# How Economic Contractions and Expansions Affect Expenditure Patterns

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In this study, we attempt to understand how household budget allocations across various expenditure categories change when the economy is in recession or expansion. The common assumption is that a household's tastes would not change as a function of economic conditions and therefore any adjustments in expenditure patterns during economic contractions/expansions would simply be due to changes in the consumption budget. Standard economic models translate these budgetary effects into lateral movements along a set of fixed Engel curves, which relate category expenditure shares to total expenditures. We propose and test a conceptual framework based on the notion of relative consumption, which prescribes that, for any given total consumption budget, expenditure shares for positional goods/services will decrease during a recession, while shares for nonpositional goods/services will increase (i.e., shifting the entire Engel curve upward or downward, depending on the nature of the expenditure category and the economic conditions).

In 2009, personal consumption expenditures accounted for 70% of GDP in the United States (Bureau of Economic Analysis). Its importance to the economy aside, how consumers allocate expenditures across different categories of commodities (e.g., food, shelter, apparel, transportation, education, health care, and recreation) reflects their life priorities and has been a fundamental issue in consumer research. Numerous studies in the marketing literature have been conducted in this area by, for example, Bellante and Foster (1984), Du and Kamakura (2008), Ferber (1956), Fisk (1959), Fritzsche (1981), Levedah (1980), Loeb (1954), Millican (1967), Ostheimer (1958), Rogers and Green (1978), Rubin, Riney, and Molina (1990), Soberon-Ferrer and Dardis (1991), Strober and Weinberg (1977), Wagner and Hanna (1983), and Wilkes (1995). In fact, psychological analysis of consumer spending under various economic conditions was the subject of the lead article in the inaugural issue of the *Journal of Consumer Research* (Katona 1974).

Recession, commonly defined as two or more consecutive quarters of negative GDP growth, can affect consumer expenditures in several ways. First, it can reduce disposable income (through unemployment, pay cuts, lower investment returns, etc.), which, in turn, leads to a smaller budget for consumption. Second, holding disposable income constant (e.g., for those who are not directly affected financially), people tend to save more or pay down debt during a recession, which again leads to less money spent on goods and services. The focus of traditional economic analysis has been on these budget-related issues, attempting to understand how total consumption expenditures change as a function of economic conditions (e.g., Deaton 1992; Hall 1993; Jappelli and Pistaferri 2010; Magrabi et al. 1991; Parker and Vissing-Jorgensen 2009).

A common assumption in traditional economic analysis is that the utilities a household derives from various commodities at different levels of expenditure would be independent of economic conditions (e.g., Deaton and Muellbauer 1980). Under this assumption, faced with a reduced consumption budget in a recession, consumers cut expenditures disproportionately more in less essential categories (e.g., dining out), resulting in smaller shares for these categories and larger shares for the more essential (e.g., food at home). When the economy starts to grow again, consumers are expected to increase both total consumption budget and shares allocated to the less essential categories.

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This stylized relationship between economic growth, household consumption budget, and expenditure share can be readily represented through Engel curves (Aitchison and Brown 1954; Millican 1967), which depict how expenditure on a particular commodity varies with the total budget, holding prices fixed. Often presented in a budget share form, the *Y*-axis of an Engel curve shows the proportion of total expenditures spent on a particular commodity, and the *X*-axis shows total expenditures. More essential commodities would have negative-slope Engel curves (i.e., increased share when the total budget shrinks), while less essential commodities would have positive-slope Engel curves (i.e., increased share when the total budget expands).

We attempt to go beyond the above stylized facts in this study. Our basic research question is: For any given level of consumption budget, how would a household's expenditure pattern (i.e., category budget shares) differ, depending on whether the economy is in recession or not? Standard economic models would suggest that for the same amount of total expenditures, category budget shares would remain unchanged. A key assumption of these standard models is that the utilities a household derives from various commodities at different levels of expenditure are independent of economic conditions. For example, consumers should enjoy jewelry in a recession as much as they do in normal economic times; it is just that in a recession, tighter budgets force them to cut more in spending on jewelry, so that they can cut less in other more essential categories. This implies that Engel curves, shaped by a household's underlying utility function, remain unchanged in a recession, and any observed adjustments in category budget shares reflect movements along the same set of fixed Engel curves, purely as a result of a shrunken consumption budget in a recession.

In this study, we depart from the standard economic assumption, arguing that the utilities a household derives from various commodities could vary systematically, depending on whether the economy is in recession or not. We postulate that people care about their relative position in a society when it comes to expenditures in certain categories. In a recession, their desire to spend in these "positional" categories will decrease, because there is no longer a need to spend as much to maintain the same social standing when others have reduced their expenditures. Consequently, for any given level of consumption budget, smaller shares would be allocated to positional expenditures in a recession. This implies that Engel curves would not remain unchanged in a recession, in contrast to what standard economic models would suggest. Rather, they would shift downward or upward, depending on the positionality of the expenditure category involved.

*Overview of Our Empirical Approach.* We investigate the above postulation empirically through a repeated cross-section data set containing information about expenditures across more than 30 major commodities from 66,368 US households over 2 decades (1982–2003), wherein the US economy experienced three recessions (July 1981–November 1982, July 1990–March 1991, and March–November 2001, according to the NBER). Such a rich data set lends external validity to our findings, thanks to the large and representative sample of households and the comprehensive coverage of their real-life expenditures across a full spectrum of goods and services.

As for internal validity, however, several challenges arise. First, the utilities a household derives from various commodities at different levels of expenditure are not directly observable and therefore must be inferred from observed expenditures, and related to economic conditions. Second, although it is tempting to equate differences in expenditure patterns to differences in preferences, it is important to distinguish between those caused by variations in consumption budget from those caused by variations in underlying utilities. Because a household's consumption budget cannot be held constant in real life, one must disentangle the impacts on expenditure patterns due to variations in consumption budget from those due to variations in underlying utilities. Finally, besides economic conditions, many other factors, both observable and unobservable, can cause household preferences to vary, and must therefore be accounted for adequately. To address these challenges in our empirical investigation, we rely on a structural budget allocation model proposed by Du and Kamakura (2008), which can be used to infer the underlying utilities that consumers derive from various commodities based on observed expenditure patterns, controlling for total consumption budget, and various observed and unobserved consumer heterogeneities.

In the rest of this study we proceed as follows. First, we review the relevant literature that leads us to postulate that the utilities that consumers derive from various commodities can differ systematically, depending on whether they live in times of economic growth or decline. Based on our synthesis of the reviewed literature, we propose a conceptual framework that leads to empirically testable predictions regarding how households may adjust their budget allocations (i.e., shifting the Engel curves vertically) as a function of economic conditions, after accounting for budgetary effects (i.e., moving along the Engel curves laterally). As we discuss next, this framework relies on the notion of positionality of certain goods/services from the economics literature (Frank 1985a, 1985b, 1999; Hirsch 1976), which we directly relate to the concepts of essentiality and visibility, two key moderators of reference-group influence in product decisions according to the consumer behavior literature (Bearden and Etzel 1982; Childers and Rao 1992). Then, we present our structural budget allocation model, which extends the model proposed by Du and Kamakura (2008), by including per capita GDP growth rate as a proxy for economic conditions (along with sociodemographics) that can potentially influence consumers' underlying utilities. This is followed by a discussion of our data and empirical findings. We conclude with a discussion on the implications of this study and directions for future research.

## PRODUCT/SERVICE POSITIONALITY AND CONSUMER EXPENDITURES

Standard economic theory assumes that the utilities a household derives from a particular commodity are determined solely by the absolute level of consumption (e.g., Deaton and Muellbauer 1980). Accordingly, each household's expenditure pattern is assumed to be independently shaped by its own preferences and the consumption budget available. From such a perspective, how a household allocates a given budget across various commodities should not be affected by economic conditions. In this study, we take a more nuanced view regarding this basic assumption. We postulate that the utilities a household derives from certain commodities can vary systematically, depending on whether they live in times of economic decline or growth. In the rest of this section, we provide an overview of the various literatures that have led us to such a postulation.

Outside the canonical economic theory on consumption expenditure, there is a substantial body of literature arguing that, besides the absolute level of consumption, relative consumption (i.e., how much one consumes as compared to others in the society) is also an important factor in shaping a household's spending decisions. As early as in his days, Adam Smith observed that women in England required better clothing to appear in public without shame than women in Scotland (Alpizar, Carlsson, and Johansson-Stenman 2005). Similarly, in his seminal work, Duesenberry (1949) stressed the importance of concerns about relative standing in determining consumption patterns over time. He used the idea of "demonstration effect" to explain how a household's expenditure pattern can be influenced by the purchases of its neighbors, arguing that the chief motivation behind higher expenditure was not just the resulting higher standard of living but also the accompanied higher social status. Easterlin's paradox (1974) about the relationship between happiness and income highlighted a stylized fact that, within a given country, people with higher incomes are more likely to report being happy; however, in international comparisons, the average reported happiness does not vary much with national income per person, suggesting a central role played by relative consumption in determining not only consumers' spending but also their subjective well-being.

Veblen (1899) coined the term "conspicuous consumption" to refer to expenditures on socially visible consumption that is intended to signal an individual's relative position in society (i.e., the idea of "signaling-by-consuming"). Much work has been done ever since on the relationship between social status and consumption. For example, Leibenstein (1950) advanced the idea that consumer purchases were often driven by their desire to either distinguish themselves from other consumers or to imitate them, resulting in, respectively, a "snob" or a "bandwagon" effect in consumption behavior. Bagwell and Bernheim (1996) demonstrated that the craving for social status associated with material displays of wealth can explain why consumers are often willing to pay higher prices for functionally equivalent products. More recently, in the marketing literature, Rucker and Galinsky (2008) showed that low power can increase consumers' willingness to pay for status-related products; Christen and Morgan (2005) showed that, as a result of conspicuous consumption, rising income inequality forced households with smaller income gains to use debt to keep up their spending relative to households with larger income gains; and Ordabayeva and Chandon (2011) showed that greater equality can reduce conspicuous consumption when consumers focus on the narrower possession gap, but it increases conspicuous consumption when consumers focus on the greater position gain.

In her work on "competitive consumption," sociologist Schor (1999) points out that, although it has always been the case that consumer spending is, in large part, driven by a comparative process through which individual households try to keep up with the norms of their reference group, what constitutes a reference group has changed over time. Schor notes that, in the 1950s and 1960s, Americans tried to "keep up with the Joneses" down the street and compared themselves mainly to other households of similar means; by contrast, nowadays, for households throughout the income distribution, comparisons are more likely to be made against the lifestyles of the upper middle class and the rich. Schor argues that such a shift occurred as people spent less time with their neighbors and friends, while television became a more important source of cues and information, which tends to be skewed toward the lifestyles of the upper middle class and the rich, thereby inflating the viewer's perception about the norms of the society when it comes to consumption. Similar observations were made by Frank and Levine (2006) in their work on "expenditure cascades," which argues that increased consumption by the rich can trigger increased spending in the class directly below them, and the chain reaction continues down to the bottom. Based on personal experience tracking consumer behavior in the past 20 years, Flatters and Willmott (2009) point out that, when less fortunate consumers are forced to live a thriftier life during a recession, many affluent consumers start to economize as well, not only due to lowered pressure for "competitive consumption" but also because the recession makes discretionary thrift acceptable or even fashionable, another manifestation of relative consumption.

Closely related to the literature on relative consumption and status-driven, conspicuous, and competitive consumer spending is the idea of positional goods (Frank 1985a, 1985b, 1999; Hirsch 1976), which argues that social comparison and relative consumption are not equally important for all goods. For goods that are "nonpositional," (e.g., bread, insurance, leisure time, and safety devices), the utilities that consumers derive from consuming them depend little on how one's own consumption compares with consumption by others (Frank 1985a). For goods that are "positional" (e.g., jewelry, cars, apparel, old paintings, and houses), relative consumption carries far more weight. Thus, for a positional good, expenditures will depend on consumers' beliefs about how much others are spending on it. To

the extent that a consumer's perception about societal norms changes systematically as a function of economic conditions, the utilities she derives from positional goods will also vary systematically, depending on whether the economy is in recession or not. The same, however, cannot be said about nonpositional goods, thanks to the lack of relative concerns for these goods.

In a recession, consumers tend to cut back on their spending. For example, 62% of Americans reduced household spending since the "Great Recession" began in December 2007, and only 6% spent more (Pew Research Center 2010). Faced with such a reality, consumers would need to spend less to achieve the same level of relative consumption (Duesenberry 1949), knowing that society would, on average, spend less. In other words, the amount of expenditures needed to credibly signal one's social standing would be lower as total consumption decreases (Heffetz 2010), because a shrunken budget would make it more costly for anyone to engage in "signaling-by-consuming" type of behavior (Veblen 1899), especially when there are more essential needs to meet. Consequently, in order to maximize total utility, it would be desirable for a household to reallocate some of its expenditures away from positional goods and toward nonpositional goods in a recession. Collectively, such reallocations by individual households would result in a new social equilibrium wherein positional expenditures account for a smaller share of total expenditures in society (Frank 1985b). However, when the economy starts to grow again, knowing that, on average, expenditure level would increase for all kinds of products and services, consumers would increase their spending more on positional goods to maintain their social standing. Thus, in times of economic expansion, consumers have the incentive to allocate a larger share of consumption budget toward positional goods. The following hypothesis formalizes the above line of arguments:

> **H1:** For any given level of total consumption budget, a household's allocation of that budget across various expenditures will differ systematically, depending on whether or not the economy is in a recession. In a recession, positional goods are likely to see decreased budget shares and nonpositional goods are likely to see increased budget shares; the reverse takes place in times of economic expansion.

To empirically test hypothesis 1 with actual household budget allocation data would require a direct measure of the extent to which a particular expenditure category is positional, which unfortunately is not available from the existing literature (Alpizar et al. 2005; Carlsson, Johansson-Stenman, and Martinsson 2007; Solnick and Hemenway 1998, 2005). However, because the idea of "relative consumption" can be viewed as a variant of reference-group influence (Gasana 2009), the positionality of a particular commodity should be a function of the extent to which a household's expenditure is influenced by its reference group. In other words, any measure of positionality should be highly correlated with the degree of reference-group influence.

Fortunately (we are grateful to a reviewer for pointing us to this literature), researchers in the consumer behavior literature have established a substantial body of work regarding the boundary conditions of reference-group influence on consumers' product decisions (Escalas and Bettman 2003). In particular, Bourne (1957, 218) proposed that two elements of "conspicuousness"—exclusiveness and visibility—can moderate reference-group influence on consumer purchase decisions. In their empirical investigation, Bearden and Etzel (1982) operationalized exclusiveness as the distinction between luxury versus necessity (i.e., whether needed for ordinary, day-to-day living), and visibility as the distinction between publicly versus privately consumed (i.e., whether other people outside of the immediate family are aware of one's consumption), which is related to the distinction Richins (1994) makes between the public and private meanings of possessions. Bearden and Etzel's survey results indicated that, for product decisions, reference-group influence was (1) substantially stronger for public luxuries than for private necessities; (2) in large part equivalent between public luxuries and public necessities; (3) significantly stronger for private luxuries than for private necessities; and (4) significantly stronger for public necessities than for either private luxuries or private necessities, which they argue may reflect strong concerns about appearing in public without products that are considered necessary for ordinary living. Childers and Rao (1992) replicated and extended the work of Bearden and Etzel. Childers and Rao's findings (of those based on survey participants in the United States) were directionally consistent with those of Bearden and Etzel, further supporting the idea that reference-group influence is substantially stronger for luxuries consumed in public as compared to products that are not conspicuously consumed.

Given the above, we therefore reformulate hypothesis 1 as follows:

> **H1a:** For any given level of total consumption budget, a household's allocation of that budget across various expenditures will differ systematically, depending on whether or not the economy is in a recession. In a recession, nonessential goods that are consumed in more visible circumstances are likely to see decreased budget shares, and essential goods that are consumed in less visible circumstances are likely to see increased budget shares; the reverse takes place in times of economic expansion.

Graphically, hypothesis 1a implies that in a recession, one should expect Engel curves of more visible nonessential goods to shift downward, and those of less visible essential goods to shift upward, and the reverse in times of economic expansion. As for the Engel curves of more visible essential goods or less visible nonessential goods, hypothesis 1a is nondirectional.

In order to classify the more than 30 major household

**TABLE 1**

PREDICTIONS OF ENGEL CURVE SHAPE AND SHIFT IN A RECESSION

| | Public (higher social-cultural visibility) | Private (lower social-cultural visibility) |
|---|---|---|
| Less essential (upward-sloping Engel curve) | Positional (Engel curve shifts down during recessions): | |
| | Apparel (3) | Charity (23) |
| | Apparel services (3) | Alcohol at home (8) |
| | Home furnishings and appliances (4) | Personal business |
| | Jewelry and watches (5) | Personal insurance (30) |
| | Recreation (6) | Medical nonprescription (22) |
| | Food away from home (7) | Medical doctors (22) |
| | Personal care (8) | Motor fuel (21) |
| | Alcohol away from home (9) | Motor insurance (29, 30) |
| | Lodging away from home (18) | Motor services and parts (20) |
| | Household operations/maintenance | |
| | Education (13) | |
| | Airfare (17) | |
| More essential (downward-sloping Engel curve) | | Nonpositional (Engel curve shifts up during recessions): |
| | Public transportation (19) | Food at home (14) |
| | Tobacco (1) | Housing rental or equivalent (15) |
| | Telephone (16) | Medical prescriptions (22) |
| | | Electricity (25) |
| | | Health insurance (29, 30) |
| | | Water, sewer, and trash (25) |
| | | Home gas, fuel, coal (25) |

NOTE.—Values in parentheses are visibility rankings reported by Heffetz (2011, table 3) out of 31 categories, based on a survey of 480 respondents in the United States; the classification between less vs. more essential categories rely in large part on Du and Kamakura (2008, table 3).

expenditure categories in our data (i.e., the Consumer Expenditure Survey from the Bureau of Labor Statistics) into essential versus nonessential, we rely conceptually on the "hierarchy of needs" (e.g., Maslow 1943), which posits that consumers first attempt to satisfy "physiological" needs, and once these needs are met, move on to satisfy safety and social needs, and finally to self-actualization needs. Because the satisfaction of the more basic needs cannot be easily postponed, substituted, or forsaken, expenditure shares for essential goods should be higher among households with smaller consumption budgets (i.e., negative-slope Engel curves). Conversely, one should expect higher expenditure shares for nonessential goods among households with larger consumption budgets (i.e., positive-slope Engel curves). Empirically, we follow Du and Kamakura (2008, table 3) in our classification of essential versus nonessential expenditure categories. Their findings suggest that the following are essential consumption needs: food at home; tobacco and smoking products; health insurance; telephone services; electricity; water, sewer, and trash collection services; and gas, heating oil, and coal. Based on conventional wisdom, we also classify public transportation, housing rental or equivalent, and medical prescriptions as essential goods. Finally, we categorize expenditures on medical doctors and those associated with the utilization of an automobile as nonessential because most poor households in the United States can substitute them with other publicly available services.

In order to classify all the household expenditure categories in our data into high visibility versus low visibility, we rely heavily on the work of Heffetz (2011), which created a survey-based, social-cultural (as opposed to just physical) visibility index of consumer expenditures, roughly defined as the speed with which members of society notice a household's expenditures on different commodities. A commodity is considered more visible if, in the cultural context in which it is consumed, society has more means to correctly assess the expenditures involved. Heffetz (2011) found that, for US consumers, expenditures on goods such as cigarettes, cars, clothes, furniture, appliances, jewelry, and equipment (TV, video, audio, music, and sports) are the most visible, while household expenditures on insurance policies, legal and accounting fees, and utilities bills are the least visible.

Table 1 summarizes our classification of all the major household expenditure categories in our data into essential versus nonessential and high versus low visibility (we excluded medical hospital due to the extremely low incidence of this expense in our sample). The numbers shown within parentheses in table 1 are visibility rankings reported by Heffetz (2011, table 3). However, because our focus is on the visibility of expenditures during an economic cycle, our high-low visibility classification departs from Heffetz' visibility rankings in six incidences (out of a total 31 categories), five of which are near the median of the rankings (i.e., 14th, 15th, 17th, 18th and 19th), where there is more uncertainty in the underlying visibility index.

We categorize expenditures on telephone, with a median Heffetz' visibility ranking of 16, as visible because it is a medium used to communicate with one's social network, and would therefore be noticeable if one's usage changed

substantially. We classify expenditures mostly related to family vacations (airfare, lodging away from home) as visible, because being away on a vacation would be fairly noticeable to one's neighbors, friends and colleagues; Heffetz' survey ranked these two categories just below the median in visibility (17th and 18th, respectively). We also classify expenditures on public transportation (19th) as visible, because consumers are likely to be able to notice heavier/lighter usage of public transportation by others. We classify housing rental or equivalent (15th) as less visible because expenditures on shelter are unlikely to change substantially in the short term, except in extreme circumstances such as foreclosures or evictions. Finally, we classify expenditures on food at home (14th) and alcohol at home (8th) as less visible, because they are much less likely to be noticed by others beyond the immediate family, as compared to food and beverages consumed away from home.

Also presented in table 1 are, for all the expenditure categories, our expectations regarding the slopes of their respective Engel curves and more importantly, the shifts of the Engel curves themselves in a recession, which are predicted according to hypothesis 1a (i.e., to have an Engel curve shifting upward/downward is equivalent to seeing increased/decreased category budget share at all levels of total budget). We test these predictions empirically through the structural model of household expenditure described next.

## MEASURING THE IMPACT OF ECONOMIC CONTRACTIONS/EXPANSIONS ON CONSUMER EXPENDITURES

Obviously, shifts in relative desirability between positional and nonpositional commodities would result in changes in budget shares. Again, it is important to distinguish budget share changes due to shifts in relative desirability from changes due to variations in the total budget. The former means moving the entire Engel curve up or down, while the latter means moving from one point to another along the same Engel curve. For example, faced with a smaller budget during a recession, consumers may cut more heavily in less essential categories (which may include more positional goods), and less so in more essential categories (which may include more nonpositional goods), leading to changes in budget shares, even though the underlying desirability of each category remains the same. In other words, shifts in category desirability will lead to changes in category shares, but category share changes do not necessarily imply shifts in category desirability, unless the total budget is held constant. Of course, this brings a real empirical challenge, because (1) a household's total budget cannot be held constant over time, and (2) the relative desirability of each category is not directly observable and can only be inferred from patterns of budget allocation. In the rest of this section, we present our empirical strategy to disentangle budget share variation due to relative category desirability shifts from budget share variation due to total budget changes. By doing so, we set out to investigate the impact of economic growth rate on consumers' underlying preferences.

Given the main goal of our empirical investigation (i.e., to quantify the impact that economic contractions/expansions have on how households allocate their total expenditures across various commodities), we abstract away from modeling the total consumption budget decision for two reasons. First, the intertemporal trade-off between more consumption now versus more savings for consumption in the future has been the focus of traditional economic analyses, and a vast literature can be found elsewhere (e.g., Gourinchas and Parker 2002). Second, each household in our sample reported its expenditures for only one year, precluding any type of dynamic analysis necessary for the study of intertemporal decisions about consumption versus savings. Instead, we focus on examining how households allocate a given consumption budget (i.e., the cross-category trade-off between more consumption in one category versus more in another). For this purpose, we need a model that considers how households allocate a consumption budget across all expenditure categories to maximize the total utility they accrue from this budget. Such a model allows us to infer the relative desirability of each expenditure category. Applying the model to household-level expenditure data over time allows us to investigate how shifts in category desirability may occur as the economy goes through various periods of expansion and contraction.

To accomplish this goal, we extend the budget allocation model recently applied by Du and Kamakura (2008) in a study of expenditure patterns among American households. In particular, our model incorporates observed heterogeneity, captured by (1) sociodemographic variables describing each household and (2) an indicator of economic growth rate during the year when the expenditures were observed. Because our main focus is on quantifying the shifts in category desirability during economic recessions/expansions, and because the model we apply is a direct extension of a published model, we describe the model only briefly next, and refer readers to Du and Kamakura (2008) for more details.

We assume that household $h$ maximizes a continuously differentiable quasi-concave utility function $G(x_h)$ over a set of $J$ nonnegative quantities $x_h = (x_{1h}, x_{2h}, \ldots, x_{Jh})$, subject to a budget constraint $p'x_h \leq m_h$, where $p = (p_1, p_2, \ldots, p_J)' > 0$, $p_i$ is the price of good in category $i$, and $m_h$ is household $h$'s total consumption budget. Following Du and Kamakura (2008), we use the Stone-Geary utility function, which has the form

$$G(x_h) = \sum_{i=1}^{J} \alpha_{ih} \ln (x_{ih} - \beta_i), \quad \textbf{(1)}$$

where $\alpha_{ih} > 0$, $(x_{ih} - \beta_i) > 0$, and $J$ is the number of available categories. Note the $h$ subscript in $\alpha_{ih}$, which implies that the utility derived from spending in category $i$, and therefore its desirability, is household specific. This budget allocation problem implies that the household incrementally

allocates its disposable income to the consumption category that produces the highest marginal utility per dollar,

$$\frac{\partial G(x_h)}{\partial x_{ih}}\frac{1}{p_i} = \frac{\alpha_{ih}}{(p_i x_{ih} - p_i\beta_i)},$$

given the current expenditure levels $x_h$, until the budget is reached, $\sum_{i=1}^{J} p_i x_{ih} = m_h$. Solving this optimization problem leads to an expenditure system that is linear in total budget and prices,

$$p_i x_{ih} = p_i\beta_i + \theta^*_{ih}\left(m_h - \sum_{j=1}^{J^*} p_j\beta_j\right), i = 1, 2, \ldots, J^*, \quad \textbf{(2)}$$

where $\theta^*_{ih} = \alpha_{ih}/\sum_{j=1}^{J^*}\alpha_{jh}$, and $J^*$ is the set of categories with positive expenditures.

In order to account for unobserved heterogeneity (i.e., diversity in underlying preferences not accounted by observed predictors) in the taste parameter ($\alpha_{ih}$) for each category $i$ and still have a model of feasible size, Du and Kamakura (2008) use a factor-analytic random-effects model by extracting the principal factors of the covariance matrix of the individual-specific terms, a formulation similar in purpose to traditional factor analysis, which attempts to capture most of the covariance in observed variables through a few common components, except that in our model, the factor decomposition is applied to unobservable random effects. This formulation leads to

$$\alpha_{ih} = \exp(\gamma_i + \lambda_i Z_h + \varepsilon_{ih}), \text{ and} \quad \textbf{(3)}$$

$$\beta_i = \min(x_i) - \exp(\eta_i), \text{ to ensure that } x_{ih} - \beta_i > 0 \text{ for } \forall h, \quad \textbf{(4)}$$

where

- $e^{\gamma_i}$ is the geometric mean of the taste parameter $\alpha_{ih}$ for category $i$ across the sample;
- $Z_h$ is a $p$-dimensional vector of i.i.d standard normal factor scores for household $h$;
- $\lambda_i$ is a $p$-dimensional vector of factor loadings for category $i$;
- $\varepsilon_{ih}$ is a random disturbance normally distributed with mean zero and standard deviation $\sigma_i$.

We extend the model by incorporating observed heterogeneity, captured by the sociodemographic characteristics of each household ($W_h$) and by variables capturing the economic environment ($Q_\tau$) in year $t$. With this simple extension, equation 3 becomes

$$\alpha_{iht} = \exp(\gamma_i + \lambda_i Z_h + \delta_i W_h + \tau_i Q_t + \varepsilon_{ih}). \quad \textbf{(3a)}$$

While $\gamma_i$ provides insights into the average taste or desire for category $i$ across households over time, the product of the factor loadings ($\lambda_i$) and factor scores ($Z_h$) will show how much higher or lower the taste of household $h$ is, relative to the average, thereby capturing differences in the desirability of category $i$ for different households due to unobserved sources. In addition to these differences in tastes due to unobserved sources, our extension of the Du and Kamakura (2008) model also captures the impact of the observed sociodemographic profile of a household (through $\delta_i$) and of shifts in the economic environment (through $\tau_i$), the latter of which being the focus of the current study. For identification purposes, tastes for one expenditure category are set to unit ($\alpha_{1ht} = 1$) without loss of generality.

The main purpose for our application of the above budget allocation model is to quantify relative category desirabilities in order to assess how the Engel curves for different consumption categories may shift up or down, in response to changes in the economic environment. As discussed earlier, we expect that in periods of economic expansion, even consumers who do not face an increase in their consumption budget will tend to devote more of their budgets to positional goods, because they perceive a general increase in consumption of these goods, and therefore, a need to spend more in order to maintain their relative standing. In periods of economic contraction, the reverse is expected.

Given the budget allocation model defined by equations 1–4, the budget share for category $i$ in household $h$ and year $t$, $S_{iht}$, is determined by

$$s_{iht} = \frac{p_{it}}{m_{ht}}\beta_i + \theta^*_{iht}\left(1 - \sum_{j=1}^{J^*}\frac{p_{jt}}{m_{ht}}\beta_j\right), \quad \textbf{(5)}$$

where

$$\theta^*_{iht} = \frac{\exp(\gamma_i + \lambda_i z_h + \delta_i W_h + \tau_i Q_t)}{\sum_{j=1}^{J^*}\exp(\gamma_j + \lambda_j z_h + \delta_j W_h + \tau_j Q_t)},$$

and $J*$ the set of categories with positive expenditures. Positionality effects due to changing economic conditions are directly captured by $\theta_{iht}*$ in equation 5. Because economic growth rate, $Q_t$, can potentially affect all categories via the coefficient $\tau$, its impact on the budget share of category $i$ depends on the relative magnitude of $\tau_i$ compared to all the other categories. More specifically, a shift of $\partial Q_t$ in the economic growth rate will result in an upward/downward shift of

$$\frac{\partial\theta^*_{iht}}{\partial Q_t} = \theta^*_{iht}\left(\tau_i - \sum_{j=1}^{J^*}\tau_j\theta^*_{jht}\right)$$

in the Engel curve.

Once the model parameters are estimated for a sample of households, counterfactual analyses can be easily performed on that same sample, by simulating the budget allocation process for each household under different economic growth rates, for any given level of consumption budget, so that changes in expenditure patterns can be solely attributed to changes in category desirability under different economic conditions. For this simulation, one needs only to apply a simple allocation heuristic implied by the model in equations 1–4 for each household:

1. Start with zero allocations to all categories ($m_{iht}$ = \$0) and a full budget.
2. Calculate all categories' marginal utilities $\partial U_{iht}/\partial m_{iht} = \exp(\alpha_{iht})/(m_{iht} - p_i\beta_i)$.

3. Allocate a dollar to the category $i$ with the highest marginal utility ($m_{iht} = m_{iht} + \$1$).
4. Deduct a dollar from the total budget.
5. Repeat steps 2–4 until the budget is totally depleted.

## EMPIRICAL RESULTS

The data for our empirical investigation comes from the Consumer Expenditure Survey (CEX) family-level extracts, which are made available by the National Bureau of Economic Research (NBER) for the 1982–2003 period (see http://www.nber.org/data/ces_cbo.html for more details on how NBER made the extracts using raw data from the Bureau of Labor Statistics). Unfortunately, the NBER has not released more recent family-level extracts (after 2003) as of yet. Even though raw CEX data from 2004 through 2009 are now available to the public through the Bureau of Labor Statistics (http://www.bls.gov/cex/), these raw data must be subjected to NBER's proprietary extraction procedure; otherwise, these new data will not be compatible with NBER's historical extracts (1982–2003) used in the current study.

The CEX Survey is collected from different samples each year, so that each of the 66,368 households in our study reports its consumption expenditures for only one year, and therefore cannot be treated as a longitudinal panel (rather, it is a repeated cross-section). The CEX-NBER extracts contain the dollar amounts allocated by each sample household during a one-year window across 32 consumption categories (we excluded the purchase of new or used automobiles, because they usually involve long-term savings or loan payments, and therefore do not represent discretionary expenditures within a single year). For each of the 32 categories and 22 years in the CEX-NBER extracts, we collected the relevant price index from the Bureau of Labor Statistics, which we normalized with 2003 as the base year. Aside from the unobserved heterogeneity in the random intercepts of the taste parameters, we use the following exogenous variables to explain variations in preferences across households and economic conditions:

*education*: number of years of schooling by the household head
*age*: age of the household head
*kid < 7*: number of children under age 7
*kid7–18*: number of children ages 7–18
*kid_college*: number of children attending college
*other adults*: number of adults in the household (other than the household head)
*married*: indicator variable equal to 1 if the household head is married, 0 otherwise
*male*: 1 if the household head is male, 0 otherwise
*white*: 1 if the household head is white, zero otherwise
*employed*: 1 if the household head is in the labor force, zero otherwise
*gdp growth*: percentage growth in GDP per capita relative to the previous year (we use this measure because it is often viewed as the single best proxy available for average standard of living in a particular economy).

Summary statistics for these variables in our sample are reported in table 2.

Using these same expenditure and price data, Du and Kamakura (2008) found that a six-factor solution was sufficient to capture the unobserved heterogeneity in consumer preferences. Because we incorporate observed heterogeneity with the exogenous variables discussed above, there is less variance in preferences to be explained by the latent factors, and therefore, we need a smaller latent space (four factors), producing the estimates reported in table 3.

Interpretation of the results reported in table 3 becomes easier if one considers their implications for the predicted budget share, shown in equation 5. From this equation, one can see that all predictors ($W_h$ and $Q_t$) affect the budget shares through the multinomial logistic function $\theta^*_{iht}$, which determines whether allocated shares shall shift upward or downward for any given budget. Therefore, the impact of these predictors must be interpreted within the context of a multinomial logistic function. For example, because of the identification restrictions in the multinomial logistic function ($\gamma_1 = \delta_1 = \tau_1 = 0$), the response parameters ($\delta$, $\tau$) can only be interpreted in relation to the baseline category, set as food at home. Thus, the results in the "GDP growth" column of table 3 suggest that in a recession (i.e., negative growth in per capita GDP), consumer tastes for charity; tobacco; medical prescriptions; motor insurance; and water, sewer, and trash increase relative to food at home, so that more of the consumption budget is allocated to the former categories than to food at home, compared to normal economic conditions. Similarly, parameter estimates in the "Education" column of table 3 suggest that taste for tobacco is higher, relative to food at home, for households with a less educated household head, so that a higher share of the consumption budget is allocated to the former, compared to households with more educated heads.

As discussed earlier, the main role of the four latent factors ($Z_h$) is to capture individual differences in tastes that cannot be explained by the observed predictors ($W_h$ and $Q_t$). Therefore, their respective loadings ($\lambda_i$) serve only to capture potential correlations in preferences across categories, and are not necessarily interpretable. Nevertheless, the loadings reported in table 3 reveal some interesting correlation patterns. For example, the loadings for the second factor suggest strong correlations between alcohol at home and alcohol away from home, indicating that households reporting higher budget allocations for alcohol consumed at home also tend to report higher allocations for alcohol consumed away from home. Similarly, loadings for the third factor indicate a negative correlation between allocated shares for motor fuel and public transportation, suggesting that households allocating higher than average shares to one tend to report lower than average shares to the other. These intuitive results lend face validity to this component of our budget allocation model.

More meaningful and interpretable insights are obtained

**TABLE 2**

SUMMARY OF SOCIODEMOGRAPHIC AND ECONOMIC PREDICTORS, MEANS AND STANDARD DEVIATION

| Year | Per capita GDP growth | Years of education | Age of the head of household | Number of kids ages 1–6 | Number of kids ages 7–18 | Number of kids in college | Number of other adults | Married head of household (%) | Male head of household (%) | White head of household (%) | Employed head of household (%) | Total budget (2003 prices) | Sample size |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1982 | −2.0 | 12.7 | 48.5 | .5 | .7 | .1 | .4 | 62 | 68 | 87 | 71 | 32,108 | 2,624 |
| | .0 | 2.8 | 17.3 | 1.0 | 1.2 | .3 | .9 | 49 | 47 | 34 | 45 | 16,873 | |
| 1983 | 4.5 | 12.6 | 49.3 | .5 | .7 | .1 | .4 | 60 | 68 | 86 | 70 | 33,300 | 2,818 |
| | .0 | 2.9 | 17.4 | 1.0 | 1.2 | .3 | .9 | 49 | 47 | 35 | 46 | 18,034 | |
| 1984 | 7.2 | 12.5 | 49.8 | .5 | .7 | .1 | .4 | 62 | 68 | 86 | 71 | 32,781 | 3,265 |
| | .0 | 2.9 | 17.5 | 1.0 | 1.2 | .3 | .9 | 49 | 47 | 34 | 46 | 18,916 | |
| 1985 | 4.1 | 12.7 | 49.2 | .5 | .7 | .1 | .4 | 64 | 69 | 87 | 73 | 33,292 | 1,570 |
| | .0 | 2.8 | 17.0 | 1.1 | 1.2 | .3 | .9 | 48 | 46 | 34 | 44 | 18,990 | |
| 1986 | 3.4 | 12.7 | 49.5 | .3 | .4 | .0 | .3 | 62 | 67 | 87 | 71 | 33,499 | 3,235 |
| | .0 | 2.8 | 17.5 | .7 | .9 | .2 | .7 | 49 | 47 | 34 | 46 | 19,072 | |
| 1987 | 3.3 | 12.6 | 50.2 | .3 | .4 | .0 | .3 | 62 | 68 | 87 | 69 | 33,467 | 3,099 |
| | .0 | 2.2 | 17.2 | .8 | .8 | .2 | .7 | 49 | 47 | 34 | 46 | 18,913 | |
| 1988 | 4.1 | 12.7 | 50.1 | .3 | .4 | .1 | .3 | 61 | 67 | 87 | 70 | 34,478 | 3,115 |
| | .0 | 2.2 | 17.2 | .8 | .8 | .2 | .8 | 49 | 47 | 33 | 46 | 19,418 | |
| 1989 | 3.5 | 12.9 | 49.8 | .3 | .4 | .0 | .3 | 62 | 66 | 88 | 73 | 35,580 | 3,071 |
| | .0 | 2.8 | 17.0 | .7 | .9 | .2 | .8 | 48 | 47 | 32 | 45 | 20,552 | |
| 1990 | 1.9 | 12.9 | 50.3 | .3 | .3 | .1 | .3 | 61 | 66 | 86 | 70 | 34,517 | 3,109 |
| | .0 | 2.8 | 17.3 | .8 | .8 | .3 | .8 | 49 | 47 | 35 | 46 | 20,045 | |
| 1991 | −.2 | 12.9 | 50.1 | .3 | .5 | .1 | .3 | 61 | 66 | 87 | 70 | 33,939 | 3,182 |
| | .0 | 2.8 | 17.2 | .8 | .9 | .3 | .7 | 49 | 47 | 34 | 46 | 20,050 | |
| 1992 | 3.3 | 12.9 | 50.5 | .3 | .5 | .1 | .4 | 59 | 64 | 86 | 69 | 33,647 | 3,150 |
| | .0 | 2.8 | 17.2 | .7 | .9 | .3 | .7 | 49 | 48 | 35 | 47 | 19,396 | |
| 1993 | 2.7 | 13.1 | 49.8 | .3 | .5 | .1 | .4 | 58 | 65 | 87 | 71 | 33,929 | 3,251 |
| | .0 | 2.8 | 17.2 | .7 | .9 | .3 | .7 | 49 | 48 | 34 | 46 | 19,963 | |
| 1994 | 4.1 | 13.1 | 50.5 | .3 | .5 | .1 | .4 | 58 | 63 | 87 | 70 | 34,419 | 2,988 |
| | .0 | 2.6 | 17.0 | .7 | .9 | .3 | .7 | 49 | 48 | 34 | 46 | 19,870 | |
| 1995 | 2.5 | 12.9 | 50.5 | .3 | .5 | .1 | .4 | 59 | 63 | 86 | 70 | 33,581 | 1,350 |
| | .0 | 2.5 | 16.8 | .7 | .9 | .2 | .7 | 49 | 48 | 35 | 46 | 18,513 | |
| 1996 | 3.7 | 13.2 | 50.3 | .3 | .6 | .1 | .4 | 58 | 62 | 86 | 68 | 34,310 | 2,643 |
| | .0 | 2.6 | 17.3 | .7 | 1.0 | .3 | .7 | 49 | 49 | 35 | 47 | 19,722 | |
| 1997 | 4.5 | 13.2 | 51.3 | .3 | .5 | .1 | .3 | 57 | 61 | 85 | 67 | 34,739 | 2,950 |
| | .0 | 2.6 | 17.1 | .7 | .9 | .2 | .7 | 50 | 49 | 36 | 47 | 20,872 | |
| 1998 | 4.2 | 13.3 | 51.0 | .3 | .5 | .1 | .3 | 59 | 60 | 87 | 67 | 34,363 | 2,762 |
| | .0 | 2.6 | 17.1 | .7 | .9 | .2 | .7 | 49 | 49 | 33 | 47 | 19,741 | |
| 1999 | 4.5 | 13.3 | 51.2 | .3 | .5 | .1 | .4 | 58 | 56 | 85 | 69 | 36,239 | 3,654 |
| | .0 | 2.5 | 17.1 | .7 | .9 | .3 | .7 | 49 | 50 | 36 | 46 | 26,581 | |
| 2000 | 3.7 | 13.3 | 51.3 | .3 | .5 | .1 | .4 | 58 | 53 | 84 | 69 | 35,168 | 3,797 |
| | .0 | 2.5 | 17.0 | .7 | .9 | .3 | .7 | 49 | 50 | 37 | 46 | 20,572 | |
| 2001 | .8 | 13.4 | 51.1 | .3 | .5 | .1 | .4 | 58 | 52 | 85 | 70 | 36,250 | 4,037 |
| | .0 | 2.5 | 16.8 | .6 | .9 | .3 | .8 | 49 | 50 | 36 | 46 | 21,268 | |
| 2002 | 1.6 | 13.4 | 51.8 | .3 | .5 | .1 | .4 | 57 | 52 | 85 | 68 | 36,344 | 4,463 |
| | .0 | 2.6 | 16.7 | .6 | .9 | .3 | .7 | 50 | 50 | 36 | 47 | 21,520 | |
| 2003 | 2.5 | 13.4 | 51.5 | .3 | .5 | .1 | .4 | 57 | 51 | 85 | 70 | 36,217 | 2,345 |
| | .0 | 2.5 | 16.9 | .7 | .9 | .3 | .7 | 50 | 50 | 36 | 46 | 23,244 | |
| Total | 3.1 | 13.0 | 50.4 | .3 | .5 | .1 | .4 | 60 | 62 | 86 | 70 | 34,499 | 66,478 |
| | 1.9 | 2.7 | 17.1 | .8 | 1.0 | .3 | .8 | 49 | 49 | 35 | 46 | 20,387 | |

**TABLE 3**

PARAMETER ESTIMATES FOR THE BUDGET ALLOCATION MODEL

| | $\gamma$ | $\tau$ | $\delta$ | | | | | | | | | | $\sigma^2$ | $\lambda$ | | | | $\beta$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expenditures | Intercept | GDP growth | Education | Age | Kid<7 | Kid7–18 | Kid_ college | Other adults | Married | Male | White | Employed | Variance | Load1 | Load2 | Load3 | Load4 | Beta |
| Food away from home | -2.83* | .03* | .29* | -.09* | -.09* | -.06* | .02* | .00 | .00 | .11* | .13* | -.06* | .50* | -.44* | −.31 | .02 | .29 | -.010* |
| Tobacco | -1.41* | -.02* | -.09* | -.22* | -.10* | -.06* | -.05* | .15* | −.01 | .05* | .05* | .00 | 1.02* | −.04 | −.31 | .00 | .05 | -.009* |
| Alcohol at home | -4.06* | .00 | .25* | -.19* | -.06* | -.12* | −.01 | .04* | -.02* | .16* | .11* | -.05* | .67* | −.19 | -.61* | .05 | .17 | -.005* |
| Alcohol away from home | -6.34* | .01* | .50* | -.39* | -.13* | -.20* | .01* | .07* | -.10* | .24* | .28* | -.11* | .88* | −.53 | -1.05* | .20 | .19 | -.001* |
| Apparel | -2.16* | .03* | .21* | -.14* | -.01* | .00 | .03* | .00 | .07* | -.04* | .04* | -.05* | .46* | -.47* | −.15 | .02 | .18 | -.011* |
| Apparel services | -4.65* | .03* | .32* | -.15* | -.05* | -.12* | .02* | -.01* | -.10* | .06* | -.10* | -.07* | .99* | −.54 | −.24 | .13 | .01 | -.001* |
| Jewelry & watches | -6.56* | .06* | .41* | -.24* | -.10* | -.03* | .04* | .08* | .24* | .01 | .16* | -.09* | 1.18* | -.94* | −.28 | .04 | .26 | -.002* |
| Personal care | -3.76* | .03* | .20* | .07* | -.05* | -.07* | .02* | .00 | .06* | -.02* | .00 | -.03* | .54* | −.30 | −.15 | .03 | .26* | -.004* |
| Personal business | -5.71* | .02* | .38* | -.03* | -.08* | -.06* | .00 | .07* | .13* | .06* | .16* | -.07* | 1.21* | −.49 | −.29 | −.05 | .53 | -.001* |
| Personal insurance | -3.56* | .01* | .23* | .09* | -.06* | -.04* | .01* | .02* | .19* | .03* | -.02* | -.03* | .68* | −.27 | −.10 | .00 | .44* | -.014* |
| Medical prescriptions | -6.59* | -.02* | .13* | .59* | -.01* | -.11* | -.02* | −.01 | .28* | -.14* | .18* | .00 | 1.26* | −.36 | .13 | −.05 | .57 | -.001* |
| Medical nonprescription | -6.13* | .02* | .29* | .19* | -.09* | -.03* | .03* | .01 | .15* | -.02* | .14* | -.03* | .90* | −.45 | −.08 | .05 | .43 | -.004* |
| Medical doctors | -5.16* | .02* | .28* | .21* | -.02* | -.03* | .02* | -.02* | .20* | -.03* | .20* | -.04* | .91* | −.45 | −.02 | −.01 | .44 | -.003* |
| Medical hospital | -8.57* | −.01 | .19* | .19* | .11* | -.03* | −.01 | .07* | .45* | -.06* | .22* | .00 | 2.24* | −.49 | .21 | .00 | .67 | -.002* |
| Health insurance | -3.84* | −.01 | .17* | .45* | -.03* | -.10* | −.01 | -.04* | .09* | -.05* | .06* | −.01 | .78* | −.12 | −.05 | .05 | .50* | -.010* |
| Motor services & parts | -3.89* | .02* | .33* | -.08* | -.08* | -.07* | .03* | .07* | .12* | .10* | .13* | -.07* | .73* | −.44 | −.32 | −.30 | .48* | -.005* |
| Motor fuel | -1.68* | .00 | .11* | -.11* | -.05* | -.05* | .02* | .05* | .08* | .08* | .09* | -.03* | .38* | −.21 | −.20 | -.23* | .34* | -.024* |
| Motor insurance | -3.02* | -.01* | .23* | -.01* | -.09* | -.09* | .03* | .05* | .11* | .04* | .11* | -.04* | .55* | −.24 | −.23 | −.19 | .50* | -.010* |
| Transportation public | -6.25* | .02* | .42* | .07* | -.09* | -.06* | .03* | .09* | -.12* | -.07* | -.23* | -.06* | 1.42* | −.55 | −.43 | 1.00* | −.13 | -.001* |
| Transport airfare | -6.34* | .03* | .59* | .08* | -.10* | -.12* | .04* | .05* | .08* | .00 | .08* | -.08* | .86* | −.59 | −.52 | .49 | .39 | -.009* |
| Recreation | -2.56* | .02* | .30* | -.11* | -.06* | -.04* | .01* | -.01* | .04* | .05* | .13* | -.07* | .49* | -.38* | −.23 | .05 | .32* | -.010* |
| Education | -8.09* | .02* | .93* | -.43* | .07* | .13* | .31* | .03* | .31* | -.10* | .16* | -.16* | 1.64* | −.78 | −.17 | .11 | .44 | -.001* |
| Charity | -6.77* | -.05* | .51* | .41* | -.03* | -.04* | .04* | -.05* | .23* | −.01 | .07* | -.07* | 1.22* | −.60 | −.06 | .08 | .57 | -.005* |
| Telephone | -1.84* | .01* | .10* | -.03* | -.04* | -.07* | .01* | .00 | -.05* | -.05* | -.02* | -.02* | .50* | −.11 | −.10 | −.02 | .28* | -.005* |
| Lodging away from home | -6.64* | .03* | .54* | .04* | -.12* | -.08* | .05* | .03* | .22* | .05* | .20* | -.09* | .78* | -.64* | −.47 | .21 | .43* | -.004* |
| Home furnishings and appliances | -3.68* | .05* | .25* | -.09* | -.03* | -.08* | .01* | .03* | .19* | .00 | .14* | -.06* | .90* | −.57 | −.16 | .00 | .31 | -.006* |
| Household operations/maintenance | -4.67* | .02* | .30* | .22* | .05* | -.07* | .01 | -.05* | .11* | -.02* | .13* | -.05* | .72* | −.30 | −.15 | .04 | .51* | -.008* |
| Electricity | -1.66* | .02* | .06* | .04* | -.03* | -.04* | .00 | .00* | .02* | .00 | .03* | -.01* | .40* | −.06 | −.07 | −.07 | .33* | -.017* |
| Water, sewer, and trash | -3.85* | -.01* | .19* | .15* | -.03* | -.02* | .01* | .02* | .11* | -.02* | .06* | -.02* | .52* | −.07 | −.12 | .03 | .55* | -.007* |
| Home gas, fuel, coal | -2.66* | .01* | .10* | .12* | -.01* | -.03* | .01 | .00 | .03* | .00 | .05* | .00 | .58* | −.10 | −.14 | .01 | .36* | -.018* |
| Housing rental or equivalent | -.16* | .00 | .15* | .08* | -.03* | -.09* | .00 | -.04* | -.06* | .00 | .04* | -.03* | .38* | −.08 | −.15 | .05 | .30* | -.045* |
| Food at home | .00* | .00* | .00* | .00* | .00* | .00* | .00* | .00* | .00* | .00* | .00* | .00* | .00* | .00 | .00 | .00 | .00 | -.028* |

NOTE.—GDP = gross domestic product.

*Values are statistically significant at the .01 level.

by combining the parameter estimates in table 3 with the observed sociodemographic and the latent factor scores for the 66,368 households, along with the per capita GDP growth rates over the 22 years, to produce theoretical Engel curves for the 32 consumption categories. Given that our main purpose is to quantify how category desirabilities shift during economic recessions and expansions, we produce three Engel curves for each category, using the observed budget and sociodemographic profile, and the estimated latent scores for each household, but assuming three different levels of per capita GDP growth: the historical average (3.1% growth) as the baseline, a 2% decline (equivalent to the 1982 recession), and a 6% growth (close to the highest growth of 7.3% observed in 1984). These Engel curves are shown in figures 1 and 2 for the categories where we found the most significant shifts from the baseline.

Comparing these three sets of Engel curves is insightful because it illustrates how economic contraction versus expansion can affect household expenditure patterns in a systematic fashion, after partialling out any effects due to budget changes. Note that because budget effects can only move a household from one point to another along the same Engel curve, any shifting up or down of the Engel curve itself must be a result from shifts in category desirabilities. In other words, whenever such shifts in consumer tastes occur (as our results clearly indicate), they will cause the Engel curves to move up or down, depending on economic expansion/contraction and the particular category involved, which is exactly what figure 1 shows for the positional and nonpositional commodities for which we have predictions in table 1. (Note that due to the wide range of expenditure shares, different scales are used for each expenditure category.)

When developing our hypotheses we conjectured that the Engel curve for a nonessential category would have a positive slope with the budget, because as the budget increases, households can afford to spend larger shares on nonessentials. Among all the categories listed in table 1, we found only two Engel curves that did not match our predictions. We expected water, sewer, and trash to be essential, when empirically its Engel curve shows a positive slope with the budget, suggesting it is nonessential. This seemingly odd result might be due to the fact that renters generally do not incur these expenses directly, and therefore these expenses are associated with households who own their homes and tend to have higher total consumption budgets. Another category that somewhat contradicts our expectation is apparel services, which was expected to be nonessential, but does not have a positive-slope Engel curve. However, as shown in figure 1, the Engel curve for apparel services suggests that it is not a clear-cut essential category either. Overall, out of the 31 predictions regarding the slope of the Engel curve (we excluded medical hospital because of the very low incidence of this expense in our sample), we found only two exceptions. One of them (water, sewer, and trash) has a plausible explanation, while the other (apparel services) shows an Engel curve that does not clearly reflect essentiality.

Regarding our hypothesis 1a, figure 1 shows the Engel curves for the expenditure categories we classify as both nonessential and visible. These are positional goods or services for which we expect the Engel curves to have a positive slope with the total budget, and to shift downward during recessions. In all of the 12 categories, we see the expected shift (for education, the shift is in the right direction, but minor); that is, for any given budget, during a recession (dashed line), the shares devoted to these categories decrease relative to the baseline scenario (solid line), while the opposite happens during economic booms (dotted line), as one would expect for positional goods (i.e., people care more about their relative standing when it comes to dining out, dressing up, being pampered, buying new furnishings and appliances, being entertained, and flying around). However, as discussed earlier, the slope of the Engel curve for apparel services does not confirm this expenditure category as nonessential.

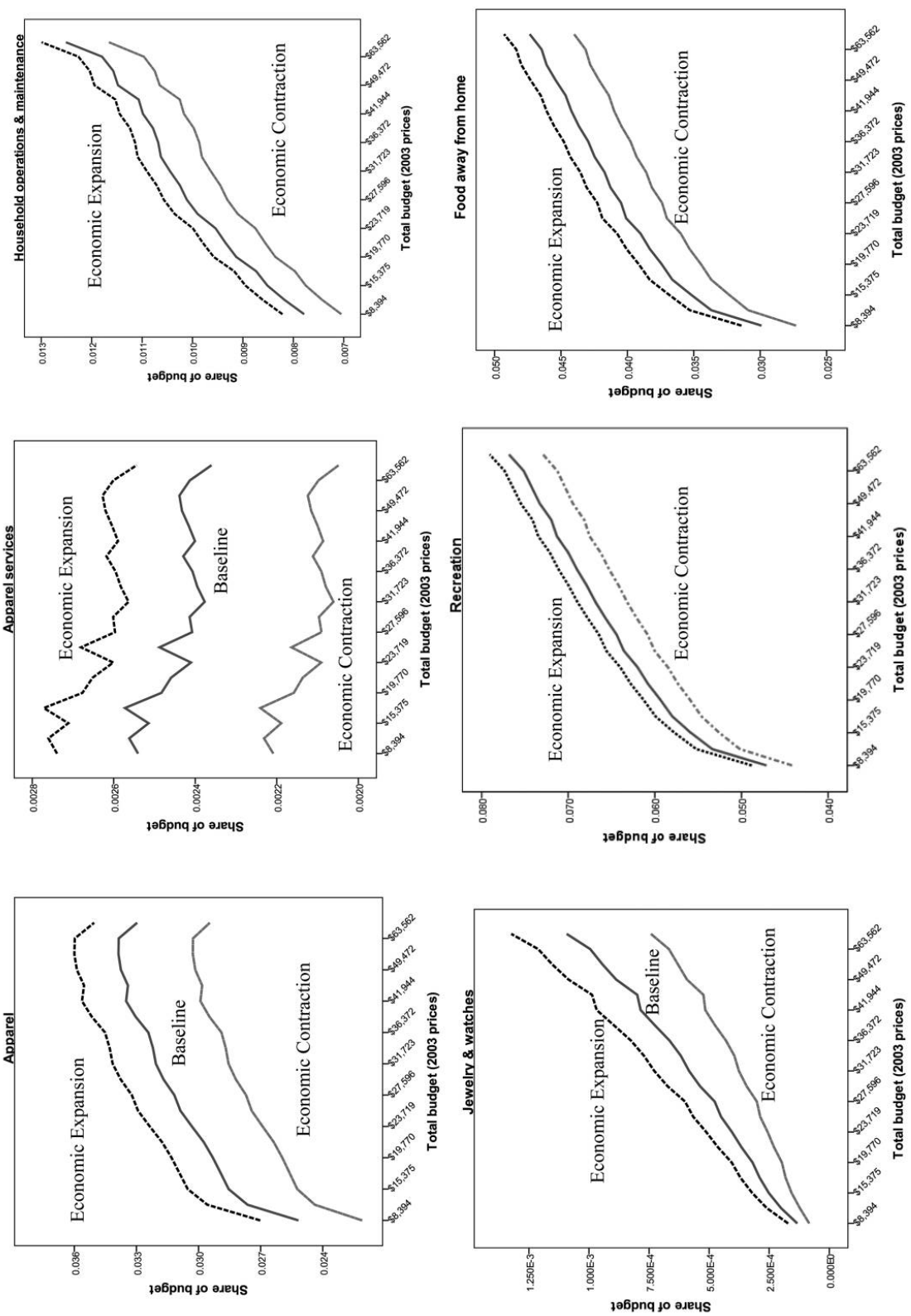
Our hypothesis 1a also posited that expenditures that are essential and have lower social-cultural visibility are nonpositional, and therefore, their shares, for any given budget, would increase during recessions. Figure 2 shows the Engel curves for the seven categories identified as nonpositional. Again the dashed line shows the Engel curve under economic contraction, while the dotted line shows the Engel curve under economic expansion. Out of the seven nonpositional categories, we find two related categories (home gas, fuel, and coal; and electricity) for which expenditure shares do not grow, for any given total budget, during recessions. Unfortunately, it is not immediately clear to us why in a recession the relative desirability for home gas, fuel, and coal would decrease, especially given that we accounted for total consumption budget and various observed and unobserved heterogeneities that could affect preferences. But one might argue that electricity is an essential, but visible expenditure category, because a substantial portion of it is for illumination, which is visible to one's neighbors, which would place this category out of the nonpositional group. In sum, out of all the 19 predictions we made regarding positionality and Engel curve shifts, we found only two (or possibly one) instances (home gas, fuel, and coal; and electricity) in which our empirical result did not confirm our prediction.

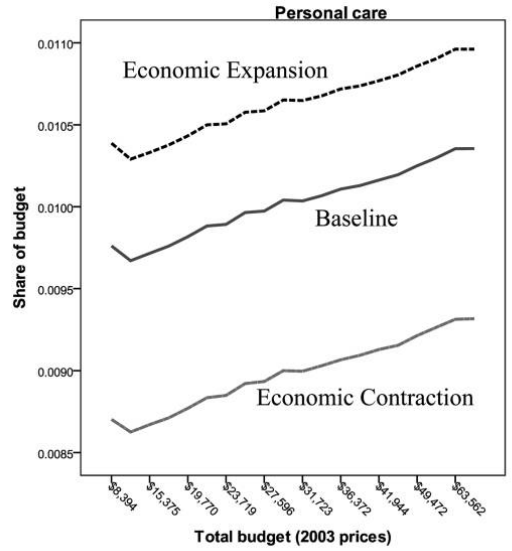
## COUNTERFACTUAL ANALYSES

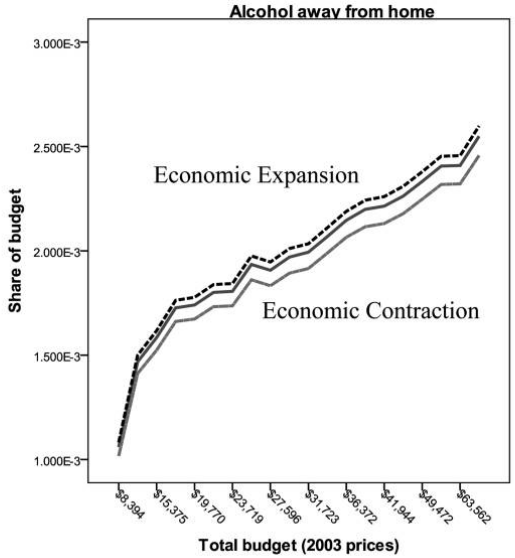
Besides estimating shifts in consumer taste parameters resulting from changing economic conditions, which was the main purpose of the above analyses, our budget allocation model also provides a tool for assessing how economic contraction/expansion may affect household expenditure patterns, using the simulation procedure described earlier. Here, the goal is not to test our hypotheses (something already accomplished through the results presented earlier), but to gain additional insights into the impact of economic contraction/expansion on consumption through counterfactual

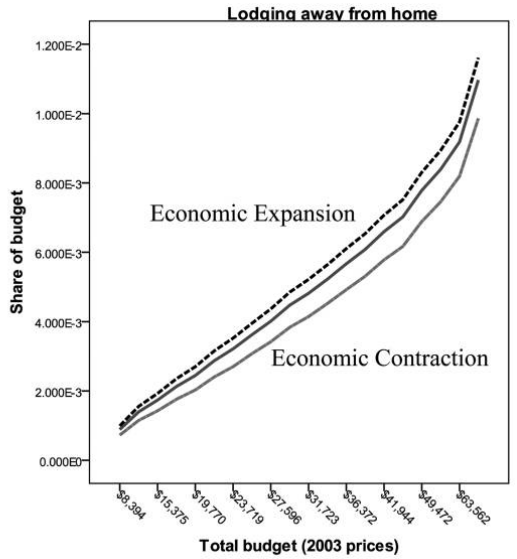
**FIGURE 1**

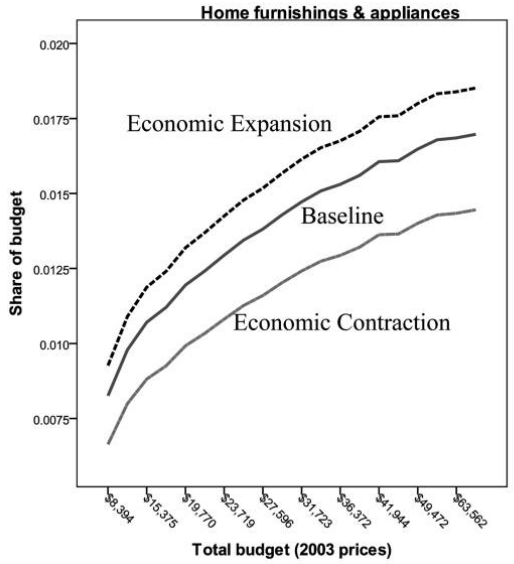
ENGEL CURVES (BASELINE, ECONOMIC CONTRACTION AND EXPANSION) FOR POSITIONAL CATEGORIES

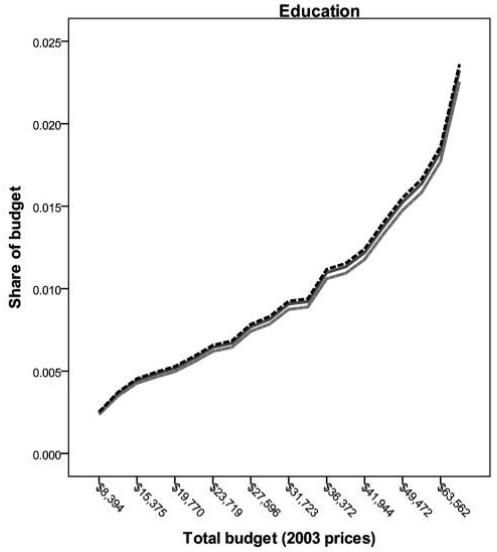



Personal care
Economic Expansion
Baseline
Economic Contraction
Share of budget
0.0110
0.0105
0.0100
0.0095
0.0090
0.0085
$8,394
$15,375
$19,770
$23,719
$27,596
$31,723
$36,372
$41,944
$49,472
$63,562
Total budget (2003 prices)


Alcohol away from home
Economic Expansion
Economic Contraction
Share of budget
3.000E-3
2.500E-3
2.000E-3
1.500E-3
1.000E-3
$8,394
$15,375
$19,770
$23,719
$27,596
$31,723
$36,372
$41,944
$49,472
$63,562
Total budget (2003 prices)


Lodging away from home
Economic Expansion
Economic Contraction
Share of budget
1.200E-2
1.000E-2
8.000E-3
6.000E-3
4.000E-3
2.000E-3
0.000E0
$8,394
$15,375
$19,770
$23,719
$27,596
$31,723
$36,372
$41,944
$49,472
$63,562
Total budget (2003 prices)


Home furnishings & appliances
Economic Expansion
Baseline
Economic Contraction
Share of budget
0.020
0.0175
0.015
0.0125
0.010
0.0075
$8,394
$15,375
$19,770
$23,719
$27,596
$31,723
$36,372
$41,944
$49,472
$63,562
Total budget (2003 prices)


Education
Share of budget
0.025
0.020
0.015
0.010
0.005
0.000
$8,394
$15,375
$19,770
$23,719
$27,596
$31,723
$36,372
$41,944
$49,472
$63,562
Total budget (2003 prices)

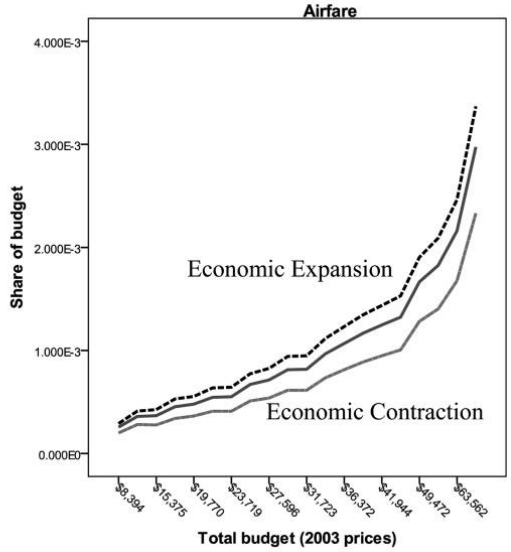
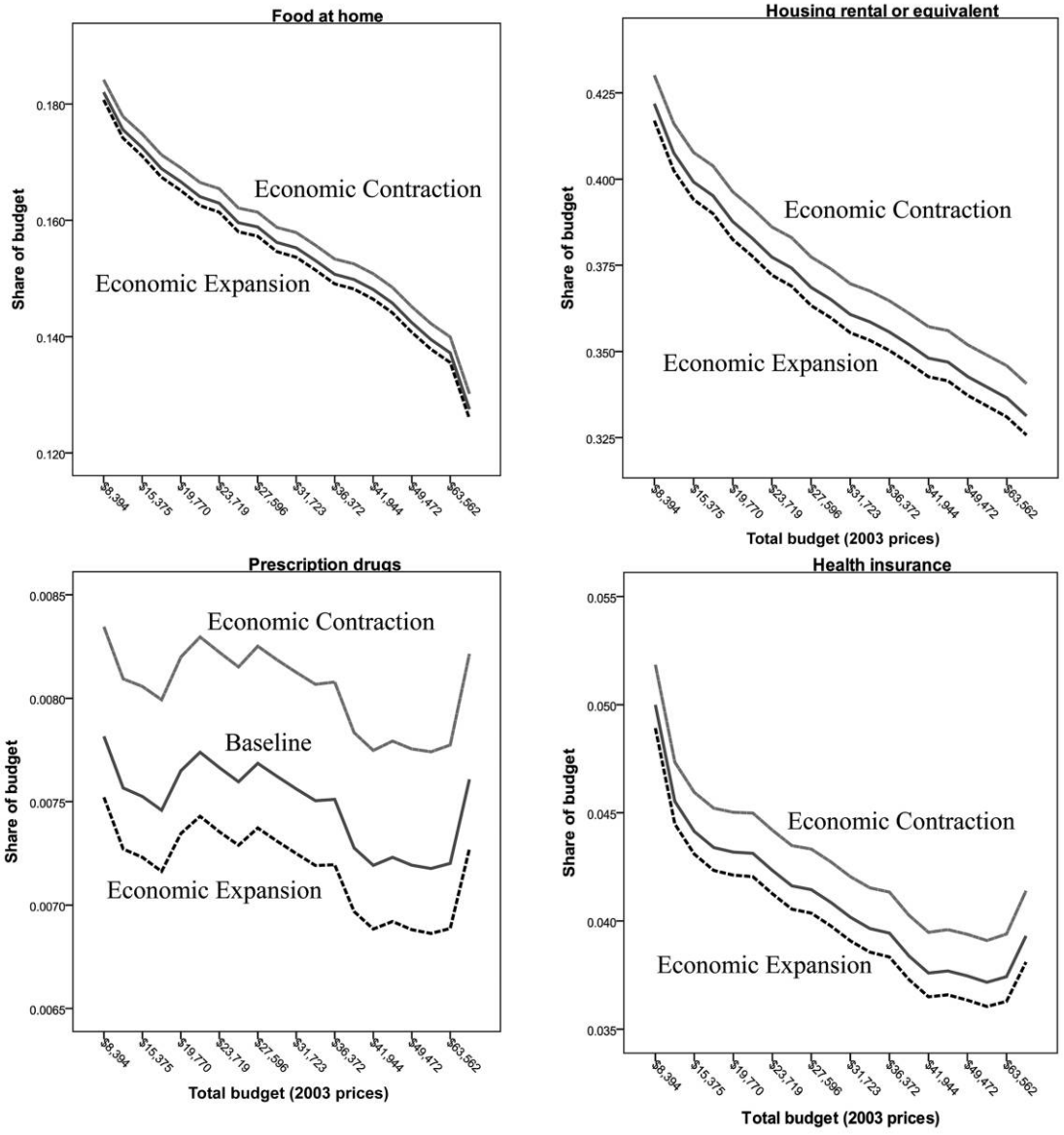

Airfare
Economic Expansion
Economic Contraction
Share of budget
4.000E-3
3.000E-3
2.000E-3
1.000E-3
0.000E0
$8,394
$15,375
$19,770
$23,719
$27,596
$31,723
$36,372
$41,944
$49,472
$63,562
Total budget (2003 prices)

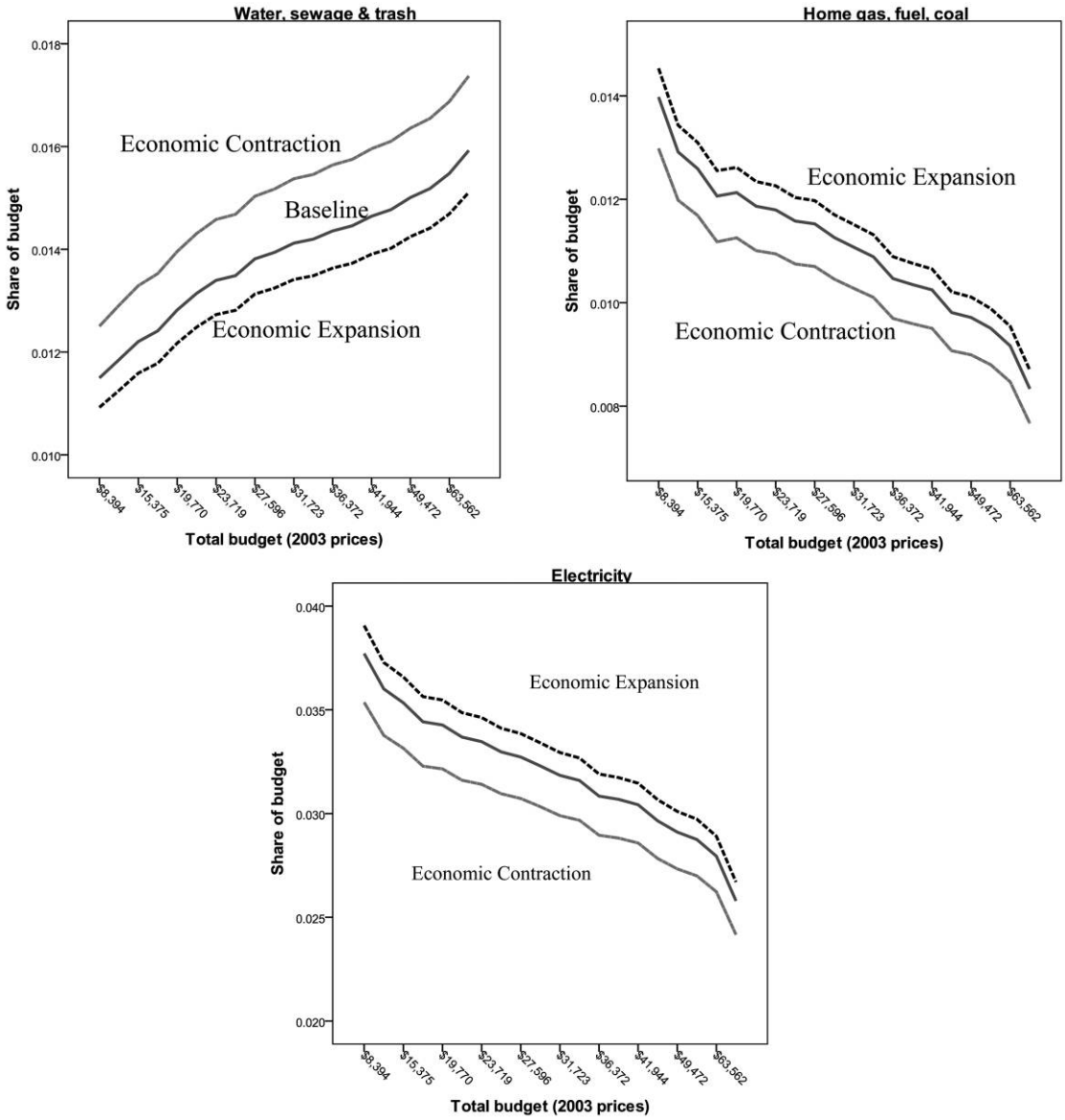
**FIGURE 2**

ENGEL CURVES (BASELINE, ECONOMIC CONTRACTION AND EXPANSION) FOR NONPOSITIONAL CATEGORIES




simulations. For these analyses, we consider five scenarios, which will provide us with additional insights into how consumption patterns change during economic expansions versus recessions. The first scenario establishes the baseline, where we set per capita GDP growth rate at the historical average (3.1%), and use actual household budgets, socio-demographic profiles and factor scores. The second scenario considers a reduction of 10% in the total consumption budget for every household in our sample, while holding per capita GDP growth rate at 3.1%, the historical average. At first glance, a 10% budget reduction seems quite high for an across-the-board shift, but this reduction is realistic for individuals whose incomes are directly affected by a recession. An across-the-board reduction of 10% in consumption while holding GDP growth constant will not happen in real life, because consumer expenditures account for about 70% of GDP, and any major reduction in consumption is bound to cause the economy to contract. However, comparing this counterfactual to the baseline scenario allows us to isolate the effects of shrunken budgets on expenditure patterns from

**FIGURE 2** (CONTINUED)




the effects of changing consumer tastes in a recession. Graphically, this second scenario captures lateral movements along the same set of baseline Engel curves.

The third and fourth scenarios assume a 2% drop and 6% increase in per capita GDP (which are all within the range of our historical data), respectively, while keeping household consumption budgets at their actual levels. These counterfactuals allow us to isolate the effects of changing consumer tastes from the effects of changing consumption budgets, under different economic conditions. Graphically, these two scenarios capture upward or downward shifts in the Engel curves themselves due to shifts in consumer tastes.

Finally, the fifth scenario considers a 10% cut in the consumption budget along with a 2% drop in per capita GDP, to demonstrate the total effects on expenditure patterns due to a combination of shrunken budgets and changing tastes under a more realistic recessionary scenario. The results from these counterfactuals are shown in table 4, as percentage changes in expenditure relative to the baseline scenario.

**TABLE 4**

RESULTS FROM COUNTERFACTUAL ANALYSES: PERCENTAGE CHANGES IN EXPENDITURES, RELATIVE TO THE BASELINE SCENARIO

| | Scenarios | | | |
|---|---|---|---|---|
| Expenditures | 10% budget cut (%) | 2% drop in per capita GDP (%) | 6% growth in per capita GDP (%) | 10% budget cut and 2% drop in per capita GDP (%) |
| Food away from home | −10.1 | −7.5 | 4.3 | −16.7 |
| Tobacco | −9.5 | 15.9 | −8.6 | 4.3 |
| Alcohol at home | −10.0 | 4.6 | −2.8 | −5.9 |
| Alcohol away from home | −10.0 | −3.8 | 2.1 | −13.4 |
| Apparel | −10.1 | −11.0 | 6.5 | −19.9 |
| Apparel services | −10.2 | −13.4 | 8.0 | −22.0 |
| Jewelry and watches | −9.8 | −34.9 | 23.7 | −41.3 |
| Personal care | −10.2 | −10.5 | 6.1 | −19.4 |
| Personal business | −10.1 | −3.7 | 2.0 | −13.3 |
| Personal insurance | −10.1 | −6.3 | 3.4 | −15.7 |
| Medical prescriptions | −9.8 | 7.6 | −4.2 | −3.1 |
| Medical nonprescription | −9.8 | −18.5 | 11.2 | −26.6 |
| Medical doctors | −10.1 | −5.0 | 2.9 | −14.5 |
| Medical hospital | −15.4 | 13.2 | −7.4 | 2.0 |
| Health insurance | −9.9 | 4.9 | −2.8 | −5.6 |
| Motor services and parts | −10.1 | −4.3 | 2.4 | −13.9 |
| Motor fuel | −10.0 | 3.2 | −2.0 | −7.1 |
| Motor insurance | −9.9 | 4.4 | −2.6 | −6.0 |
| Transportation public | −9.9 | −12.3 | 7.5 | −20.9 |
| Transport airfare | −10.2 | −24.0 | 15.2 | −31.6 |
| Recreation | −10.1 | −5.4 | 3.1 | −14.9 |
| Education | −8.7 | −2.8 | 1.6 | −11.2 |
| Charity | −9.2 | 31.6 | −15.7 | 18.4 |
| Telephone | −10.0 | −0.8 | 0.4 | −10.7 |
| Lodging away from home | −10.3 | −12.2 | 7.2 | −20.9 |
| Home furnishings and appliances | −10.1 | −15.7 | 9.6 | −24.1 |
| Household operations/maintenance | −10.2 | −7.7 | 4.4 | −16.9 |
| Electricity | −10.1 | −6.3 | 3.6 | −15.7 |
| Water, sewer, and trash | −9.8 | 9.1 | −5.1 | −1.8 |
| Home gas, fuel, coal | −10.2 | −8.0 | 4.4 | −17.2 |
| Housing rental or equivalent | −10.0 | 2.5 | −1.5 | −7.7 |
| Food at home | −10.0 | 1.8 | −1.1 | −8.4 |

The first column of table 4 suggests that a reduction in the consumption budget, either due to a drop in income or a shift from consumption to savings does not affect budget allocation patterns substantially. In response to a substantial budget cut of 10%, most categories see a drop of about 10% in expenditures, with education, charity and tobacco showing the smallest reductions, and medical hospital showing the largest reductions (although this particular category has very low incidence across the sample, and therefore the substantial change in this category might be more of a reflection of shifts in incidence).

The changes in expenditure patterns in a recession (second column of table 4) are more interesting. Our counterfactuals suggest that even with the consumption budget unchanged, expenditures in nonessentials, such as jewelry and watches, public transportation, airfare, and home furnishings and appliances, see substantial drops (−35%, −24%, and −16%, respectively, in response to a 2% drop in per capita GDP). One result raises a particular concern regarding consumer welfare, that is, the 18% reduction in nonprescription drugs, although this predicted change is in line with survey results reported by A. C. Nielsen in 2009 (http://www.blog.nielsen.com), which show that 32% of American respondents would reduce their consumption of nonprescription drugs in a recession. However, holding the consumption budget unchanged, expenditures on charity increase by 32% in response to a 2% drop in per capita GDP, while expenditures on tobacco increase by 16%. The 13% increase in medical hospital, again, might be due to the very low incidence of this category in our sample. These results suggest that, ceteris paribus, consumers who do not change their consumption budget during a recession become more charitable, as manifested in larger shares of their budgets allocated to charity, which is consistent with the notion that charity, being low in visibility/positionality, would gain in relative desirability as compared to expenditures that are more visible/positional. Notice, however, that an increase in the budget share for charity might also happen because the need is clearly greater in recessions, leading charity organizations to be more aggressive in their collection efforts.

Our counterfactuals also suggest that in hard economic times, smokers spend a higher percentage of their budget

on tobacco, confirming survey-based results showing that smoking onset and relapses increase during recessions (Barclay 2009), and the possible role of tobacco as an "affordable pleasure" in tough economic times (Shafey et al. 2009).

The last column of table 4 provides a more complete picture of what one may expect for a household facing a 10% budget cut during a recession with a 2% drop in per capita GDP, combining the effects of a shrunken budget and changing tastes. In such a scenario, one observes substantial reductions in expenditures on most categories, except for charity (18% increase), tobacco (4% increase), and medical hospital (2% increase). The most dramatic drops in expenditures under this recessionary scenario are found in jewelry and watches (−41%), airfare (−32%), nonprescription drugs (−27%), and home furnishings and appliances (−24%).

## DISCUSSION

In this study, we examined if and how GDP growth rate, a broad indicator of economic conditions, may be related to a household's consumption budget allocation, an individual decision. In light of the Great Recession that the United States has just gone through, we were particularly interested in understanding how consumers' taste or desire for various commodities may have shifted in difficult times like this, as compared to their preferences in more normal times.

Traditional economic analyses of consumer expenditure have assumed, with limited empirical evidence, that consumer tastes will remain unchanged, regardless of economic conditions. Under such a standard assumption, the impact of economic conditions on household budget allocation will only come through changing consumption budgets. Meanwhile, the underlying desirability of each category will remain stable. Faced with smaller budgets in a recession, consumers have less to spend on luxuries, and therefore allocating larger shares to more essential categories. In other words, according to traditional economic models, changes in expenditures during recessions are simply due to budgetary effects, because the utility which consumers draw from goods and services does not change with the economic environment.

Drawing on the literatures on relative consumption (Duesenberry 1949; Frank and Levine 2006; Schor 1999), positional goods (Frank 1985a, 1985b, 1999; Hirsch 1976), and reference-group influences on consumer behavior (Bearden and Etzel 1982; Childers and Rao 1992; Escalas and Bettman 2003; Gasana 2009; Richins 1994), we postulated that for visible and nonessential commodities, consumers derive utility not only from consumption but also from their positional value, either because these expenditures signal a higher status, or because consumers derive indirect utility from simply being able to spend more than their peers. During a recession, as consumers see others spending less in positional categories (due to a more limited budget), they figure that they can also spend less and still maintain their relative standing, which in turn leads to reduced budget shares for these categories across society.

The notion that consumers derive utility not only from the direct consumption of a good but also from how much others are spending on the same good (through the positional value) is an unorthodox departure from the traditional economic paradigm, because it implies that consumers will draw more value from consuming the same quantity of a certain good, if they see others consuming less of it. This notion was recently tested by Heffetz (2011), who developed a stylized game-theoretical model with households making rational budget allocation decisions between two goods, one visible to the public and the other invisible. When households care about not only the direct utility from consumption but also its signaling value, Heffetz' model shows that, in equilibrium, higher income households would spend larger shares on the visible good, and smaller share on the invisible good, thereby explaining why the Engel curves for invisible goods decrease with income while those for visible goods increase with income. While we rely on the same notion of "positional value," our budget allocation model is able to empirically isolate two distinct effects: (*a*) the budget effect, which, similarly to Heffetz (2011), explains why the Engel curve for essential goods (e.g., food at home) has a negative slope while the slope is positive for nonessential goods (e.g., food at restaurants); and (*b*) the positional effect, which explains why, during a recession, consumers reduce their expenditures on nonessential and visible goods even when they do not experience a reduction in consumption budget.

Among the significant shifts in expenditure patterns that we are able to empirically identify, the vast majority are in a direction that is consistent with our hypothesis about positionality and expenditures during economic contractions/expansions. More visible nonessential (positional) goods (e.g., food away from home, apparel, apparel services, jewelry and watches, personal care, home furnishings and appliances, recreation, and airfare) become relatively less desirable in a recession, while less visible essential (nonpositional) goods (e.g., food at home; housing; prescription drugs; water, sewage, and trash; health insurance) gain in relative desirability during a recession. Our Engel curves for nonessential visible goods/services clearly show that industries tied to those commodities could suffer a double whammy during a recession. First, consumers generally reduce their consumption budget either because their income is lower, or because they become more risk averse, allocating more of their income toward savings, which forces them to satisfy essential needs first (the budget effect). Second, consumers derive less relative utility from, and thus less desire for, visible nonessentials (the positional effect), leading to further lowered shares of shrunken budgets for these positional goods/services.

In sum, we see our key contribution to the marketing literature on household expenditures as twofold. First, we present strong empirical evidence showing that consumer tastes, and thereby their consumption budget allocation patterns, do shift systematically as a function of GDP growth rates, even after controlling for the budget effect. Second, our study provides a field test of the theory that relative standing in a society plays an important role in household

spending decisions and that this role is stronger for goods that are more visible and nonessential. The modeling framework used in our study can also be readily adapted for examining how other environmental variables may affect individual consumption preferences.

Taken together, the empirical findings of our study highlight the need in consumer research to further examine the link between household-level spending decisions and macro-level economic conditions. Our study suggests that such a link exists because spending decisions are not made by each household in isolation. Instead, each household's decisions are made within a broader social context, wherein certain relative standards, jointly shaped by spending decisions made by all the households in the society, play a significant role. To the extent that macro-level economic conditions can change those relative standards (or the perception of them), they can change household-level spending decisions.

## DIRECTIONS FOR EXTENSIONS

Theoretically, the positional effect we managed to detect and isolate (from the budget effect) with our modeling framework is driven by consumers' comparison to their respective reference groups. Therefore, a potentially fruitful extension would be to identify these reference groups for individual consumers, in order to further explore the mechanisms behind the positional effect. For example, Bourdieu (1984) theorizes that consumer preferences are determined by social class, suggesting socioeconomic status as a potentially useful construct in understanding the positional effect. Within our empirical modeling framework, once each household in the CEX-NBER database is classified into a socioeconomic stratum, their status can be included as one of the predictors in our model, allowing one to test for another form of positional effect, and obtain a better understanding of the impact of social class on consumption preferences.

In its present version, our modeling framework assumes a symmetric effect of economic contraction/expansion on consumption preferences. In future research, one might consider the possibility that a household's tastes may shift asymmetrically in response to perceived spending changes by its reference group, depending on whether the total consumption budget of the reference group is increasing (in economic expansions) or decreasing (in economic contractions). However, empirical tests for such asymmetric effects would require true longitudinal data, where a panel of households are tracked over time, as opposed to repeated cross-sections such as the CEX data used in this study.

## REFERENCES


Aitchison, J., and J. A. C. Brown (1954), "A Synthesis of Engel Curve Theory," *Review of Economic Studies*, 22 (1), 35–46.

Alpizar, Francisco, Frederik Carlsson, and Olof Johansson-Stenman (2005), "How Much Do We Care about Absolute versus Relative Income and Consumption?" *Journal of Economic Behavior and Organization*, 56 (3), 405–21.

Bagwell, Laurie S., and B. Douglas Bernheim (1996), "Veblen Effects in a Theory of Conspicuous Consumption," *American Economic Review*, 86 (June), 349–73.

Barclay, Eliza (2009) "Outlook Hazy for Smoking Rates in the USA," *Lancet*, 373 (9673), 1415.

Bearden, William O., and Michael J. Etzel (1982), "Reference Group Influence on Product and Brand Purchase Decisions," *Journal of Consumer Research*, 9 (September), 183–94.

Bellante, Don, and Ann C. Foster (1984), "Working Wives and Expenditure on Service," *Journal of Consumer Research*, 11 (2), 700–707.

Bourdieu, Pierre (1984), *Distinctions: A Social Critique of the Judgment of Taste*, trans. Richard Nice, Cambridge, MA: Harvard University Press.

Bourne, Francis S. (1957), "Group Influence in Marketing and Public Relations," in *Some Applications of Behavioral Research*, ed. R. Likert and S. P. Hayes, Basel: UNESCO.

Carlsson, Fredrik, Olof Johansson-Stenman, and Peter Martinsson (2007), "Do You Enjoy Having More than Others? Survey Evidence of Positional Goods," *Economica*, 74 (296), 586–98.

Childers, Terry L., and Akshay R. Rao (1992), "The Influence of Familial and Peer-Based Reference Groups on Consumer Decisions," *Journal of Consumer Research*, 19 (September), 198–211.

Christen, Markus, and Ruskin M. Morgan (2005), "Keeping Up with the Joneses: Analyzing the Effect of Income Inequality on Consumer Borrowing," *Quantitative Marketing and Economics*, 3 (2), 145–73.

Deaton, Angus (1992), *Understanding Consumption*, New York: Oxford University Press.

Deaton, Angus, and John Muellbauer (1980), *Economics and Consumer Behavior*, New York: Cambridge University Press.

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

Duesenberry, James S. (1949), *Income, Saving, and the Theory of Consumer Behavior*, Cambridge, MA: Harvard University Press.

Easterlin, Richard A. (1974), "Does Economic Growth Improve the Human Lot? Some Empirical Evidence," in *Nations and Households in Economic Growth: Essays in Honor of Moses Abramovitz*, ed. Paul A. David and Melvin W. Reder, New York: Academic Press.

Escalas, Jennifer E., and James R. Bettman (2003) "You Are What You Eat: The Influence of Reference Groups on Consumer's Connections to Brand," *Journal of Consumer Psychology*, 13 (3), 339–48.

Ferber, Robert (1956), "Consumer Expenditures for Services in the United States," *Journal of Marketing*, 21 (1), 24–35.

Fisk, George (1959), "Toward a Theory of Leisure-Spending Behavior," *Journal of Marketing*, 24 (2), 51–57.

Flatters, Paul, and Michael Willmott (2009) "Understanding the Post-recession Consumer," *Harvard Business Review*, 87 (7–8), 106–12.

Frank, Robert H. (1985a), *Choosing the Right Pond: Human Behavior and the Quest for Status*, New York: Oxford University Press.

——— (1985b), "The Demand for Unobservable and Other Nonpositional Goods," *American Economic Review*, 75 (1), 101–16

——— (1999), "Positional Externalities Cause Large and Pre-

ventable Welfare Losses," *American Economic Review*, 95 (2), 137–41.

Frank, Robert H., and Adam Seth Levine (2006), "Expenditure Cascades," mimeograph, Cornell University.

Fritzsche, David J. (1981), "An Analysis of Energy Consumption Patterns by Stage of Family Life Cycle," *Journal of Marketing Research*, 18 (2), 227–32.

Gasana, Parfait U. (2009), "Relative Status and Interdependent Effects in Consumer Behavior," *Journal of Socio-Economics*, 38 (1), 52–59.

Gourinchas, Pierre-Olivier, and J. A. Parker (2002), "Consumption over the Lifecycle," *Econometrica*, 70 (1), 47–89.

Hall, Robert E. (1993), "Macro Theory and the Recession of 1990–1991," *American Economic Review*, 83 (2), 275–79.

Heffetz, Ori (2011), "A Test of Conspicuous Consumption: Visibility and Income Elasticities," *Review of Economics and Statistics*, 93 (4), 1101–17.

Hirsch, Fred (1976), *Social Limits to Growth*, Cambridge, MA: Harvard University Press.

Jappelli, Tullio, and Luigi Pistaferri (2010), "The Consumption Response to Income Changes," NBER Working Paper No. w15739, NBER, Cambridge, MA.

Katona, George (1974) "Psychology and Economics," *Journal of Consumer Research*, 1 (1), 1–8.

Leibenstein, H. (1950), "Bandwagon, Snob, and Veblen Effects in the Theory of Consumer Demand," *Quarterly Journal of Economics*, 64 (May), 183–207.

Levedahl, J. William (1980), "The Impact of Permanent and Transitory Income on Household Automobile Expenditure," *Journal of Consumer Research*, 7 (1), 55–66.

Loeb, Benjamin S. (1954), "The Use of Engel's Laws as a Basis for Predicting Consumer Expenditures," *Journal of Marketing*, 20 (1), 20–27.

Magrabi, Frances M., Young Sook Chung, S. Sohn Cha, and Se-Jeong Yang (1991), *The Economics of Household Consumption*, New York: Praeger.

Maslow, Abraham H. (1943), "A Theory of Human Motivation," *Psychological Review*, 50 (4), 370–96.

Millican, Richard D. (1967), "A Re-examination of Engel's Laws using BLS Data (1960–1961)," *Journal of Marketing*, 31 (4), 18–21.

Ordabayeva, Nailya, and Pierre Chandon (2011), "Getting Ahead of the Joneses: When Equality Increases Conspicuous Consumption among Bottom-Tier Consumers," *Journal of Consumer Research*, 38 (June), 27–41.

Ostheimer, Richard (1958), "Who Buys What? Life's Study of Consumer Expenditures," *Journal of Marketing*, 22 (3), 260–72.

Parker, Jonathan, and Annette Vissing-Jorgensen (2009), "Who Bears Aggregate Fluctuations and How?" NBER Working Paper No. W14665, NBER, Cambridge, MA.

Pew Research Center (2010), "A Balance Sheet at 30 Months: How the Great Recession Has Changed Life in America," Pew Social and Demographic Trends report, Pew Research Center, Washington, DC.

Richins, Marsha (1994), "Valuing Things: The Public and Private Meanings of Possessions," *Journal of Consumer Research*, 21 (December), 504–21.

Rogers, David, and Howard L. Green (1978), "Changes in Consumer Food Expenditure Patterns," *Journal of Marketing*, 42 (2), 14–19, 135.

Rubin, Rose M., Bobye J. Riney, and David J. Molina (1990), "Expenditure Pattern Differentials between One-Earner and Dual-Earner Households: 1972–1973 and 1984," *Journal of Consumer Research*, 17 (1), 43–52.

Rucker, Derek D., and Adam D. Galinsky (2008), "Desire to Acquire: Powerlessness and Compensatory Consumption," 35 (August), 257–67.

Schor, Juliet (1999), *The Overspent American: Why We Want What We Don't Need*, New York: Harper Perennial.

Shafey, Omar, Michael Eriksen, Hana Ross, and Judith Mackay (2009), *The Tobacco Atlas*, 3rd ed., Atlanta: American Cancer Society.

Soberon-Ferrer, Horacio, and Rachel Dardis (1991), "Determinants of Household Expenditures for Services," *Journal of Consumer Research*, 17 (4), 385–97.

Solnick, Sara J., and David Hemenway (1998), "Is More Always Better? A Survey on Positional Concerns," *Journal of Economic Behavior and Organization*, 37 (3), 373–83.

——— (2005), "Are Positional Concerns Stronger in Some Domains than in Others?" *American Economic Review*, 95 (2), 147–51.

Strober, Myra H., and Charles B. Weinberg (1977), "Working Wives and Major Family Expenditures," *Journal of Consumer Research*, 4 (3), 141–47.

Veblen, Thorstein (1899/1965), *The Theory of the Leisure Class*, New York: Macmillan.

Wagner, Janet, and Sherman Hanna (1983), "The Effectiveness of Family Life Cycle Variables in Consumer Expenditure Research," *Journal of Consumer Research*, 10 (3), 281–91.

Wilkes, Robert E. (1995), "Household Life-Cycle States, Transitions, and Product Expenditures," *Journal of Consumer Research*, 22 (1), 27–42.