0.58                     | 0.37                         | -0.59                           | -0.72                    | -0.53                        |
| Personal care                     | 1.38                            | 1.00                     | 0.92                         | -0.65                           | -0.26                    | -0.19                        |

*Note:* Using the income elasticity of education as an example, we can interpret the table as follows: African Americans have a sample average income elasticity of education of 2.30. For Caucasian Americans with exactly the same set of characteristics as the African American sample, the average income elasticity of education is 1.50. For the sample of Caucasian Americans studied in this research, the actual average income elasticity is 1.34.

<sup>a</sup>Due to the complexity of the model, we are not able to compute the standard deviations of the elasticities. The table presents mean estimates.

tobacco are found to be income inelastic. Education, with an income elasticity of 2.30, is the most income elastic expenditure category, followed by household equipment and operation (1.96), health care (1.84), entertainment (1.80), and food away from home (1.72). Health care, with an own-price elasticity of -3.56, is the most price elastic expenditure category, closely followed by education, with an own-price elasticity of -3.16. Apparel, transportation, household equipment and operation, and food away from home are also found to be own-price elastic, with own-price elasticities ranging from -1.61 (for apparel) to -1.03 (for food away from home). Food at home, entertainment, shelter, utilities, alcohol, tobacco, and personal care are found to be own-price inelastic, with food at home and entertainment having close to zero own-price elasticities.

Adjusted F-tests are performed to test the joint significance of the

TABLE 3

*Simulation Results: Adjusted Budget Share Differences between African Americans and Other Ethnic Groups (with F-test Results)*

| Expenditure Category              | African Americans | Asian Americans | Hispanic Americans | Caucasian Americans |
|-----------------------------------|-------------------|-----------------|--------------------|---------------------|
|                                   | (%)               | (%)             | (%)                | (%)                 |
| Food at home                      | 21.6              | 21.7            | 23.4***            | 21.1***             |
| Food away from home               | 3.4               | 4.6***          | 3.9**              | 4.4***              |
| Shelter                           | 22.4              | 26.6***         | 25.6***            | 23.2                |
| Fuel and utilities                | 15.4              | 10.8***         | 11.9***            | 12.4***             |
| Household equipment and operation | 4.0               | 3.7             | 4.0                | 4.0                 |
| Apparel                           | 6.4               | 5.0***          | 6.0***             | 5.1***              |
| Entertainment                     | 3.3               | 3.8             | 3.4                | 4.2***              |
| Transportation                    | 12.7              | 11.8*           | 12.5               | 12.6***             |
| Education                         | 1.5               | 2.3***          | 1.3                | 1.6***              |
| Health care                       | 4.9               | 6.3**           | 5.0                | 6.8***              |
| Alcohol                           | 1.1               | 0.8             | 1.1                | 1.2                 |
| Tobacco                           | 1.8               | 1.4             | 0.9***             | 2.2***              |
| Personal care                     | 1.5               | 1.2             | 1.0                | 1.1                 |

*Note:* Using the budget share for education as an example, we can interpret the table as follows: African Americans allocate an average of 1.5 percent of their budget to education. For Asian Americans with exactly the same characteristics as the African Americans in the sample, the budget share for education would be 2.3 percent. For Caucasian Americans with exactly the same characteristics as the African Americans in the sample, the budget share for education would be 1.6 percent. The difference between African Americans and Hispanic Americans is not statistically significant.

\*\*\*Significantly different at 99 percent level.

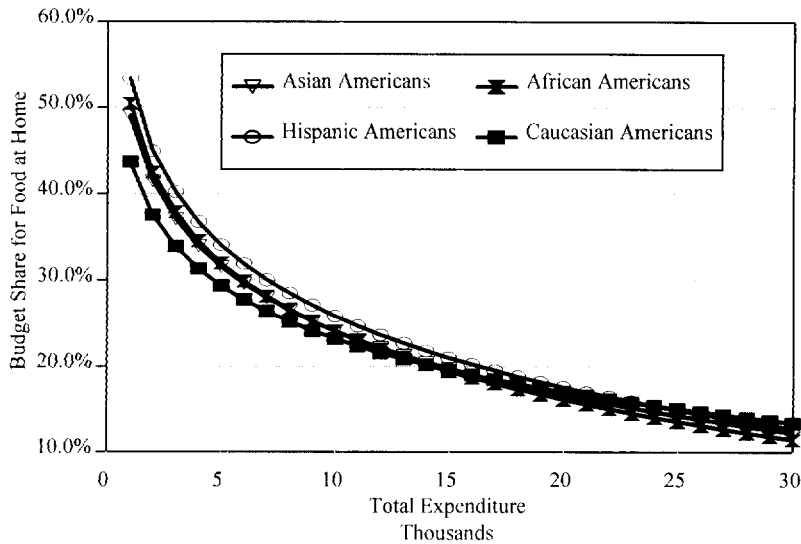
\*\*Significantly different at 95 percent level.

\*Significantly different at 90 percent level.

impact of ethnicity on household budget allocation patterns. The budget allocation patterns of the other three ethnic groups with exactly the same characteristics as the African American households in the sample are also estimated. The results of the joint F-tests, together with the means of the simulated budget shares, are reported in Table 3.

To further understand the dynamics of ethnic differences in household budget allocation patterns, two sets of simulations are performed at different levels of total expenditure. The first set of simulations uses means (for continuous variables) and modes (for discrete variables) of the African American households in the sample as a representative African American household, and different ethnicities are attached to this household for the simulation. The second set of simulations uses each African American household in the sample. Different ethnicity is attached to these households for the budget share simulations, and the means are then calculated. The two sets of simulations yield similar patterns in terms of

**FIGURE 1**  
*Simulation Results: Ethnic Differences in Budget Share for Food at Home by Levels of Total Expenditure*



**FIGURE 2**  
*Simulation Results: Ethnic Differences in Budget Share for Food Away from Home by Levels of Total Expenditure*

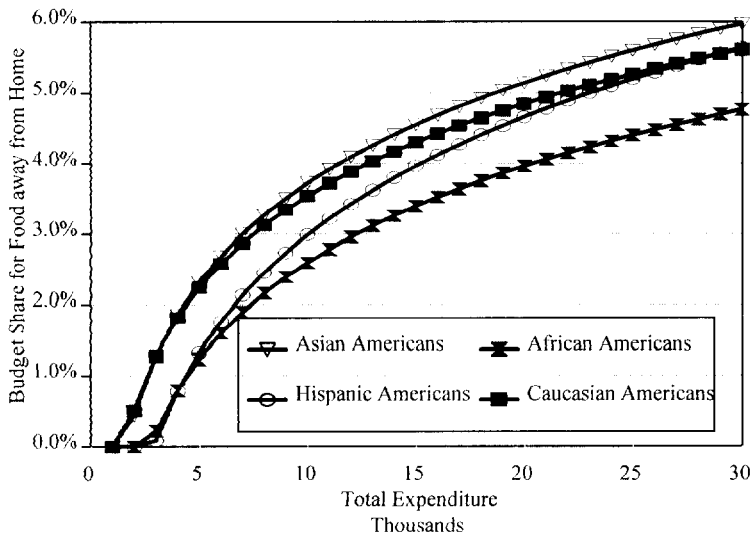


FIGURE 3

*Simulation Results: Ethnic Differences in Budget Share for Shelter by Levels of Total Expenditure*

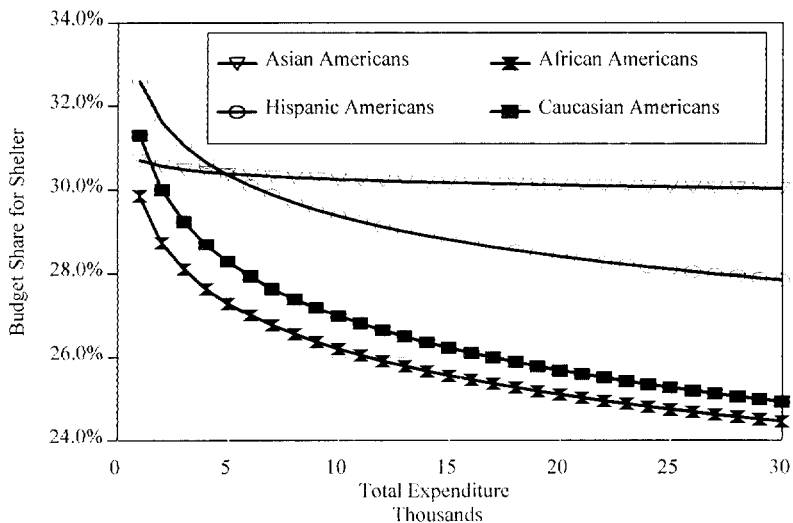
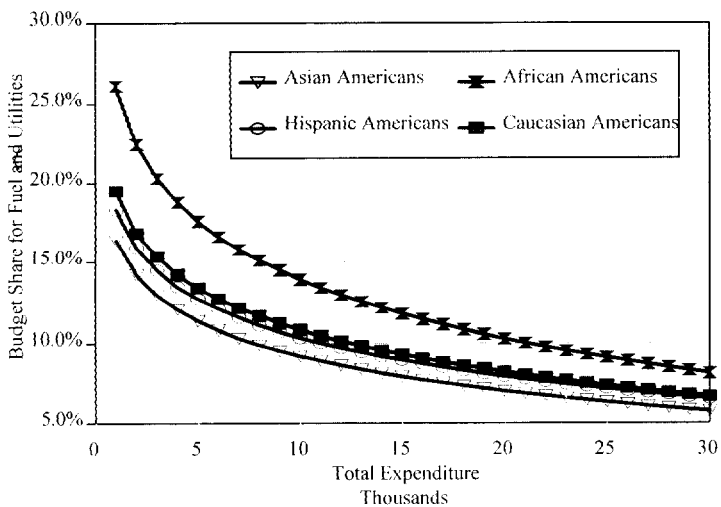
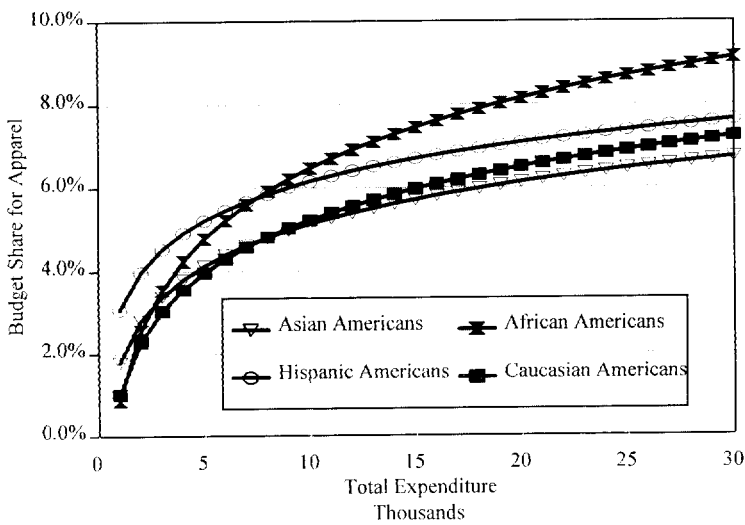


FIGURE 4

*Simulation Results: Ethnic Differences in Budget Share for Fuel and Utilities by Levels of Total Expenditure*



**FIGURE 5**  
*Simulation Results: Ethnic Differences in Budget Share for Apparel  
by Levels of Total Expenditure*



**FIGURE 6**  
*Simulation Results: Ethnic Differences in Budget Share for Entertainment  
by Levels of Total Expenditure*

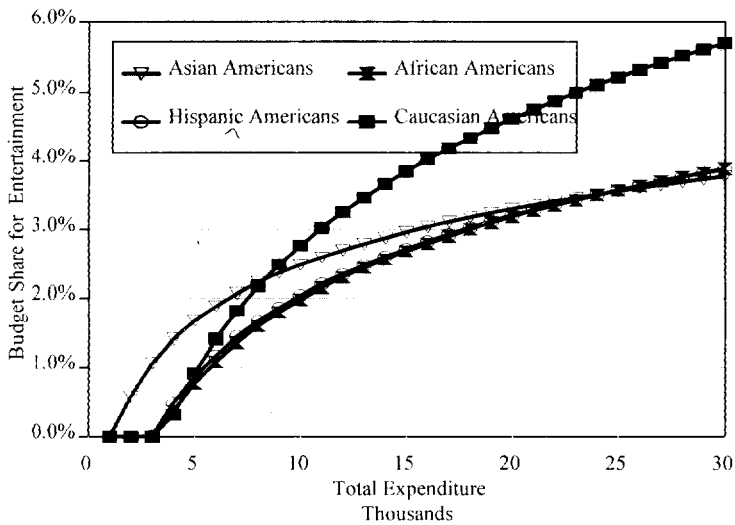


FIGURE 7

*Simulation Results: Ethnic Differences in Budget Share for Transportation by Levels of Total Expenditure*

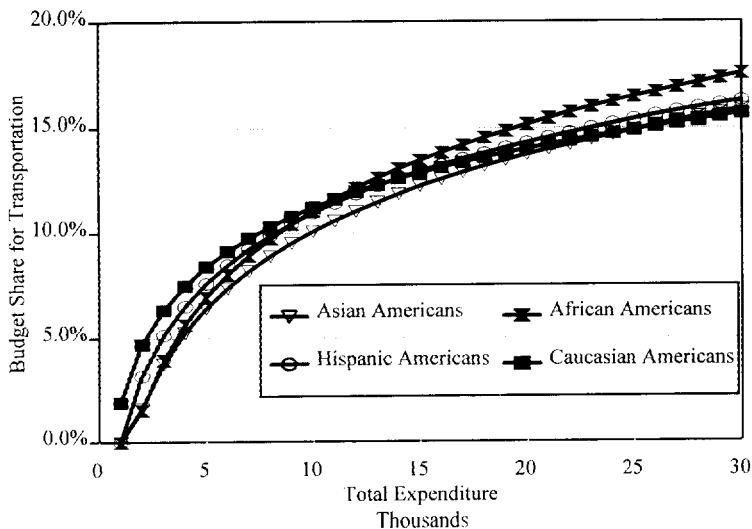


FIGURE 8

*Simulation Results: Ethnic Differences in Budget Share for Education by Levels of Total Expenditure*

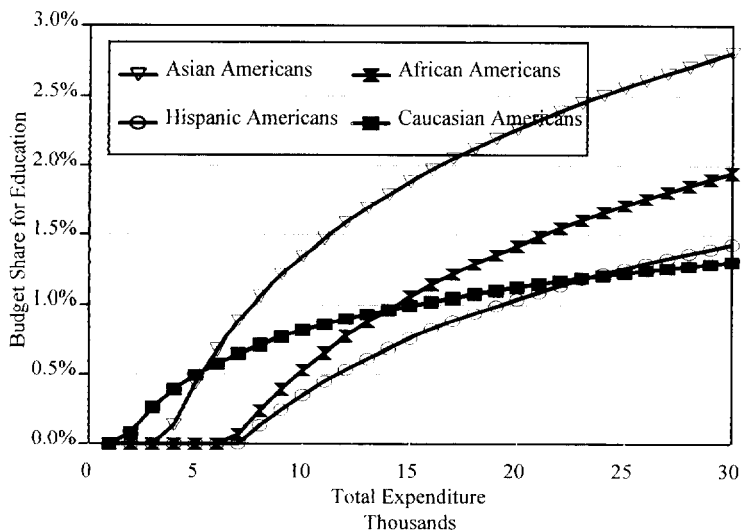


FIGURE 9

*Simulation Results: Ethnic Differences in Budget Share for Health Care by Levels of Total Expenditure*

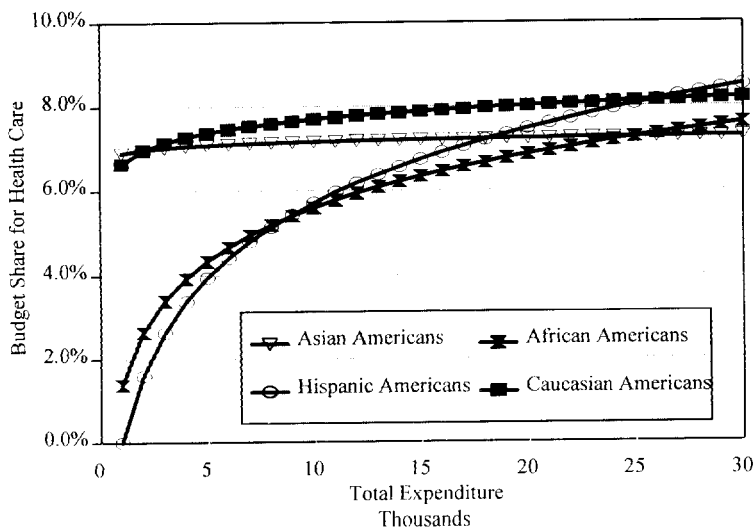
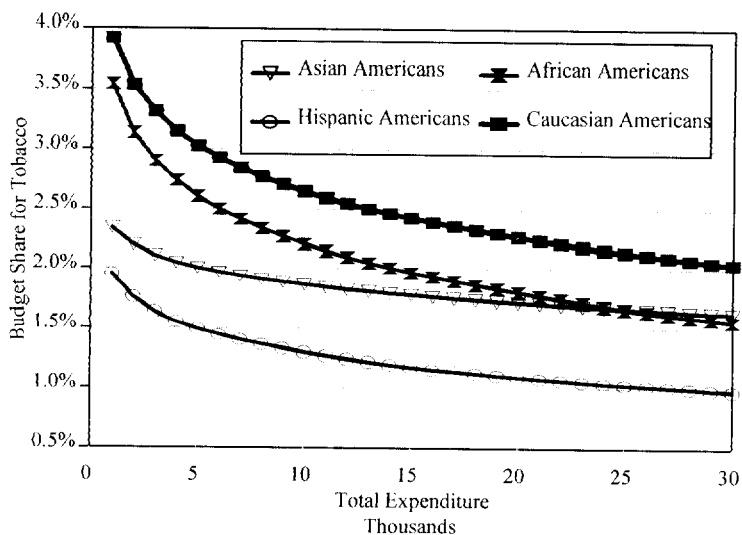


FIGURE 10

*Simulation Results: Ethnic Differences in Budget Share for Tobacco by Levels of Total Expenditure*



ethnic differences. Due to space limitation, only selected results from the first set of simulations are presented in Figure 1 through Figure 10. All other graphs are available from the authors upon request.

After controlling for other socio-economic and demographic variables, researchers found that African American households have statistically significantly different budget allocation patterns than other ethnic groups in more than half of the expenditure categories investigated in this study. When compared to the budget shares of Asian American households, African American households are significantly different in seven out of thirteen expenditure categories. Compared to Hispanic households, the number of significantly different expenditure categories is six; compared to Caucasian households in which the number is nine.

#### *Food at Home*

Food at home is a necessity and is very price inelastic. Budget share for food at home are found to be statistically significantly different between African Americans and Hispanics and between African Americans and Caucasians. While African American households allocate less of their budget to food at home than Hispanic households at any level of total expenditure, they are found to allocate more of their budget to food at home than Caucasian households at low levels of total expenditure but less at higher levels of total expenditure. In addition, Caucasian households are more income elastic than African American households, on average. Since the relationship between budget share for food at home and total expenditure is non-linear, conflicting results from previous studies may be due to the use of simplified linear models. Also, differences in classification of ethnic groups in different studies also may have contributed to conflicting results (Bae 1992; Foster 1988; Wagner and Soberon-Ferrer 1990).

#### *Food Away from Home and Entertainment*

Both food away from home and entertainment are found to be luxury goods. However, food away from home is about unitary price elastic, whereas entertainment is very price inelastic. The simulations show that African American households allocate less of their budget to food away from home than Asians, Hispanics, and Caucasians, *ceteris paribus*. On average, the difference in budget share for food away from home is about 35 percent between African Americans and Asians, 15 percent between

African Americans and Hispanics, and 29 percent between African Americans and Caucasians. This result confirms the findings by Bellante and Foster (1984), Hanna and Carter (1986), Foster (1988), and Wagner and Soberon-Ferrer 1990. Further, as total household expenditure increases, the difference in budget share for food away from home between African Americans and households of other ethnicity becomes larger. However, no substantial difference in income elasticity at mean levels is found. Possible explanations for these findings are racial discrimination and the purchase of less expensive food when eating out (*e.g.*, fast food). Past research has indicated that African American consumers are less likely to eat out because of racial discrimination (Blackwell, Mathews and Randolph 1979; Stafford, Cox, and Higginbotham 1968; Wagner and Soberon-Ferrer 1990). Past research also has noted that African American women are more likely than Caucasian women to eat less expensive, less nutritious meals (Lee 1979; Lino 1990). Further, the differences also may be caused by the availability of restaurants serving ethnic food.

Entertainment contains two major categories: (1) fees, admissions, and club memberships and (2) entertainment equipment. African American households allocate less of their budget to entertainment than Asian American households (15 percent difference) and Caucasian households (27 percent difference) when all characteristics except for ethnicity are held the same during the simulation. In addition, Caucasian households have higher income elasticity for entertainment. Previous studies have not been able to identify the reasons African Americans spend less on entertainment than Asians and Caucasians. However, because admissions to shows and club memberships are expenditures in public settings, it is speculated that African American households may be less likely than Caucasian households to attend these functions due to racial discrimination. Also, the availability of entertainment events with ethnic themes may be limited. The same explanation probably applies to other minority ethnic groups. Furthermore, sociological studies have found evidence that African Americans are more likely than Caucasians to attend church activities (such as church dinners) and gatherings of family and friends (Miner 1993). It is possible that African American households use these activities as substitutes for entertainment events in general public settings. The simulations indicate that differences in entertainment budget share between African Americans and Asian Americans are mainly at low or middle levels of total expenditure. While both African Americans and Asian Americans are likely to prefer entertainment with family and friends over entertainment in public settings (both due to possible racial

discrimination and limited availability of entertainment events with ethnic themes), anecdotal evidence suggests that the method of family entertainment is different for Asian Americans and for African Americans, with Asian Americans putting more emphasis on entertainment equipment, such as fancy stereo systems. Thus, even at low levels of total expenditure, Asian Americans may perceive possessing some entertainment equipment, such as televisions and stereos, as important for family gatherings and entertaining, and, therefore, allocate a larger amount of their budget than African Americans on acquiring this equipment.

#### *Shelter, Fuel and Utilities, and Transportation*

Both shelter and transportation are found to be luxury goods for African American households, with income elasticities larger than one on average. Shelter is own-price inelastic, with an own-price elasticity at  $-0.53$ , on average, whereas transportation is price elastic, with an own-price elasticity at  $-1.41$ , on average. Fuel and utilities are found to be a necessity with an inelastic own-price effect for African American households.

Consistent with findings by Myers (1991), researchers found that African American households spend a statistically significantly lower proportion of their budget on shelter, compared to Asian American households (19 percent difference) and Hispanic households (14 percent difference). African Americans may be more likely, due to past patterns of housing segregation and their lingering effects, than other ethnic households to live in neighborhoods where housing is less expensive. In addition, Asian culture and Hispanic culture tend to put more emphasis on traditional family values, reflected in their having a higher proportion of married-couple families with children than both African American and Caucasian households, and a larger number of children per household than African American and Caucasian households on average. A home is perceived as a place where family members spend most of their time together; therefore, it is particularly important for cultures emphasizing traditional family values.

Everything else being equal, African American households spend more on fuel and utilities, compared to Asian Americans, Hispanics, and Caucasians. On average, the budget share difference is about 30 percent between African Americans and Asian Americans, 23 percent between African Americans and Hispanics, and 19 percent between African Americans and Caucasians. African American households also are found to be less income elastic for fuel and utilities than other ethnic groups.

Although previous research has not found or noted explanations for these differences, one possible reason could be that because African Americans tend to spend less of their budget on shelter, their houses may be older, of lower quality, and less energy efficient. For example, older, lower-quality homes may not be well insulated and may have leaky faucets, which leads to higher electric and water bills. Lino's 1990 study supports this argument.

African American households allocate less of their budget to transportation at low levels of total expenditure than Asian Americans and Caucasians but more of their budget to transportation at higher levels of total expenditure. African American households also are found to have higher income elasticity for transportation compared to Hispanic and Caucasian households. This result is partially consistent with Lino's 1990 finding that single-parent, non-Caucasian households spent statistically significantly less than single-parent, Caucasian households on transportation because single-parent households usually are low income. Also, compared to other ethnic groups, African American households are more likely to live in urban core areas where public transportation exists in large supply. This explanation is supported by Alexis' (1962) finding that African Americans spent less on personal transportation (*e.g.*, cars) but more on public transportation (*e.g.*, buses) than Caucasians.

### *Apparel*

Apparel is found to be both income and price elastic for African American households, with an income elasticity of 1.50 and an own-price elasticity of -1.61. Consistent with most previous findings, African American households allocate a higher budget share to apparel products than all other ethnic groups, holding everything else equal, except at very low levels of total expenditure (less than \$6,000 a year). On average, the budget share difference is about 22 percent between African Americans and Asian Americans, 6 percent between African Americans and Hispanics, and 20 percent between African Americans and Caucasians. African American households are more income elastic than Asian American and Hispanic households but less income elastic than Caucasian households. Dardis, Derrick, and Lehfeld's (1981) explanation for this finding was that clothing is a "compensatory consumption" item. Clothing compensates for African American people's lack of access to other material items that give a visual representation of status. Thus, clothing serves as a status symbol for African American consumers and improves their self esteem (Alexis 1962; Andreasen and Hodges 1977; Bauer and Cunningham 1970a, 1970b; Johnson 1981).

### *Health Care and Education*

Health care and education are found to be extremely own-price elastic for African American households, with an average own-price elasticity of  $-3.56$  for health care and  $-3.16$  for education. Health and education are found to be luxury goods for African American households, with an average income elasticity of  $2.30$  for education and  $1.84$  for health care. Simulation results show that on average, African American households spend less on health care than Asian Americans (29 percent difference) and Caucasians (39 percent difference). Given the fact that many low-income African Americans do not have private health insurance (U.S. Bureau of the Census 1990), it is not surprising that African Americans spend less on health care than Asian Americans and Caucasians at low levels of total expenditure. This result confirms the findings by Alexis (1962) and Myers (1991). However, the difference vanishes at higher levels of total expenditure. Past studies also have shown that African Americans are heavy users of emergency rooms at hospitals and public health clinics where they do not have to pay for health care at the time of service or receive care at minimum cost (Aday, Fleming, and Andersen 1984; Annas 1986; Berkanovic and Reeder 1973; Dutton 1979; Gibson 1973; Gold 1984). However, that phenomenon is more likely a result of income differences rather than ethnic differences.

Simulations show that at low levels of total expenditure, African American households tend to allocate a smaller proportion of their budget to education than Caucasian households, whereas at higher levels of total expenditure, they spend more on education than Caucasian households. It is possible that African American households, when their economic situation permits, would spend more money on education to improve their disadvantaged social status, whereas Caucasian households, born advantaged on average, do not have to put in extra efforts to reach the same social status. Asian American households, on the other hand, spend more of their budget on education than African American households at all levels of total expenditure. This result supports Myers's 1991 finding and may be a result of the selective nature of the US immigration policy regarding immigrants from Asia.

African American households are more income elastic for both education and health care than Caucasian households. They are also more income elastic for health care compared to Asian American households. These findings further confirm that low-income and high-income African Americans have very different budget allocation patterns. Future research

should investigate the complex relationship of income, ethnicity, and household behavior in more detail.

### *Alcohol and Tobacco*

Alcohol is income elastic but not very price elastic. Tobacco is both income and price inelastic. No statistically significant differences in budget share patterns for alcohol are found among different ethnic groups. This finding is not consistent with Gibson's 1978 finding that African Americans spent more than Caucasians on alcohol and tobacco products. However, Gibson's study did not control for other factors that might affect alcohol and tobacco use. African American households allocate a statistically significantly higher proportion of their budget to tobacco compared to Hispanic households (50 percent difference) but a lower proportion compared to Caucasian households (22 percent), on average. This pattern seems to be true at all levels of total expenditure. Again, this finding is not consistent with Gibson's 1978 study.

### SUMMARY OF DISCUSSION

Most of the categories African American households spend less money on are expenditures related to public settings (restaurants and theaters) or dealing with professionals who are predominantly Caucasians (doctors and professors). This leads to the speculation that African American households spend less money on these expenditure categories, not because they inherently dislike eating out or seeing a doctor, but because of the perception of possible discrimination in public places where most people are not of their own race, or because of a simple preference for being with their own racial group coupled with a lack of commercial opportunities specializing in African American clientele and a limited number of African American doctors and professors.

The other important finding is that low-income African Americans allocate their budget quite differently from higher-income African Americans. This is evident in that the difference for many expenditure categories is smaller between higher-income African Americans and higher-income Caucasian Americans compared to the difference between lower-income African Americans and lower-income Caucasian Households. In some cases, such as education, higher-income African Americans actually spend more than Caucasians, while lower-income African Americans spend less than Caucasians. This implies that for African Americans, the within group difference in budget allocation pattern is quite large.

## CONCLUSIONS, IMPLICATIONS AND LIMITATIONS

Using the 1980-1992 Consumer Expenditure Survey data with price information from the Consumer Price Index and the 1990 ACCRA Cost of Living Index, this study uses a Linear Approximation of the Almost Ideal Demand System (LA/AIDS) to analyze the budget allocation patterns of 13 expenditure categories of African American households in the United States in comparison with budget allocation patterns of Asian American, Hispanic, and Caucasian households. Findings show that ethnicity does affect a household's needs and preferences and, therefore, affect their budget allocation patterns. Nine of thirteen expenditure categories are statistically significantly different between African American and Caucasian households; seven of thirteen expenditure categories are statistically significantly different between African American and Asian American households; and six of thirteen expenditure categories are statistically significantly different between African American and Hispanic households.

Compared to Caucasian households, African American households allocate statistically significantly less of their budget to food away from home, entertainment, health care, and tobacco products but more of their budget to apparel and utilities, after controlling for other factors. The patterns for food at home, transportation and education are more complex, with low-income African American households spending less money on transportation and education and more money on food at home compared to their low-income Caucasian counterparts. However, at high levels of income, the directions of these differences are reversed. It should be noted that for African American households, the within group difference in budget allocation pattern is quite large.

Based on the results, it is speculated that African American households spend less money on expenditure categories involving public settings or dealing with people who are not of their own race. It could be that African Americans perceive possible discrimination in public places where most people are not of their own race. It also could be a simple preference to be with their own racial group coupled with a lack of commercial facilities specializing in African American clientele and a limited number of African American professionals.

The results of this study have implications for marketers, consumer educators, public policy makers, and researchers. Consistent with previous studies, we found that African American households spend more money on apparel and utilities. In order to meet the specific needs of the

growing African American population, it is important for clothing manufacturers and utility and telephone companies to study the tastes and preferences of this group. On the other hand, Extension programs that focus on housing energy efficiency should make an effort to reach the African American population. Policy makers might want to encourage small businesses specializing in food and entertainment to match African American consumers' tastes. In addition, restaurants and entertainment establishments should create an atmosphere to make African American consumers feel welcome. Opportunities and incentives should be given to African Americans to encourage more of them to become doctors and professors, so hospitals and universities can become places where African American consumers feel comfortable. Increasing consumption in these categories will enable the African American population in the U.S. to become healthier and better educated.

This study has several limitations. First, problems exist with the ACCRA data, which provide price information on commodities across regions and cities. Also, for confidentiality reasons, the CE data do not publish the city size information for the western region. Therefore, it is assumed that all households in the west faced the same prices for all expenditure categories, which is not a realistic assumption. The problems with the ACCRA data and CE data have inevitably introduced error into this study. Second, due to computational limitations, we use the LA/AIDS demand system with a form of demographic translating. More flexible forms would have made possible better comparisons of differences in price elasticities for different ethnic groups.

A better data set, a more comprehensive approach, and a more flexible, yet feasible econometric model are crucial for future research in this area. Future research is also needed to theoretically investigate why ethnic groups spend more or less on certain expenditure categories than others. Because our society is starting to recognize the importance of diversity in its social structure, theories regarding cultural diversity and consumption preference need to be constructed and tested. Expenditure patterns of other minority groups, such as Asian Americans, Hispanic Americans, and Native Americans, need to be investigated if good quality data are available. Furthermore, more detailed expenditure categories should be studied to get a detailed picture of African American households' budget allocation patterns, and more flexible yet feasible econometric models are desirable to study the ethnic differences in income and price responses.

## APPENDIX

TABLE A.1  
*Descriptions of Expenditure Categories*

| Variables                         | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Food at home                      | (1) Food and non-alcoholic beverages at grocery stores; (2) Food and non-alcoholic beverages at convenience or specialty stores; (3) Food prepared by consumer units on trips.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Food away from home               | (1) Food on board, including at school; (2) Catered affairs; (3) Food on out-of-town trips; (4) Dining out at restaurants, etc. (excluding alcoholic beverages); (5) Meals received as pay; (6) School meals.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Shelter                           | (1) Rent of dwelling, including parking fees; (2) Lodging away from home; (3) Housing for someone at school; (4) Ground rent; (5) Fire and extended coverage; (6) Homeowners insurance; (7) Property taxes; (8) Mortgage interest; (9) Penalty charges on special or lump-sum mortgage payment; (10) Parking; (11) Repair or maintenance services; (12) Contractor's labor and material costs; (13) Construction materials; (14) Management and upkeep services for security; (15) Tenants' insurance; (16) Rent received as pay.                                                                                                                                                                                                          |
| Fuel and utilities                | (1) Fuel oil; (2) Gas, bottled or tank; (3) Coal; (4) Wood and other fuel; (5) Electricity; (6) Natural gas; (7) Telephone services; (8) Water and sewerage services; (9) Trash and garbage collection; (10) Septic tank cleaning.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Household equipment and operation | (1) Household textiles including linens, curtains, drapes, slipcovers and decorative pillows; (2) Household furniture includes living room, dining room, bedroom, nursery furniture, porch, lawn, and other outdoor furniture; (3) Floor covering includes installation and replacement of wall-to-wall carpets, room size rugs and other soft floor coverings; (4) Household appliance and other equipments; (5) Baby sitters, day care fees, care of invalids, house cleaning and maintenance; (6) Other household services include termite and pest control products, repair of household appliances and other household equipments, furniture repair, rental and repair of lawn and garden tools, rental of other household equipment. |
| Apparel                           | (1) Men's, boys', women's, and girls' apparel; (2) Footwear; (3) Other apparel products and services.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Entertainment                     | (1) Fees and admissions; (2) Television, radio, sound equipment; (3) Other entertainment supplies; (4) Subscriptions for newspapers, magazines, and book and record clubs.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Transportation                    | (1) Vehicle maintenance and repair; (2) Gasoline and motor oil; (3) Vehicle insurance; (4) Vehicle rent; (5) Public transportation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Health care                       | (1) Health insurance; (2) Medical services; (3) Prescription drugs and medical supplies.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Education                         | (1) Books; (2) School supplies; (3) Tuition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Alcohol                           | (1) Alcoholic beverage at home; (2) Alcoholic beverage away from home.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Tobacco                           | (1) Tobacco products.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Personal care                     | (1) Electric personal care appliances; (2) Personal care services; (3) Rent or repair of electric personal care appliances, wigs, and hairpieces.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

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