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Socioeconomic status and consumption in an emerging economy

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ABSTRACT

Despite the central role of social class or socioeconomic status on consumer behavior and the fact that this construct has been utilized in marketing research for more than seven decades, the marketing literature is surprisingly lacking in the conceptualization and measurement of this important construct. In this study, we address these issues and propose a flexible and robust theory-based framework for socioeconomic stratification, which we apply to identify socio-economic strata during a period (2003 and 2009) of substantial economic and social development in one emerging economy (Brazil). We then use this stratification to examine the relationship between socioeconomic status and consumption. Our socioeconomic stratification framework shows how the recent economic development observed in Brazil benefited the lower strata, leading to the emergence of the country's "new middle class." We also find that despite the high income concentration still prevalent in Brazil, consumption in many product categories is more evenly distributed; therefore, firms would be ill-advised to follow a premium market positioning strategy targeted mostly to the upper classes because this would leave a substantial portion of the market to the competition.

1. Introduction

This study has three main purposes. The first is to propose a modeling framework for social stratification based on the concepts of social class and permanent income that is also flexible enough to accommodate the typical socio-demographic data collected in market research studies. The second is to apply the proposed framework to historical data from the emerging economy of Brazil, which represents an excellent "laboratory" for the study of socioeconomic status and for illustrating our proposed framework because of the social programs implemented there since 2001, which have led to dramatic socioeconomic shifts in that economy. The third purpose is to relate household consumption to social stratification to understand how consumption priorities vary across social strata, and to separate differences that are due to budget effects from those that truly reflect differences in consumption priorities.

1.1. Social stratification over time and across societies

Since the dawn of mankind, the question of social stratification has been a constant presence in advanced societies. In antiquity, Athenian society was stratified into Eupatrids, Metics and Slaves; Sparta had the Spartans, the Periecos and Serfs (Pomeroy, Burstein, Donlan, & Roberts, 1999); and ancient Rome was stratified into Patricians, Commoners and Slaves (Shelton, 1997). More recently, societies have been stratified into classes that might differ slightly in nomenclature but generally translate into upper class, upper middle class, middle class, working class and lower class (Beeghley, 2004; Gilbert, 2002; Thompson & Hickey, 2005). In a number of developing countries the concept of social stratification has been prevalent as a way to relate socioeconomic status to consumption and for marketers to implement differentiated strategies (Corrales, Barberena, & Schmeichel, 2006). Socioeconomic status is important for market segmentation in developing countries because societies with emerging economies tend to be more hierarchical and exhibit a greater separation among the social classes, giving class distinctions a greater role than in economically developed societies (Burgess & Steenkamp, 2006). Moreover, global corporations have historically overlooked substantial sections of emerging markets because they were not economically viable and because of the firms' focus on the most affluent strata of society. The recent growth of the so-called "middle class" in emerging economies calls for more precise and valid measurement of social classes. One applied example of the concept of socioeconomic status of consumers in South America is the "Criterio Brasil" developed by the Brazilian Association of Research Companies (ABEP) based on the possession of eight types of durable goods, the employment of domestic help, and the level of education attained by the head of household. This measurement is widely used in ad hoc marketing research, tracking studies, media and consumer research (ABEP, 2011). Similar efforts can be found across Central and South America (Corrales et al., 2006) based on different combinations of

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occupation and education of the head of household, the dwelling type and ownership status, the presence of a domestic worker and ownership of various durable goods. Marketers in several European countries also utilize standard criteria for social stratification, but the common practice in Europe (Urquijo & Lobl, 2003; Ware & Dinning, 2003) is to define social strata on the basis of the level of education (e.g., Portugal, Italy) and occupation (e.g., Portugal, Italy, Russia, France, UK, Germany) of the head of the household, as well as on household income (Italy).

The examples above of social stratification across many emerging and developed economies highlight the importance of social class or socioeconomic status (SES) as a basis for market segmentation and as an important common basis for integrating information across multiple sources (e.g., media, marketing research, retail sales and household panels).

1.2. Social stratification in marketing and other disciplines

Since its inception, the field of marketing has used social class as a tool for market segmentation (Bauer, Cunningham, & Wortzel, 1965; Coleman, 1983; Sivadas, 1997) and as a foundation for establishing a marketing communication strategy (Bass, Pessemier, & Tigert, 1969; Beakman, 1967; Rich & Jain, 1968). More recently, Williams (2002) studied how gender and social class affect consumers' buying criteria for a broad range of product categories; Dahl and Moreau (2007) utilized social class in their study of consumers' creative experiences; Rucker and Galinsky (2008) related social class to consumers' desire to acquire certain products; Steenkamp and de Jong (2010) found, in a global study, that people who self-classified in higher social classes have more positive attitudes toward global brands; Steenkamp, de Jong, and Baumgartner (2010) found, in a study of social-desirability bias in cross-national surveys, that among all the socio-demographic covariates they considered, social class was the only one with no impact on socially desirable responses. Most importantly to marketers, because it defines the position of individuals within a stratified social system, SES determines the context under which consumption occurs. The concept of SES is becoming even more important to marketers because of the rise of the BRICS (Brazil, Russia, India, China, South Africa); from 1995 to 2010, BRICS countries more than doubled their share of global GDP to over 15%, with a projected growth of their combined GDP from US$9 trillion to US$128 trillion between 2010 and 2050 (O'Neill, Wilson, Urushothaman, & Stupnytska, 2005). One of the driving forces for this growth is the strengthening of internal markets (Renard, 2009) with the growth of a “middle class” with resources and hunger for consumption (Fioratti, 2006) and the reduction of poverty levels in these countries (Chan, Gabel, Jenner, & Schindele, 2011). The emergence of the “middle class” is viewed as a driver for economic growth because this vaguely-defined socioeconomic cohort strives for a better life-style and seeks the adoption of goods and services associated with higher social status (Cui & Song, 2009; Murphy, Shleifer, & Vishny, 1989), driving growth in internal demand for goods and services (Senauer & Goetz, 2003).

Socioeconomic status has also been a frequent and important segmentation criterion in research on education (Filmer & Pritchett, 2001), health (Deressa, Ali, & Berhane, 2007; Gwatkin, Rustein, Johnson, & Wagstaff, 2000; Marmot, Bosma, Hemingway, Brunner, & Stansfeld, 1997; and Thomas, 2007), psychology (Gray-Little & Hafdahl, 2000; Jayakody, Danziger, & Kessler, 1998; Rogler, 1996) and economic development (Sumarto, Suryadarma, & Suryahadi, 2007). There are many reasons for the central role of the concept of socioeconomic status across multiple disciplines. Socioeconomic status determines an individual's opportunities and challenges in all realms of life and provides information about an individual's access to social and economic resources (Duncan, Daly, McDonough, & Williams, 2002).

Despite the fact that social class has been widely utilized in marketing research over the past seven decades, relatively limited attention has been paid to the construct itself. This dearth of research on the measurement of social class is also noted in other disciplines. A recent report by a task force commissioned by the American Psychological Association (Saegert et al., 2006) recommended that the APA establish a continuing Committee on Socioeconomic Status to ensure that issues of SES receive more attention by APA members, calling for more research in the conceptualization and measurement of SES.

The current study is a response to this call. We first review the literature on the conceptualization and measurement of social class or socioeconomic status, discussing the challenges in measuring this construct and in classifying consumers into social strata. Then, we propose a modeling framework for the definition and classification of social class that is grounded in theory, sufficiently flexible to handle multiple indicators of socioeconomic status using different measurement scales, and robust to missing data, a prevalent problem in survey research. We apply this measurement framework to data from Brazil in 2003 and 2009, covering a period of dramatic socioeconomic shifts in that country, and use this stratification of Brazilian households to study shifts in consumption during this period and to study the impact of socioeconomic status on consumption priorities.

2. The conceptualization and measurement of social class and socioeconomic status

2.1. Social class

Sociologists developed the concept and operationalization of *social class* based on the classification of occupations defining a society's labor markets and production systems. Wright (1985) started with Karl Marx's classic division of the means of production between the bourgeoisie and proletariat (Marx & Engels, 1848), and added intermediate categories for the labor force based on their credentials and status to identify twelve occupations that typify classes within a society in terms of their relationship to the means of production. Goldthorpe (1987) combined Marx's perspective with Weber's (1949), further aggregating occupations according to market conditions (wage rates, upward mobility and economic stability) and working conditions (production control, authority) into seven social classes. Classification of individuals on the basis of occupation is common in Europe (Avendano, Kunst, van Lenthe et al., 2005; Griffin, Fuhrer, Stansfeld, & Marmot, 2002; Marmot et al., 1997). As we reviewed earlier, this focus on *social class* based on occupation (along with education, and sometimes income) is typical of social stratification schemes used by European marketers.

2.2. Socioeconomic status

While occupation is generally agreed to play an important role in an individual's social status and in understanding socioeconomic inequalities within a society, it is also widely acknowledged that there are substantial disparities in the prestige and economic return within some occupational categories in modern societies. Rather than focusing on the role of labor and capital in production systems to identify *social classes*, the notion of *socioeconomic status* (*SES*) emphasizes status achievement, using education and income as the cause and effect of occupational status, respectively. The main argument behind this conceptualization of SES is that education qualifies the individual for occupations in modern societies and income is the consequence of occupational status. Education is also typically completed early in adulthood, thereby serving as an early indicator of SES that is valid for most adults.

Earlier attempts to rank individuals in terms of socioeconomic status related education and income to occupational status, producing an index (e.g., the Socio Economic Index by Duncan, 1961; the International Socio-economic Index by Ganzeboom, de Graaf, & Treiman, 1992) used to rank individuals within a society (Duncan, 1961;

Hauser & Warren, 1997). However, using educational attainment and income as indicators of SES has several limitations. Educational stratification in modern societies occurs not only in the access to different levels of education, but increasingly in the quality of education received at these levels. Moreover, measuring formal education does not capture on-the-job training or other career investments that differentiate between individuals with similar levels of formal schooling. These shortcomings make educational attainment measured in years of education a limited indicator of socioeconomic status. Income is also a problematic variable to measure in surveys. While income earned from stable employment is easier to recall and report, income produced by temporary work or in informal labor markets carries larger reporting errors (Hentschel & Lanjow, 1998). Moreover, income produced from capital is more likely to be under-reported in surveys. Current household income may also be a poor indicator of the standard of living of retired individuals because it does not reflect available financial resources and disregards the cumulative effects of a lifetime of privilege or deprivation (Duncan et al., 2002). Moreover, while educational attainment reflects the individual's potential for social status, current income is more reflective of the individual's current condition rather than of his/her enduring or potential place in society. Friedman (1957) makes a distinction between income and wealth, considering income as having two components: transitory income and permanent income "reflecting the effect of those factors that the unit regards as determining its capital value or wealth," (Friedman, 1957, pp. 21). Friedman argues that consumption behavior is primarily determined by permanent income, and that consumption typically correlates poorly with income because total income is a poor measure of permanent income, as people smooth their consumption over time by borrowing or drawing on savings in times of low income and investing/saving in times of high income. Consequently, wealth can vary dramatically across different social groups with similar incomes (Braverman et al., 2005).

While European marketers typically base their social stratification on the concept of *social class*, using occupation as the primary indicator (Urquijo & Lobl, 2003; Ware & Dinning, 2003), marketers in the "new world" base their stratification on the concept of *socioeconomic status* (Corrales et al., 2006), using permanent income as its latent measure. However, SES and its latent source (permanent income) are theoretical constructs that are not directly observable and must therefore be inferred from proxy variables. A common set of proxies for inferring wealth in addition to current income is the ownership of durable consumer goods and the employment of domestic labor, which provide valuable insights into how households utilize their wealth (Filmer & Pritchett, 2001; Montgomery, Gragnolati, Burke, & Paredes, 2000). These proxies serve as valuable indicators of the household's long-run economic status; asset ownership is unlikely to change in response to short-term economic shocks and will therefore lead to a more stable measure of long-term socioeconomic status, and it is also generally measured with less error (McKenzie, 2003; Onwujekwe, Hanson, & Fox-Rushby, 2006). Asset ownership is also less likely to be affected by household size and composition than consumption needs and patterns because households are likely to adjust their consumption patterns in response to economic shocks but less likely to sell assets (Filmer & Pritchett, 2001).

Another common indicator used to infer socioeconomic status is the individual's access to public services. However, access to certain public services (paved roads, sewage systems, piped water) might be supply-restricted, thereby reflecting the regional availability of these services rather than the individual's access to them. On the other hand, at equilibrium, these supply restrictions might be a reflection of the lack of political clout or geographic mobility and, therefore, lead to lower social status in rural areas.

A review of the extensive literature on the conceptualization and measurement of social class and socioeconomic status across multiple disciplines, briefly summarized above, shows that theory stipulates SES as a latent construct based on social resources such as income, education, occupation, access to public services, and assets accumulated through life. Income is a necessary but insufficient indicator of SES, which must be inferred from indicators that reveal the individual's ability to move or to remain in his/her current status and his/her ability to take advantage of society's resources.

2.3. Measurement methodology

Recently, social scientists have proposed several methodological improvements to the identification of socioeconomic classes and to the classification of individuals in to these social strata. Filmer and Pritchett (2001) apply principal components analysis to dummy-coded data on housing characteristics and the ownership of consumer durables, constructing a uni-dimensional asset index (i.e., the first principal component) as a proxy for wealth or permanent income. Vyas and Kumaranayake (2006) discuss issues related to the choice of assets to measure SES and the preparation of data for this purpose, pointing out that substantial variance (i.e., information) is ignored when only the first principal component is retained. While the use of principal components analysis of asset-ownership has been a popular approach for SES measurement via wealth indices (Filmer & Pritchett, 2001; McKenzie, 2003; Sahn & Stifel, 2003; Vyas & Kumaranayake, 2006), it has been also the subject of criticisms from several scholars who do not disagree with the notion of using asset-ownership as proxies for wealth or permanent income, but object to the application of principal components analysis to these data on methodological grounds. For example, Howe, Hargreaves, and Huttly (2008) note that the goal of measuring wealth along a single dimension is not necessarily compatible with the underlying assumptions of principal components analysis, which is likely to produce multiple dimensions that are subsequently ignored when focusing solely on the first dimension. They also point out that the binary nature of asset-ownership data is not consistent with PCA, which assumes continuous indicators and produces the wealth index as a linear combination of these continuous variables. Kolenikov and Angeles (2009) propose the use of polychoric correlations to deal with the binary nature of asset-ownership and demonstrate that proper treatment of the indicator variables can affect the predictive validity of the resulting wealth indices. May (2006) avoids these problems by applying a unidimensional latent-trait (e.g., item response theory) model where the ownership of each asset serves as a binary indicator of the continuous, unidimensional latent trait representing the inferred wealth index. This approach is superior to PCA in its treatment of binary data and robustness to missing data, but it carries the same caveat as Filmer and Pritchett (2001) of imposing a unidimensional structure to asset-ownership. Clearly, a multidimensional latent-trait model (Reckase, 2007) could be applied to the same indicators, but one would have to wrestle with the interpretation of the multiple dimensions and with their connection to the underlying theoretical concept of permanent income.[1] Bollen, Glanville, and Stecklov (2006) develop a structural equation model that posits a latent variable measuring the theoretical construct of "permanent income," utilizing asset-ownership, education, occupation and income as indicators of permanent income as a formative construct.

All these attempts to build wealth indices as measurements of permanent income treat SES as a continuum, regardless of whether they are based on principal components, item-response theory or structural equation modeling, with each individual occupying a place along this unidimensional line. This notion of a SES continuum contrasts the original conceptualization of social classes as discrete categories defining the status of large sectors of a society. In other words, recent work in the measurement of SES has departed from

[1] A more flexible unidimensional ordering of households may be attained with Mokken scale analysis (Van Schuur, 2003), which is based on the same principles of the Item Response Theory, but with a more flexible, nonparametric measurement model.

Table 1
Socioeconomic profiles from the proposed stratification.

Size	1	2	3	4	5	6	7	8	Total
	4%	7%	13%	16%	22%	21%	9%	6%	
Head education									
Incomplete elementary	1%	1%	14%	14%	33%	43%	62%	75%	31%
incomplete middle school	5%	5%	25%	25%	34%	35%	29%	22%	27%
Incomplete high school	9%	9%	18%	18%	14%	11%	6%	3%	12%
Incomplete college	48%	48%	34%	34%	16%	10%	3%	1%	21%
College or graduate	37%	37%	10%	10%	3%	1%	0%	0%	8%
Head occupation									
Private employment	26%	28%	38%	40%	37%	33%	25%	16%	33%
Public employment	17%	24%	10%	12%	8%	4%	3%	2%	9%
Independent	20%	15%	24%	15%	29%	19%	38%	37%	24%
Employer	16%	12%	6%	3%	2%	0%	2%	1%	4%
Temporary rural worker	0%	0%	0%	0%	1%	2%	6%	11%	2%
Other employment	1%	0%	3%	3%	6%	9%	12%	14%	6%
Retired	18%	18%	16%	23%	13%	24%	10%	13%	18%
Unemployed	4%	2%	4%	4%	5%	8%	4%	6%	5%
log(per capita income)	7.825	7.820	6.761	6.761	5.988	5.748	5.308	5.039	6.254
Per capita income	R$2503	R$2489	R$863	R$863	R$398	R$314	R$202	R$154	R$520
Sewage									
City network	84%	84%	74%	74%	45%	45%	2%	1%	51%
Septic tank	12%	12%	15%	15%	22%	22%	12%	7%	17%
Tank	4%	4%	9%	9%	28%	28%	55%	32%	22%
Other	0%	0%	2%	2%	6%	6%	32%	60%	10%
Citywater	98%	98%	98%	98%	93%	93%	51%	29%	87%
Pavement	95%	95%	88%	88%	63%	63%	12%	12%	66%
Bedrooms	2.71	2.15	2.15	1.89	1.89	1.75	1.75	1.75	1.93
Bathrooms	2.86	2.09	1.53	1.27	1.13	1.04	0.84	0.49	1.26
Stoves	1.25	1.11	1.11	1.08	1.08	1.03	1.03	0.73	1.06
Maids	0.67	0.39	0.12	0.10	0.06	0.03	0.02	0.01	0.11
Freezers	1.21	0.74	0.64	0.29	0.24	0.06	0.06	0.01	0.31
Refrigerators	1.26	1.06	1.06	1.00	1.00	0.85	0.83	0.13	0.92
Blenders	1.22	1.02	1.02	0.90	0.90	0.61	0.61	0.08	0.80
Vacuum cleaners	0.73	0.48	0.27	0.09	0.01	0.00	0.00	0.00	0.12
Press irons	1.53	1.14	1.14	0.97	0.97	0.67	0.60	0.09	0.88
Clothes washers	1.04	0.92	0.83	0.56	0.38	0.11	0.10	0.00	0.43
Color TVs	3.21	2.03	2.01	1.29	1.24	0.88	0.88	0.22	1.32
Black and white TVs	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Stereos	1.39	0.85	0.85	0.60	0.60	0.38	0.38	0.14	0.59
Radios	0.97	0.61	0.59	0.37	0.37	0.33	.033	0.33	0.43
Air conditioners	0.94	0.49	0.08	0.02	0.00	0.00	0.00	0.00	0.11
Fans	2.38	1.52	1.66	0.89	1.10	0.52	0.48	0.08	0.98
Sewing machines	0.51	0.37	0.37	0.26	0.26	0.13	0.13	0.07	0.24
Water filters	0.42	0.38	0.38	0.38	0.38	0.33	0.33	0.29	0.36
Automobiles	1.68	1.11	0.75	0.38	0.26	0.05	0.05	0.02	0.39
Bicycles	1.18	0.46	0.97	0.26	0.99	0.43	0.56	0.87	0.68
Motorcycles	0.18	0.08	0.20	0.09	0.17	0.04	0.15	0.06	0.12
Personal computers	1.33	0.86	0.52	0.26	0.06	0.01	0.00	0.00	0.24
Water purifiers	0.23	0.17	0.08	0.05	0.03	0.01	0.00	0.00	0.05
Microwave ovens	0.96	0.74	0.52	0.33	0.07	0.01	0.00	0.00	0.24
Parabolic antennas	0.24	0.15	0.33	0.11	0.33	0.08	0.43	0.05	0.22
DVD players	1.71	1.04	0.94	0.60	0.53	0.22	0.22	0.02	0.55
Clothes dryers	0.28	0.12	0.10	0.02	0.02	0.00	0.00	0.00	0.04
Mixers	0.95	0.72	0.72	0.38	0.38	0.05	0.05	0.00	0.35
Hair dryers	1.19	0.73	0.59	0.28	0.17	0.03	0.02	0.00	0.27
Dishwashers	0.33	0.15	0.02	0.01	0.00	0.00	0.00	0.00	0.03

Variables in bold were constrained to vary monotonically across strata.

the general conceptualization of class, which is generally ignored by wealth indices (Bollen, Glanville, & Stecklov, 2001). When one reads a press report that major corporations are turning their attention to the "middle-class" in emerging economies, the reference is to a group or class of consumers rather than to the consumers' individual placement along a continuous line. Marketers in emerging economies plan and implement their strategies at the segment level, and therefore feel more comfortable operating with classes than with individual rankings or continuous measurements.

The social-stratification framework we propose and implement next is an attempt to confront these differences between the continuous notion of SES and the discrete conceptualization of social classes. Our main objective with this framework is to define social strata on the basis of the more modern construct of *permanent income* but identify latent classes rather than a unidimensional continuum, because our main purpose is to produce a classification tool for market segmentation purposes in the spirit of the many marketing applications we reviewed earlier on. We apply a monotonically constrained latent class model for the identification and classification of socioeconomic strata based on indicators of permanent income, as well as social class. As we demonstrate later, this monotonically-constrained latent class model for socioeconomic stratification shares some of the features of item response theory, in the sense that it is robust to missing data and provides diagnostics about the information contained in each indicator and its meaning for the individual's socioeconomic standing. However, rather than placing individuals on a unidimensional continuum or adding the complexity of mapping households on multiple dimensions (which might not be theoretically justified), interpreting these dimensions, and then

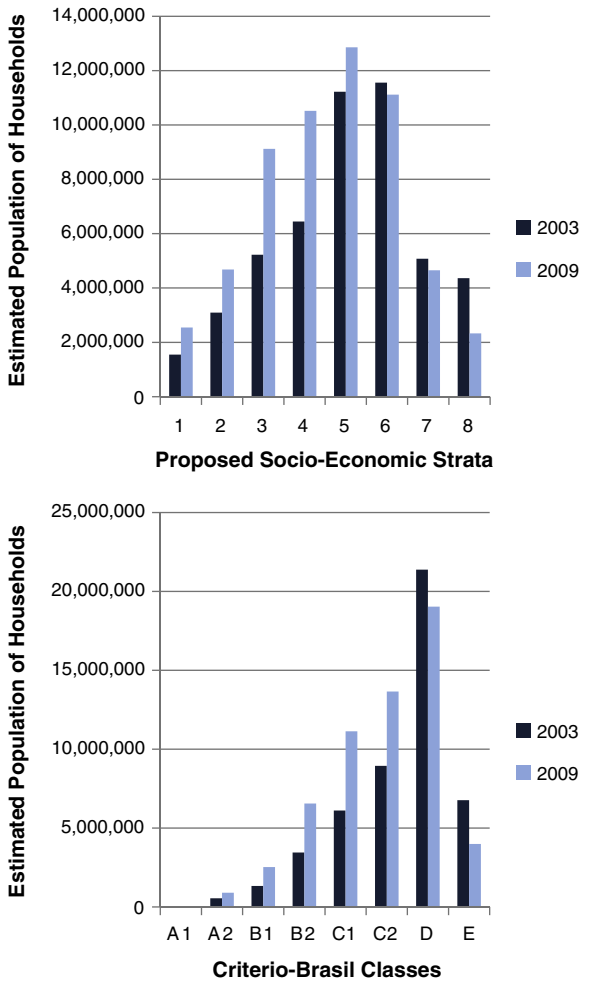

Fig. 1. Shifts in social stratification in Brazil between 2003 and 2009.

hierarchically categorizing the households into classes, our framework directly identifies stratified socioeconomic classes and classifies individuals into these strata.

3. Socioeconomic stratification in Brazil

When compared to the trajectory of some of the other "BRICS" economies such as China and India, Brazil's growth rate in the first decade of the 21st century is not as impressive, at 2.9% annual growth in per capita GDP between 2003 and 2009. The most remarkable aspect of this growth in the Brazilian economy is that it happened with income re-distribution rather than concentration. In the first decade of the 21st century, the Gini coefficient in Brazil declined from its peak of 0.609 in 1990 to 0.545 in 2009 (Neri, 2010), which combined with economic growth led to a 45% reduction in the population living below the poverty level between 2003 and 2009 (Neri, 2010) and to the emergence of a "new middle class" in Brazil. However, when one mentions the "middle class" within a society it is often unclear exactly what this cohort represents. The main purpose of the model and application we present next is to develop an objective socioeconomic stratification that can be applied across studies within the same society, thereby providing a consistent definition of socioeconomic status that can also be used as a basis for comparisons within and across studies.

As briefly discussed earlier, a widely applied criterion for the classification of consumers into socioeconomic classes in Brazil is the "Criterio Brasil," which is based on education, the number of certain durable consumer goods present in the home, the number of bathrooms, and the number of domestic workers employed by the household. This criterion was developed as a predictor of income by estimating a classic Mincerian income regression (Mincer, 1958) to define the weights for each indicator in the final income score, and then classifying individuals into eight strata based on this score (Neri, 2010), thereby leading to a classification based on predicted current income rather than on the theoretical concept of *permanent income*. In other words, despite the fact that "Criterio Brasil" uses asset ownership as an indicator, it is still focused on household income because its score is defined by a Mincerian income regression model predicting current household income as the dependent variable.

The framework for socioeconomic class identification and classification we propose next differs from the popular "Criterio Brasil" in several important ways. First, rather than building a predictive score for current household income and stratifying the population based on this score, we directly identify classes based on indicators of *permanent income* or wealth (e.g., the number of consumer durables owned, the employment of household help) as well as *social class* (e.g., the occupation of the head of household, educational attainment, access to public services). Second, rather than creating a unidimensional wealth index and stratifying the population based on this index, we directly identify latent classes that are ordered in terms of the indicators of *social class* and *permanent income*, thereby identifying natural strata in the population based on two closely related theoretical constructs. Third, rather than classifying households into strata on the basis of a linear score and an arbitrary set of cut-off points, our framework directly classifies each household probabilistically into "naturally" occurring strata using a monotonically-constrained latent-class model that avoids the assumption of unidimensionality and is robust to missing data. This robustness to missing data is particularly valuable for marketing researchers, because it makes it possible to compare stratifications obtained from different sets of indicators (Balasubramanian & Kamakura, 1989).

3.1. A monotonically-constrained latent class model for socioeconomic stratification

Let Y_i represent a K-dimensional vector of continuous, ordinal or nominal indicators of permanent income or social standing for household i and assume we have gathered these indicators from a sample of N households. Our goal is to identify S ordinal socioeconomic strata in our sample that are ordered according to K indicators. For example, if y_{ik} is a continuous indicator, then the mean of this indicator should monotonically increase or decrease across the ordinal strata; similarly, if y_{ik} is a binary indicator, then the proportion for this binary indicator should monotonically increase or decrease across the ordinal strata. As we briefly show below, this can be easily accomplished with a monotonically-constrained latent class model (Vermunt, 2001). The likelihood function for the standard latent class model for household i is given by

$$L\left\{Y_i\middle|\Theta,\prod\right\}=\sum_{s=1}^{s}\pi_s\prod_{k=1}^{K}p\left(y_{ik}\middle|\Theta_{ks}\right), \tag{1}$$

where π_s is the estimated size of socioeconomic class s in the population, Θ_{ks} collects the response parameters for item k and segment s, and $p(y_{ik}|\Theta_{ks})$ is the probability associated with the observed indicator y_{ik}, given that household i belongs to socioeconomic class s. The form of the probability function $p(y_{ik}|\Theta_{ks})$ will depend on whether the k^{th} indicator is binary, categorical, ordinal or continuous. For example, if the indicator is continuous, then $p\left(y_{ik}\middle|\Theta_{ks}\right)=\frac{1}{\theta_{k2s}\sqrt{2\pi}}\exp\left\{-\frac{1}{2}\left(\frac{y_{ik}-\theta_k-\theta_{k1s}}{\theta_{k2s}}\right)^2\right\}$. On the other hand, if the k^{th} indicator is categorical with M categories, then $p\left(y_{ik}\middle|\Theta_{ks}\right)=\frac{\exp(\theta_{km}+\theta_{kms})}{\sum_{m'=1}^{M}\exp\left(\theta_{km'}+\theta_{km's}\right)}$. To ensure that the latent strata are ordered, we specify an ordinal latent class model that

Table 2
Cumulative consumption expenditures (in 2009) by social strata: proposed stratification and "criterio Brasil".

Proposed	Cumulative % of households	Cumulative % of consumption expenditures	Criterio Brasil	Cumulative % of households	Cumulative of consumption expenditures
1	4.4%	16.4%	A1	0.1%	0.4%
2	12.5%	35.3%	A2	1.6%	8.0%
3	28.3%	55.6%	B1	6.0%	20.9%
4	46.5%	72.7%	B2	17.3%	41.2%
5	68.7%	87.3%	C1	36.6%	63.6%
6	87.9%	95.7%	C2	60.2%	81.2%
7	96.0%	98.8%	D	93.1%	97.8%
8	100.0%	100.0%	E	100.0%	100.0%

variables, directly mapping these manifest variables into discrete social strata, thereby bypassing the arbitrary categorization of a unidimensional continuum into classes.[2] Despite these valuable advantages, we are not aware of any prior work using this methodology for social stratification.

3.2. Brazilian socioeconomic classes in 2003 and 2009

To illustrate the features of our proposed framework for socioeconomic stratification and to understand the dramatic shifts in socioeconomic structure and consumption in Brazil in recent years, we apply our framework to the household characteristics gathered in 2003 and 2009 by the "Instituto Brasileiro de Geografia e Estatistica"

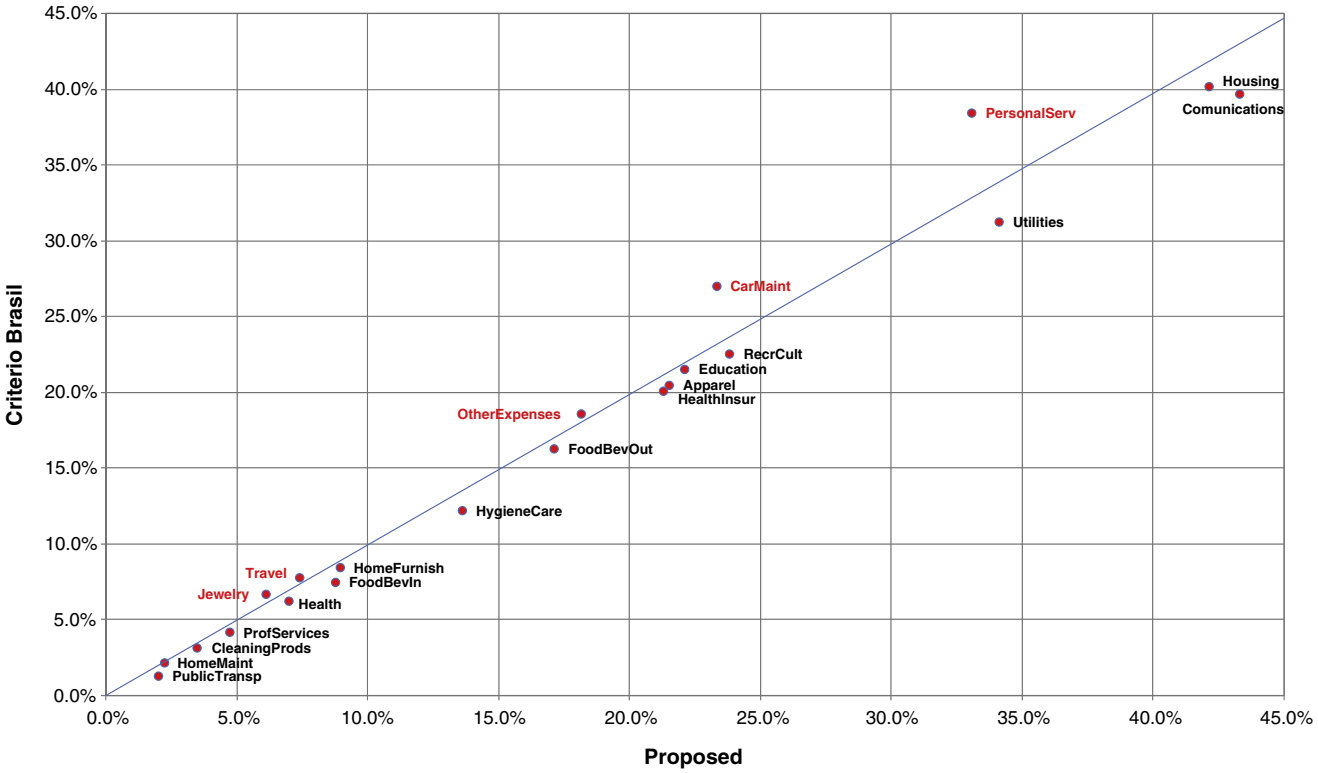

Fig. 2. Percentage of variance in consumption explained by two competing approaches for social stratification.

imposes monotonic constraints on the class positional parameters ($\theta_{ks} \leq \theta_{ks+1}$ or $\theta_{ks} \geq \theta_{ks+1}; 1 \leq s \leq S-1$) for all manifest variables where the researcher has a priori information on the theoretical order of these positional parameters across social strata. Estimation of the monotonically-constrained latent class model is easily attained with commercial software (Latent Gold, Vermunt & Magidson, 2010). While the model described here is basically a standard latent class model with monotonic constraints on some of the response parameters, it offers many valuable features for the purpose of social stratification. First, as shown in the literature, latent class analysis is robust to missing data (Kamakura & Wedel, 1997), which leads to a flexible classification framework where different researchers can categorize their samples into the same social strata, even though they might have collected different subsets of indicators. Second, the monotonic constraint in the response parameters across classes leads to ordered latent classes that are consistent with the theoretical concept of social stratification. Third, latent class analysis directly identifies naturally occurring latent classes that best explain the relationship among manifest

(IBGE) as part of the Survey of Household Budgets ("Pesquisa de Orcamento Familiar", or POF), which we later relate to consumption expenditures observed in the same period. As discussed earlier, we depart from traditional wealth indices by combining indicators of *permanent income* such as the number of consumer durables owned, employment of household help, and dwelling characteristics, with indicators of *social class* such as education, the occupation of the head of household, and access to public services. Summary statistics for these indicators are listed in the last column of Table 1.

We applied the monotonically-constrained latent class model to the sample of 48,568 households in 2003 and 55,685 in 2009, using projection weights provided by IBGE to ensure that the results are directly projectable to the population of households in the country in both years. We chose to identify the same number of social strata as

[2] A decision must be made on the desired number of classes, which can be either done with statistical information criteria such as the Consistent Akaike's Bayesian Criterion (CAIC) or the Bayesian Information Criterion (BIC), or by the researcher based on the purposes of the stratification analysis (see Wedel & Kamakura, 2000).

Table 3
Demographic analysis of the socioeconomic strata in Brazil (2003 and 2009).

Effect	Estimate	Std. error
State capital	0.71	.019
Metropolitan area	0.36	.034
Rural	−1.44	.020
Residents = 1	−0.15	.061
Residents = 2	0.12	.054
Residents = 3	0.31	.049
Residents = 4	0.48	.045
Residents = 5	0.37	045
Residents = 6	0.23	050
Age = up to 24	−0.22	.044
Age = 25 to 29	0.18	.037
Age = 30s	0.52	.032
Age = 40s	0.64	.032
Age = 50s	0.46	.031
Age = 60s	0.19	.032
Married	0.42	.021
Single male	−0.33	.032
White	1.91	.091
Black	0.74	.094
Asian	2.35	.141
Brown	0.79	.091
Kids0_4 = 0	1.57	.155
Kids0_4 = 1	1.19	.155
Kids0_4 = 2	0.54	.160
Kids5_9 = 0	1.20	.101
Kids5_9 = 1	0.89	.101
Kids5_9 = 2	0.33	.105
Kids10_14 = 0	1.16	.088
Kids10_14 = 1	0.95	.088
Kids10_14 = 2	0.43	.092
Kids15_19 = 0	0.86	.103
Kids15_19 = 1	0.73	.102
Kids15_19 = 2	0.47	.107
Kids25_29 = 0	−0.27	.073
Kids30_34 = 0	−0.11	.041
[Kids20_24 = 0] * [year = 2003]	−0.14	.072
[Kids20_24 = 1] * [year = 2003]	−0.16	.074
[White] * [year = 2003]	−0.54	.160
[Black] * [year = 2003]	−0.48	.164
[Asian] * [year = 2003]	−0.53	.230
[Brown] * [year = 2003]	−0.58	.160
[Age = 30s] * [year = 2003]	0.16	.048
[Age = 40s] * [year = 2003]	0.14	.048
[State capital] * [year = 2003]	0.18	.028
[Metropolitan area] * [year = 2003]	0.35	.050
[Rural] * [year = 2003]	−0.47	.029

in "Criterio Brasil" so that we can directly compare the two social-stratification schemes.[3] Given the large number (over 500) of parameters involved, we do not report them here (they are available upon request); a more intuitive understanding of the socioeconomic classes can be obtained from the class profiles reported in Table 1.

Note that because we identified the latent social strata by pooling the data between 2003 and 2009, we are able to see the dramatic shifts in social stratification in Brazil during this relatively short period of six years, as shown in Fig. 1, compared to the shifts measured in terms of the existing industry criterion ("Criterio Brasil") applied to the same data. This comparison reveals two major differences between the two stratification procedures. First, the social classes defined by "Criterio Brasil" are skewed in size towards classes C1, C2 and D, with much fewer households classified in the first three classes (A1, A2 and B). This highly skewed distribution helps to discriminate the wealthy minority from the rest of the population, but tends to lump the majority of the population into very large classes, making it more informative for studies focusing on the wealthy minority than for studies focusing on the less (economically) fortunate majority, including the middle class, which has been the recent focus of marketers in Brazil. In contrast, our proposed social stratification produces a more symmetric distribution, with the bulk of the population in the central four strata (3 to 6), leading to a more balanced classification of the population in socioeconomic terms. With this more balanced distribution, our socioeconomic classification is more informative both at the middle and extreme strata. Second, because the distribution of socioeconomic strata produced by our proposed model is less skewed, it produces clearer evidence of the dramatic shifts in socioeconomic stratification between 2003 and 2009.

The top panel of Fig. 1 shows how the population of households has shifted towards the higher strata on the left, particularly the households classified in the middle to low socioeconomic strata. This upward shift has led to over 20.5 million Brazilians rising above the poverty threshold (R$145 or US$83 of monthly per capita income based on the exchange rate in December 2009) between 2003 and 2009. This emergence of a new class of economically-relevant consumers requires the repositioning of many businesses to better cater to their needs, which change as these consumers move upwards in the social stratification, with a growing interest in and consumption of categories not previously consumed, such as food away from home, cosmetics, automobiles and air travel (Souza & Lamounier, 2010).

3.3. Consumption concentration by category and social strata

The differences between our proposed socioeconomic stratification and the social classification based on the "Criterio Brasil" become more evident when comparing the distribution of the annual

Table 4
Entropy of classification for each indicator and socioeconomic stratum.

Item	Expected posterior entropy	Expected drop in entropy
Per capita income	1.56	24.5%
Color TVs	1.59	22.1%
Bathrooms	1.65	17.7%
Personal computers	1.71	13.6%
Sewage	1.71	13.5%
Automobiles	1.72	13.3%
Microwave ovens	1.72	12.9%
Education	1.72	12.8%
Clothes washers	1.72	12.8%
DVD players	1.74	12.0%
Food mixers	1.75	10.9%
Press irons	1.75	10.8%
Hairdryers	1.76	10.1%
Refrigerators	1.78	9.4%
Pavement	1.78	9.2%
Fans	1.79	8.8%
Blenders	1.79	8.6%
Freezers	1.79	8.4%
Vacuums	1.80	7.8%
City water	1.81	7.4%
Occupation of HH	1.85	5.0%
Stereos	1.85	4.9%
Air conditioners	1.86	4.7%
Bicycles	1.88	3.3%
Maids	1.88	3.1%
Dish antennas	1.89	2.8%
Stoves	1.90	2.5%
Dishwashers	1.90	2.4%
Clothes dryers	1.91	1.8%
Bedrooms	1.91	1.8%
Water purifiers	1.91	1.6%
Sewing machines	1.92	1.3%
Radios	1.92	1.2%
Motorcycles	1.93	0.9%
Water filters	1.94	0.1%
Black and white TVs	1.94	0.0%

[3] This decision could be guided by information criteria as discussed earlier or by cross-validation tests (Wedel & Kamakura, 2001), but ultimately should depend on the intended use of the stratification scheme. Given that the most widely utilized stratification scheme in Brazil contains eight strata, and given our intention to use this scheme as a basis for comparison, we chose to estimate our model with eight ordered classes.

Table 5
Classification comparison (full set vs. top 15 and 14 selected items).

		Stratification based on all 36 indicators								Total
		1	2	3	4	5	6	7	8	
Stratification based on top 15 indicators	1	2106	288	57	1	0	0	0	0	2452
	2	414	3764	532	207	0	0	0	0	4917
	3	152	726	8434	1224	211	0	0	0	10,747
	4	2	233	1519	8482	1594	239	2	0	12,071
	5	0	678	678	1917	20,633	2698	563	0	26,489
	6	0	0	1	323	3566	18,168	1992	337	24,387
	7	0	0	0	1	869	2479	9784	752	13,885
	8	0	0	0	0	0	342	885	8484	9711
Stratification based on top 14 indicators (excluding income)	1	2129	297	99	1	0	0	0	0	2526
	2	398	3225	1115	141	0	0	0	0	4879
	3	147	1169	7552	1159	401	0	0	0	10,428
	4	0	312	1500	7603	2483	304	0	0	12,202
	5	0	8	954	2752	18,919	2532	582	0	25,747
	6	0	0	1	487	3798	18,240	2165	403	25,094
	7	0	0	0	12	1271	2,507	9665	825	14,280
	8	0	0	0	0	1	343	814	8345	9,503
	Total	2674	5011	11,221	12,155	26,873	23,926	13,226	9573	104,659

consumption budget implied by the two criteria, shown in Table 2. This table shows that "Criterio Brasil" produces social classes that are uneven in terms of economic relevance to marketers, while the socioeconomic strata identified by the proposed model are more evenly distributed in terms of economic relevance, except for the two lowest strata (7 and 8), which are less economically relevant. For example, the first two classes (A1 and A2) from "Criterio Brasil" represent a very small fraction of both households (1.6%) and cumulative consumption (8%), while in contrast, our proposed stratification produces top two strata (1 and 2) containing 12.5% of the population and accounting for 35.3% of consumption. On the other extreme, the situation is reversed; "Criterio Brasil" lumps almost 40% of the households into the two bottom strata accounting for about 19% of consumption, while the proposed stratification places 22% of households in the two bottom strata, accounting for 14% of total consumption. These results demonstrate that "Criterio Brasil" provides more details about consumption among the top minority of wealthier Brazilians, while our proposed stratification produces more evenly distributed strata in terms of both size and consumption.

While the results from Fig. 1 and Table 2 show that the two stratification schemes produce distinct class distributions both in terms of population and economic relevance, the question still remains as to whether they differ in their ability to differentiate among consumers in terms of consumption. To answer this question, we analyzed consumption expenditures across our sample of 55,685 households in 2009, estimating the percentage of variance in projected consumption explained by the two stratification schemes across the Brazilian population in 2009 for each of 21 consumption categories. The results from this comparison are displayed in Fig. 2, which shows that the proposed stratification generally explains differences in consumption better than the traditional Mincerian approach. The only exceptions are clearly non-essential categories such as *Jewelry and Accessories*, *Leisure Travel*, *Personal Services*, *Car Maintenance* and *Other Expenses*. These results once again demonstrate that by devoting the four top strata to the wealthiest 17% of the Brazilian population, the Mincerian approach provides more details about the wealthy minority, thereby better explaining consumption expenditures in some of the non-essential categories. By distributing the population more evenly across the eight strata, our proposed stratification explains a higher variance in expenditures for most (16) of the 21 consumption categories. At first glance, these differences in explanatory power might seem small, but two important factors must be taken into account. First, these measures of explanatory power are obtained across a large sample of more than 50,000 observations, and therefore, a strong regression towards the mean should be expected, leading to smaller (but highly significant) differences. Second, both classification schemes rely on exactly the same indicators, with the result that their classifications cannot be dramatically different; in other words, one should not expect households classified at the bottom (or

Table 6
Cumulative consumption expenditures by socio economic strata for selected categories.

Year	2003								2009							
Social class	1	2	3	4	5	6	7	Gini	1	2	3	4	5	6	7	Gini
Households	3%	10%	20%	34%	57%	81%	91%		4%	12%	28%	46%	69%	88%	96%	
Grains, starches, oils, fats	4%	10%	20%	29%	54%	75%	89%	0.05	6%	13%	29%	43%	68%	84%	95%	0.02
Sugars	8%	17%	31%	43%	66%	82%	93%	0.13	12%	26%	46%	60%	80%	91%	97%	0.22
Animal protein	6%	14%	29%	40%	66%	83%	93%	0.11	8%	17%	37%	52%	76%	89%	97%	0.10
Fruits and vegetables	9%	21%	36%	51%	74%	88%	96%	0.24	11%	25%	47%	63%	83%	93%	98%	0.24
Bakery	8%	18%	35%	49%	73%	90%	97%	0.23	9%	20%	41%	59%	80%	93%	98%	0.18
Dairy	9%	21%	38%	53%	75%	89%	96%	0.26	11%	25%	47%	63%	84%	94%	99%	0.25
Drinks and infusions	9%	21%	37%	51%	75%	89%	96%	0.25	10%	22%	45%	62%	82%	93%	98%	0.22
Cleaning products	10%	21%	36%	49%	72%	88%	95%	0.22	12%	24%	45%	60%	81%	92%	98%	0.21
Hygiene and personal care	10%	22%	39%	55%	77%	92%	97%	0.30	12%	27%	48%	65%	85%	95%	99%	0.28
Communications	16%	38%	56%	74%	91%	98%	100%	0.53	19%	42%	65%	83%	94%	99%	100%	0.50
Professional services	19%	47%	64%	81%	90%	97%	99%	0.59	23%	45%	68%	82%	94%	98%	99%	0.52
Jewelry and accessories	16%	36%	53%	66%	85%	94%	98%	0.44	25%	45%	65%	79%	92%	97%	99%	0.48
Vacation home	22%	54%	65%	79%	88%	97%	99%	0.59	34%	58%	74%	90%	97%	99%	100%	0.63
Travel	17%	43%	58%	73%	87%	94%	98%	0.51	31%	53%	69%	83%	92%	97%	99%	0.54
Recreation and culture	18%	42%	61%	76%	90%	97%	99%	0.55	22%	44%	65%	80%	92%	98%	100%	0.49
Private education	26%	54%	73%	86%	94%	98%	99%	0.67	27%	55%	76%	89%	96%	99%	100%	0.61
Private health insurance	23%	54%	71%	89%	96%	100%	100%	0.68	27%	59%	78%	94%	98%	100%	100%	0.66

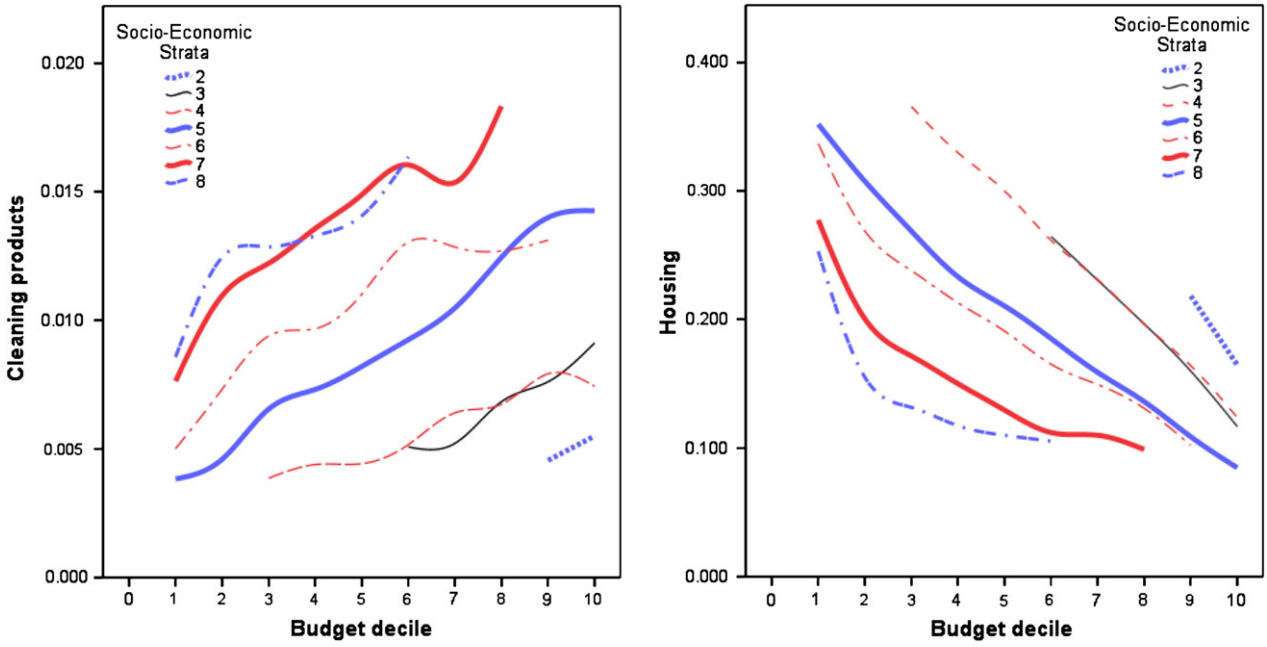

Fig. 3. Engel curves by socioeconomic stratum.

top) according to one scheme to move to the top (or bottom) according to the other scheme, and therefore, the differences in stratification straddle neighboring strata. Most importantly, our proposed stratification produces consistently better explanation of consumption, with only a few (5) exceptions.

3.4. Socioeconomic stratification and demography

To understand these social strata and the movements between 2003 and 2009 in demographic terms, we applied an ordinal logistic regression to the individual classifications of the 104,253 households in our sample, using their demographic profiles and year of data collection as predictors. The results are reported in Table 3, where social strata are coded so that a positive coefficient reflects a propensity to belong to higher strata (i.e., higher permanent income); to simplify presentation, only the statistically significant parameters ($p<0.01$) are reported. Based on these results, we conclude that:

- Households living in state capitals and other metropolitan areas are more likely to be in higher socioeconomic strata, while households living in rural areas tend to be in lower strata.
- Mid-size households (three to five members) are more likely to be in higher strata than smaller or larger households.
- Households with middle-aged heads (30s to 50s) are more likely to be in higher strata than those with younger or older heads.
- Households headed by couples are more likely to be in higher strata, while those headed by single males are more likely to be in lower strata.
- Households headed by Asians are more likely to be in the upper strata, followed by Whites and Browns.
- Households without children under 19 years of age or with children over 25 are more likely to be in the upper strata.
- The shifts observed between 2003 and 2009 were not evenly distributed across demographic groups.
- The position of households headed by Whites, Browns, Asians and Blacks improved between 2003 and 2009.
- The position of households with heads in the 30s and 40s declined between 2003 and 2009.
- The position of households living in state capitals and other metropolitan areas declined between 2003 and 2009.

3.5. Useful features of the proposed socioeconomic stratification framework

Because the socioeconomic classes were identified on the basis of a monotonically-constrained latent class model, classification of individual households into the strata is robust to missing data (Balasubramanian & Kamakura, 1989; Wedel & Kamakura, 2001). For example, if only a subset of K′ (where K′<K,) indicators $Y_i^{K'} = \{y_{ik}; k = 1,\ldots,K'\}$ is observed for household i, the posterior probability that the household belongs to stratum s is obtained from:

$$\Pr\left\{i \in s \middle| Y_i^{K'}\right\} = \frac{\pi_s \prod_{k=1}^{K'} p(y_{ik}|\Theta_{ks})}{\sum_{s'=1}^{S} \pi_{s'} \prod_{k=1}^{K'} p(y_{ik}|\Theta_{ks'})}. \quad (2)$$

In other words, a household can be classified into the socioeconomic strata using all the available information, even when the number of indicators available from that household is limited relative to the set used to identify and define the socioeconomic strata. In contrast, social stratification based on traditional wealth indices can only be done when all variables composing the index are measured.

The contribution of each individual indicator k to socioeconomic stratification can be measured by the expected posterior classification entropy

$$E_k = \int \sum_s \left[-\tau_{ks} \log(\tau_{ks}) - (1-\tau_{ks}) \log(1-\tau_{ks})\right] f(y_k) dy_k, \quad (3)$$

where $\tau_{ks} = \frac{\pi_s p(y_k|\Theta_{ks})}{\sum_{s'=1}^{S} \pi_{s'} p(y_k|\Theta_{ks'})}$, and $f(y_k)$ is the observed frequency distribution of the indicator (y_k).

This entropy measure, shown in Table 4, indicates the classification information that can be expected from each indicator variable, and therefore can be used to select indicators that provide the best classification of households into the social strata. The second column of Table 4 displays the expected posterior classification entropy for each item, computed as shown above, while the third column shows the improvement (drop) in entropy relative to the entropy based on prior membership probabilities (class sizes). These statistics show that the most informative items for social stratification are per capita income (in log); the numbers of color TVs, bathrooms, personal computers, automobiles and microwave ovens; access to sewage

treatment; and the educational attainment of the head of the household.

Taking advantage of the robustness of latent class analysis to missing data, and of the entropy measure for each social indicator in Table 4, a subset of items can be identified for a more parsimonious measurement of socioeconomic status that will not require too much time and effort, making it suitable for a consumer survey. We illustrate and test this feature by selecting a subset of indicators and comparing the classification based on this subset with the classification from the full sample. For this test, we used the top 15 of the 36 indicators listed in Table 4, as well as a similar set excluding per capita income, which is often difficult to measure in a survey (Hentschel & Lanjow, 1998). The social stratification obtained with these two subsets is compared to the original stratification (based on the calibrated model on all items) in Table 5. Socioeconomic stratification based on the top 15 indicators matched the classification obtained with all 36 indicators in 76.3% of the 104,659 households, while ignoring per capita income led to a match in 72.3% of the cases. These hit rates are quite reasonable, considering the very large sample size involved. Most importantly, Table 5 shows that the mismatched cases relative to the full-set stratification are mostly assigned to neighboring strata; when the nearest strata are included as correct matches, the matching rates increase to 96.0% and 94.8%, respectively.

The empirical evidence from Table 5 discussed above has important implications for marketing researchers, as it demonstrates that social stratification based on the proposed model is fairly robust to missing data, allowing researchers to compare social stratification based on different indicators. In other words, consumers from two different studies can be classified into the same social strata, even if the studies gathered different classification data for social stratification. This feature of the proposed stratification framework is particularly useful to marketing researchers who often need to relate results from different sources, each using different criteria for socioeconomic stratification, for example when concatenating results from media research, consumer research, internal sales reports and other sources. As long as these different sources use subsets of the items listed in Table 4, even if these items are not the same, our proposed framework makes it possible to aggregate the results from these different sources into compatible socioeconomic segments. Marketing researchers may take advantage of this to produce comparable social stratification schemes based on different indicators or to concatenate results obtained from different sources, using socio-economic stratification as the common basis for relating these independent sources. Our empirical results also show that substantial savings can be attained in data collection (asking only 14 out of 36 questions) with little loss in the accuracy of social stratification. This robustness to missing data is particularly important in survey research where respondents often decline to answer questions related to income, educational attainment and occupation, which form the basis for many socioeconomic stratification schemes (Corrales et al., 2006; Thompson & Hickey, 2005). The ability to select a small subset of the indicators of permanent income and social class to stratify a sample leads to shorter surveys, with lower costs and better data quality due to better response rates.

In conclusion, the conceptual discussion and empirical results presented so far demonstrate that the proposed framework for social stratification offers several benefits over the traditional Mincerian approach. First, rather than attempting to predict current income through the estimation of a Mincerian income regression and arbitrarily stratifying the population based on predicted current income, our framework is based on the theoretical concepts of *social class* and *socioeconomic status*, using multiple indicators of *permanent income* and *social class* to identify naturally occurring (latent) classes that are ordered in terms of these manifest indicators. Second, when applied to the household population of Brazil in 2003 and 2009, the proposed framework produces a more even stratification than the prevalent Mincerian approach, which provides finer details among the wealthy minority than among the majority, particularly the middle strata, which have been the recent focus of attention by most marketers in emerging markets. Third, because it produces more evenly distributed strata not only in size, but also in income, the proposed framework generally explains consumption better than the Mincerian approach, except for non-essential consumption, where attention to the wealthy minority is warranted. Fourth, we provide empirical evidence that by utilizing a latent class model, our framework is robust to missing data, allowing marketing researchers to produce a social stratification that is comparable across studies, even when these studies utilize different measurement indicators, which is quite useful when comparing marketing research results obtained from different sources.

4. Socio-economic stratification and consumption in Brazil

The link between socioeconomic status and consumption is almost definitional, with some scholars (e.g., Deaton, 1992) advocating the use of consumption expenditures as indicators of SES. This explains why the categorization of households into socioeconomic strata is commonly used by marketers as a market segmentation tool, particularly in emerging economies. In this second section of our study, we relate socioeconomic stratification in Brazil in 2003 and 2009 to consumer expenditures to demonstrate that in many expenditure categories, the myopic focus on the wealthy minority in emerging economies is unwise because it ignores a substantial portion of the market that, at least in Brazil, has exhibited the fastest growth with economic development. For this purpose we use expenditure data gathered by the same source (IBGE/POF) from the same households we used to develop, implement and test our socioeconomic stratification model. Aside from measuring the demographic profile and performing a complete inventory of the households' dwelling and physical assets, the IBGE/POF program also gathers detailed data on the weekly and monthly expenditures of each household, which are annualized to reflect each household's annual consumption budget. This wealth of data allowed us to directly relate consumption expenditure to the demographic profile and socioeconomic status of the 104,353 households in our sample, which can be projected to the country's population based on the sample projection weights provided by the data source.

Table 6 shows how consumption expenditures are concentrated among the socio-economic strata across a few selected product/service categories. The overall conclusion from this table is that even though Brazil still has one of the highest income concentrations in the world, with a Gini coefficient of 0.545 in 2009 (Neri, 2010), the concentration in expenditures across socioeconomic strata varies substantially and is reasonably low for the more essential consumption categories, as measured by their respective Gini coefficients across socioeconomic strata. For example, expenditures in essential consumption categories such as *Grains*, *Starches*, *Oils and Fats*, *Sugars*, *Animal Protein*, and *Urban Transportation* are more evenly distributed, with Gini coefficients in the 0.02 to 0.28 range. In contrast, non-essentials such as *Private Education*, *Private Health Insurance*, *Vacation Home*, *Personal* and *Professional Services*, show highly concentrated expenditures, with Gini coefficients in the 0.44 to 0.68 range. A marketer competing in dairy, bakery, beverages, hygiene and personal care, or cleaning products would be unwise to focus on the top three socioeconomic strata (representing 28% of all households in 2009), because this narrow targeting would miss more than half of the market value in these categories in 2009. This empirical evidence suggests that the policy of "fighting from high ground" with premium brands followed by some global corporations competing in the packaged-goods industry might work well in developed economies, but might not transfer well to emerging markets such as Brazil for

Table 7
Parameter estimates for the budget allocation model.

		Food and bev. at home	Food and beverages away	Utilities	Home maintenance	Cleaning products	Home furnishings	Communications	Public transport	Car use and maintenance
HH location	Intercept	**0.43**	**−2.69**	**−1.62**	**−4.45**	**−2.19**	**−2.62**	**−2.33**	**−1.77**	**−2.23**
	2009	**−0.02**	**0.15**	**−0.03**	**−0.15**	**0.03**	**−0.02**	**0.05**	**0.11**	**0.01**
	Capital	**−0.09**	**−0.03**	**0.02**	−0.03	**−0.07**	**−0.15**	**0.04**	**0.05**	**−0.20**
	Metro	**−0.04**	0.00	**0.01**	**0.02**	**−0.03**	**−0.06**	**0.01**	**0.05**	**−0.12**
	Small town	**−0.03**	−0.02	**0.12**	0.03	**−0.01**	**−0.04**	**0.05**	**−0.09**	**−0.14**
	Residents	**0.17**	**0.20**	**0.14**	**0.12**	**0.16**	**0.13**	**0.14**	**0.22**	**0.15**
Head of HH age	Up to 25	**0.02**	**0.19**	**0.01**	−0.01	**0.03**	**0.12**	**0.05**	**0.11**	**0.11**
	25−29	**0.02**	**0.22**	0.00	0.00	**0.04**	**0.12**	**0.06**	**0.13**	**0.16**
	30s	**0.01**	**0.27**	0.00	0.01	**0.03**	**0.09**	**0.08**	**0.15**	**0.19**
	40s	**−0.01**	**0.19**	0.00	−0.02	0.01	**0.02**	**0.06**	**0.12**	**0.15**
	50s	**−0.01**	**0.12**	0.00	−0.01	0.00	−0.01	**0.03**	**0.08**	**0.09**
	60s	0.00	**0.06**	0.00	0.01	0.00	0.00	**0.02**	**0.04**	**0.05**
Marital status	Couple	**0.05**	**0.05**	**0.02**	0.05	**0.04**	**0.03**	**0.03**	**0.02**	**0.24**
	Single male	**−0.01**	**0.10**	**−0.04**	−0.03	**−0.03**	**−0.07**	**0.00**	**−0.02**	**0.14**
Head of HH race	White	0.01	0.05	**0.11**	0.02	**0.06**	**0.07**	0.02	0.03	**0.07**
	Black	0.01	0.02	**0.06**	0.04	**0.03**	**0.05**	0.01	**0.04**	−0.01
	Asian	0.00	0.00	**0.01**	−0.01	0.01	0.00	0.00	0.01	0.00
	Mulato	**0.05**	**0.07**	**0.13**	0.08	**0.10**	**0.12**	0.04	**0.07**	0.06
Number of children	Kids 0_4	0.00	**−0.07**	**−0.01**	−0.03	0.00	−0.01	**−0.05**	**−0.07**	**−0.04**
	Kids 5_9	**−0.02**	**−0.06**	**−0.02**	−0.03	**−0.03**	**−0.04**	**−0.05**	**−0.07**	**−0.05**
	Kids 10_14	**−0.01**	−0.01	**−0.02**	−0.01	**−0.01**	**−0.02**	**−0.04**	**−0.05**	**−0.04**
	Kids 15_19	0.00	**0.02**	**−0.01**	0.00	0.01	0.00	0.00	0.01	−0.01
	Kids 20_24	0.00	**0.03**	**−0.01**	−0.01	**0.01**	0.01	**0.01**	**0.04**	**0.02**
	Kids 25_29	**0.01**	**0.04**	0.00	0.00	0.01	0.01	0.01	0.02	0.04
	Kids 30_34	**0.00**	**0.03**	0.00	−0.01	0.00	0.00	0.01	**0.01**	**0.02**
Socio economic class	1	**−0.07**	**0.09**	**−0.04**	**0.25**	**0.02**	**0.06**	**0.18**	**−0.03**	**0.21**
	2	**−0.09**	**0.12**	**−0.05**	**0.26**	**0.02**	**0.06**	**0.24**	**−0.03**	**0.29**
	3	**−0.12**	**0.11**	0.00	**0.33**	0.00	**0.07**	**0.31**	**0.00**	**0.32**
	4	**−0.13**	**0.10**	**−0.01**	**0.19**	**−0.02**	0.01	**0.29**	**0.02**	**0.26**
	5	**−0.13**	**0.06**	**0.05**	**0.24**	**−0.01**	**0.06**	**0.32**	0.00	**0.26**
	6	**−0.12**	−0.02	**0.08**	0.02	**−0.04**	**−0.03**	**0.17**	0.00	0.00
	7	**−0.03**	**0.02**	**0.07**	**0.12**	**0.02**	**0.04**	**0.12**	0.01	**0.08**
	σ	**0.36**	**0.81**	**0.58**	**1.92**	**0.34**	**0.93**	**0.52**	**0.70**	**0.71**
	λ1	**−0.67**	**−0.44**	**−0.25**	**−0.58**	**−0.80**	**−0.52**	**−0.35**	**−0.43**	**−0.42**
	λ2	**−0.32**	**−0.73**	**−0.19**	**−0.77**	**−0.33**	**−0.64**	**−0.48**	**−0.50**	**−0.60**
	β	**−0.15**	**−0.03**	**−0.01**	**−0.01**	**−0.04**	**−0.01**	**−0.05**	**−0.08**	**−0.10**

Values shown in bold font are statistically significant at the 0.01 level.

these high-penetration product categories. In these product categories and markets, where the middle and lower socioeconomic strata represent a substantial and growing portion of total demand, it also might be better to pursue a strategy that is focused on "good-enough products" (Bach, 1997; Capps, 2009) appealing to the budget-constrained, price-sensitive masses. The only consumption categories where it would make sense to follow an exclusive "premium" strategy focused on the top few socioeconomic strata are the highly concentrated categories such as *Travel* or *Recreation and Culture*, where the top three strata (28% of households in 2009) account for more than 60% of the market volume.

Another way of studying consumption expenditures across socioeconomic strata is through the comparison of Engel curves (Aitchison & Brown, 1954; Du & Kamakura, 2008) relating expenditure shares for each consumption category to the total budget, which we classify in deciles (1 represents the lowest budget decile). Fig. 3 shows the Engel curves for two consumption categories as examples.[4] The left panel of Fig. 3 shows that the Engel curves for *Cleaning Products* increase with budget (towards the higher deciles) within each stratum, the typical pattern for non-essential goods/services. However, for the same budget decile, the allocated shares are higher for the lower strata than for the upper socioeconomic strata. In other words, the total consumption budget has a positive effect on the allocated shares in this category, but households in the upper classes have a lower priority for goods in this category. In contrast, the patterns for *Housing* within each stratum are more typical of essential goods/services: as the budget increases (higher budget deciles), expenditure shares in these categories decrease. However, for the same consumption budget (same decile), the Engel curves shift upwards as we move up in the social ladder (from lower to upper strata). In the *Housing* case, the budget effect is negative (the share allocated to the category decreases with larger budgets) within each stratum, but these categories are higher priorities for households in the upper strata.

The patterns shown in Fig. 3 and discussed above suggest two different effects of socioeconomic status on consumption across categories: 1) a budget effect, showing changes in the slope of the Engel curve relative to the total budget, and 2) a shift in consumption priorities showing upward or downward shifts in allocated shares for the same budget, depending on the socioeconomic stratum. Therefore, socioeconomic status affects consumption expenditures in two ways. First, wealthier households in the upper strata have larger consumption budgets and therefore can devote a higher share of those budgets to less essential consumption categories such as *Jewelry and Accessories* than households in lower strata. Second, socioeconomic status may also affect consumption priorities so that households from different strata with similar consumption budgets will allocate different shares of their budgets to the same consumption category. The first (budget) effect is a reflection of resource constraints; households with a more limited budget must first pay for the essential elements of daily life, leaving less of the budget available for luxuries, while households with similar priorities but larger budgets can afford to spend more of their budgets on the luxuries. The second effect (differences in consumption priorities) is a reflection of sociocultural differences across strata; under similar resource constraints,

[4] The first stratum is not shown in the figure because all budgets in this class were ranked within the same decile (the highest).

Travel	Apparel	Jewelry and accessories	Hygiene and personal care	Health	Health insurance	Private education	Recreation and culture	Professional services	Personal services	Other expenses
−3.60	**−1.79**	**−4.60**	**−2.13**	**−0.95**	**−3.48**	**−5.81**	**−3.71**	**−6.63**	**−4.24**	**−2.83**
0.13	**0.04**	**−0.11**	**0.03**	**−0.31**	**−0.07**	**−0.12**	**0.06**	**−0.12**	0.00	**−0.10**
−0.23	**−0.08**	**−0.04**	**−0.04**	**−0.13**	**0.06**	**0.03**	0.00	**−0.10**	**−0.02**	**−0.11**
−0.13	**−0.04**	**−0.03**	**−0.02**	**−0.05**	**0.03**	0.01	**0.01**	**−0.02**	**−0.03**	**−0.04**
−0.07	−0.01	0.00	0.00	0.00	**0.03**	**0.06**	**0.02**	**−0.06**	**0.07**	**−0.05**
0.20	**0.22**	**0.27**	**0.20**	**0.20**	**0.12**	**0.55**	**0.23**	**0.17**	**0.13**	**0.16**
0.07	**0.15**	**0.17**	**0.12**	**−0.11**	**−0.03**	**0.23**	**0.19**	**0.10**	**0.06**	**0.03**
0.09	**0.17**	**0.18**	**0.14**	**−0.15**	−0.02	**0.30**	**0.21**	**0.17**	**0.06**	**0.06**
0.09	**0.18**	**0.19**	**0.15**	**−0.22**	**−0.04**	**0.41**	**0.24**	**0.22**	**0.05**	**0.09**
0.06	**0.11**	**0.12**	**0.09**	**−0.21**	**−0.04**	**0.33**	**0.16**	**0.16**	−0.01	**0.09**
0.04	**0.05**	**0.05**	**0.04**	**−0.14**	**−0.04**	**0.19**	**0.08**	**0.10**	**−0.06**	**0.06**
0.04	**0.03**	**0.03**	**0.02**	**−0.06**	**−0.02**	**0.08**	**0.04**	**0.06**	**−0.04**	**0.03**
0.09	**0.01**	0.00	**0.01**	**0.05**	**0.07**	**−0.06**	**0.03**	**0.12**	**0.09**	**0.16**
0.03	**−0.01**	**−0.04**	**−0.03**	**−0.11**	−0.01	**−0.07**	**0.05**	**0.07**	**0.09**	**0.13**
0.08	**0.04**	0.01	0.03	**0.10**	−0.01	−0.01	0.01	0.10	**0.12**	0.04
0.04	**0.02**	0.02	0.02	**0.05**	−0.02	0.01	0.00	0.03	**0.05**	0.03
0.01	0.00	0.00	0.00	0.00	0.00	−0.01	0.00	0.01	0.01	0.01
0.12	**0.07**	**0.07**	0.07	**0.10**	−0.02	0.05	0.02	0.08	**0.14**	0.06
−0.07	**−0.04**	**−0.08**	**−0.04**	0.00	−0.01	**−0.15**	**−0.02**	**−0.07**	**−0.03**	**−0.06**
−0.09	**−0.06**	**−0.09**	**−0.06**	**−0.06**	**−0.06**	**0.07**	**−0.05**	**−0.08**	**−0.05**	**−0.08**
−0.06	**−0.03**	**−0.05**	**−0.03**	**−0.07**	**−0.05**	**0.10**	**−0.05**	**−0.08**	**−0.04**	**−0.06**
−0.01	**0.03**	**0.03**	**0.02**	**−0.04**	**−0.03**	**0.06**	**0.01**	**−0.04**	0.01	**−0.03**
0.02	**0.03**	**0.04**	**0.03**	**−0.02**	0.00	0.01	**0.05**	**0.02**	**0.03**	−0.01
0.02	0.03	0.03	0.02	−0.01	**0.02**	−0.01	**0.04**	**0.04**	**0.03**	**0.02**
0.01	**0.01**	0.01	**0.01**	**−0.01**	0.01	0.00	**0.02**	**0.02**	**0.02**	0.01
0.16	**0.04**	**0.12**	**0.03**	**0.02**	**0.40**	**0.35**	**0.19**	**0.50**	**0.33**	**0.18**
0.19	**0.05**	**0.13**	**0.04**	**0.03**	**0.52**	**0.43**	**0.24**	**0.65**	**0.41**	**0.22**
0.16	**0.06**	**0.14**	**0.05**	**0.05**	**0.60**	**0.41**	**0.28**	**0.80**	**0.35**	**0.22**
0.10	**0.03**	**0.09**	**0.04**	**0.03**	**0.57**	**0.32**	**0.22**	**0.73**	**0.31**	**0.16**
0.09	**0.05**	**0.10**	**0.06**	**0.06**	**0.52**	**0.27**	**0.24**	**0.71**	**0.28**	**0.15**
−0.04	**−0.02**	−0.01	0.00	**0.03**	**0.31**	**0.08**	**0.09**	**0.36**	**0.13**	**0.02**
0.04	**0.02**	**0.04**	**0.03**	**0.05**	**0.15**	**0.10**	**0.08**	**0.19**	**0.10**	**0.04**
1.00	**0.52**	**0.73**	**0.48**	**0.98**	**0.86**	**1.33**	**0.64**	**1.31**	**0.95**	**1.02**
−0.44	**−0.38**	**−0.45**	**−0.57**	**−0.41**	**−0.37**	**−0.38**	**−0.39**	**−0.40**	**−0.34**	**−0.44**
−0.79	**−0.61**	**−0.78**	**−0.51**	**−0.57**	**−0.65**	**−0.83**	**−0.74**	**−0.95**	**−0.65**	**−0.74**
−0.02	**−0.03**	**−0.01**	**−0.03**	**−0.02**	**−0.05**	**0.00**	**−0.02**	**−0.01**	**0.00**	**−0.01**

households in different strata will allocate the same budget differently across consumption categories because they assign different priorities to the competing consumption categories. Some social scientists (e.g., Bourdieu, 1984) attribute these differences in consumption priorities to class distinctions in "taste," while others (Hirsch, 1976; Schor, 1999) argue that conspicuous consumption (on non-essential goods) has signaling value because consumers in the higher strata draw value not only from the actual consumption of luxury goods, but also from sending the signal that they can afford to spend more than other consumers (Kamakura & Du, 2012).

4.1. Consumption budget allocation model

To capture and isolate these two distinct effects on budget allocations and better assess the contribution of socioeconomic stratification in explaining consumer expenditures, we fit a consumption budget allocation model using category prices, household composition and socioeconomic class as predictors. The model we used is a simple variant of 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 indicators of family composition and the classification of each household into a socioeconomic stratum. Following Du and Kamakura (2008), we assume that household h maximizes a continuously differentiable quasi-concave direct utility function $G(x_h)$ over a set of J non-negative quantities $x_h = (x_{1h}, x_{2h}, \ldots, x_{Jh})$, subject to a budget constraint $p' x_h \leq m_h$, where $p = \left(p_1, p_{2,\ldots,} p_J\right)' > 0$, p_i is the price of good i, and m_h is household h's total consumption budget. We use the Stone–Geary utility function, which has the form:

$$G(x_h) = \sum_{i=1}^{J} \alpha_{ih} \ln(x_{ih} - \beta_i) \tag{4}$$

where $\alpha_{ih} > 0$, $(x_{ih} - \beta_i) > 0$, and J is the number of all available consumption categories. Note the h subscript in α_{ih}, which implies that all marginal utilities are 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 limit is reached, or $\sum_{i=1}^{J} p_i x_{ih} = m_h$. Solving this optimization problem leads to an expenditure system that is linear in total budget and prices,

$$p_i x_{ih} = p_i \beta_i + \theta^*_{ih} \left(m_h - \sum_{j=1}^{J^*} p_j \beta_j \right), i = 1, 2, \ldots, J, \tag{5}$$

with expected allocated shares given by

$$s_{ih} = \frac{p_i \beta_i}{m_h} + \theta^*_{ih} \left(1 - \sum\nolimits_{j=1}^{J^*} \frac{p_j \beta_i}{m_h} \right), \tag{6}$$

Table 8
Counterfactual simulations comparing budget allocations under different scenarios.

	Allocating the actual budget			Allocating the median budget			Allocating a budget 10% larger than actual					
	Expenditure shares			Expenditure shares			Expenditure shares			% deviation		
Consumption Category	Upper Strata (1 and 2)	Middle Strata (3–5)	Lower Strata (6–8)	Upper Strata (1 and 2)	Middle Strata (3–5)	Lower Strata (6–8)	Upper Strata (1 and 2)	Middle Strata (3–5)	Lower Strata (6–8)	Upper Strata (1 and 2)	Middle Strata (3–5)	Lower Strata (6–8)
Food bevIn	16.6%	22.1%	29.6%	16.4%	22.2%	29.4%	16.6%	22.1%	29.5%	0%	0%	0%
Food bevOut	5.5%	4.9%	4.2%	5.6%	4.9%	4.3%	5.5%	4.9%	4.2%	0%	0%	0%
Utilities	3.6%	5.6%	7.2%	3.7%	5.7%	6.9%	3.6%	5.6%	7.1%	0%	0%	−1%
Home maintenance	0.6%	0.3%	0.1%	0.5%	0.3%	0.2%	0.6%	0.3%	0.1%	0%	2%	6%
Cleaning prods	2.7%	2.8%	2.8%	2.5%	2.7%	3.0%	2.7%	2.8%	2.8%	0%	0%	1%
Home furnishings	1.7%	1.8%	1.8%	1.7%	1.8%	1.8%	1.7%	1.8%	1.8%	0%	0%	0%
Comunications	7.3%	6.4%	3.8%	7.4%	6.4%	3.9%	7.3%	6.4%	3.8%	0%	0%	1%
Public transport	5.0%	6.8%	6.7%	4.7%	6.7%	7.0%	5.0%	6.8%	6.8%	0%	0%	1%
Car maintenance	11.3%	7.7%	3.4%	11.1%	7.6%	3.8%	11.3%	7.7%	3.5%	0%	0%	3%
Travel	1.8%	1.2%	0.9%	1.8%	1.2%	1.0%	1.8%	1.2%	0.9%	0%	0%	1%
Apparel	5.6%	6.5%	6.5%	5.7%	6.6%	6.5%	5.6%	6.5%	6.5%	0%	0%	0%
Jewelry accessories	0.4%	0.3%	0.2%	0.4%	0.3%	0.3%	0.4%	0.4%	0.2%	0%	1%	3%
Hygiene care	3.6%	4.2%	4.0%	3.6%	4.2%	4.1%	3.6%	4.2%	4.0%	0%	0%	0%
Health	3.2%	3.9%	4.2%	3.3%	4.0%	4.2%	3.2%	3.9%	4.2%	0%	0%	0%
Health insurance	5.5%	2.4%	0.5%	5.4%	2.3%	0.5%	5.5%	2.4%	0.5%	0%	1%	7%
Education	1.5%	0.7%	0.4%	1.5%	0.7%	0.4%	1.5%	0.7%	0.4%	0%	0%	1%
Recreation cult	2.7%	2.1%	1.3%	2.7%	2.1%	1.4%	2.7%	2.1%	1.3%	0%	0%	1%
Prof services	0.7%	0.3%	0.0%	0.7%	0.3%	0.0%	0.7%	0.3%	0.0%	0%	1%	7%
Personal serv	2.7%	1.1%	0.7%	2.8%	1.1%	0.7%	2.7%	1.1%	0.7%	0%	0%	0%
Other expenses	3.4%	2.3%	1.6%	3.5%	2.3%	1.7%	3.4%	2.3%	1.6%	0%	0%	0%
Housing	14.4%	16.5%	20.1%	15.0%	16.7%	19.1%	14.4%	16.4%	19.9%	0%	0%	−1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%			

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

The budget-share Eq. (6) shows how the budget-allocation model relates to the Engel curves discussed earlier. The term $\theta_{ih}{}^*$ in Eq. (6) captures the consumption priority of household h for category i (i.e., upward/downward shifts in the Engel curves for the same budget), while the other terms $\left(\frac{p_i\beta_i}{m_h} and \sum_{j=1}^{J^*} \frac{p_j\beta_i}{m_h}\right)$ capture the budget effect (changes in allocation as the budget grows/shrinks).

Instead of allowing only for unobserved heterogeneity (i.e., diversity in underlying preferences not accounted for by the observed predictors) in the taste parameter (α_{ih}) for each category i, as in Du and Kamakura (2008), we also attempt to explain the households' consumption priorities using descriptors of the households' composition and their socioeconomic classification, captured by the predictor vector (W_{ht})

$$\alpha_{iht} = \exp(\gamma_i + \delta_i W_{ht} + \lambda_i Z_{ht} + \varepsilon_{ih}). \quad (7)$$

Details about the estimation of this model can be found in Du and Kamakura (2008). Once the model parameters are estimated for a sample of households, expenditure predictions can be obtained for any household by simulating the budget allocation process. This simulation can be carried out by applying a simple allocation heuristic implied by the model in Eqs. (4)–(7) for each sample household:

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

This simple simulation algorithm produces allocations that maximize the estimated utility function subject to the budget constraints faced by each household, allowing us to perform counterfactual analyses that simulate consumption expenditures for each household under different hypothetical conditions, which we will use later to predict how households respond to changes in their consumption budget and how socioeconomic status affect consumption to better understand the differences in consumption priorities across social strata.

4.2. How Brazilians spent their money in 2003 and 2009

Application of the model described in Eqs. (4)–(7) to our data using our proposed socioeconomic stratification produced the parameter estimates reported in Table 7. As shown by Du and Kamakura (2008), the two factor loadings (λ_1 and λ_2) along with the household-level latent factor scores (Z_{i1} and Z_{i2}) capture individual differences in preferences that are not explained by demographics and social class. The σ parameter measures the error variance associated with the utility function for each consumption category while β shows how the utility function changes in relation to the quantity consumed in each category. The response parameters for each of the predictors in the budget allocation model can be interpreted in a similar way to a regression model, except that they refer to shifts in the households' utility functions due to socio-demographic differences across households in a multinomial logistic regression (see θ^* in Eq. (6)) and therefore cannot be directly interpreted because they are relative to all consumption categories. Because of these complexities in the interpretation of the model parameters, we rely instead on two counter-factual simulations (using the allocation heuristic discussed earlier) to understand how budget allocations across competing categories are affected by shifts in the total budget and/or differences in consumption priorities across social strata. In the first simulation, we predict each household's allocation of the same budget using the median budget across all households in our sample, providing insights into the differences in consumption priorities across social strata after equalizing resources constraints. In the second simulation, we increase the budget for each household by 10% and predict the allocation across all consumption categories, thereby measuring the budget effect for each social stratum and consumption category. The results from these two simulations are reported in Table 8. To simplify the presentation of the data we aggregate the simulation results into three socioeconomic segments: the "Upper"

segment, containing strata 1 and 2, the "Middle" segment, containing strata 3 to 5, and the "Lower" segment, aggregating the bottom 3 strata.

The first three columns of results in Table 8 show how the actual consumption budget would be allocated based on the estimated parameters (from Table 7), defining a baseline for comparison. The next 3 columns show how a standard (median) budget would be allocated by all households in the three segments, thereby isolating consumption priorities from budgetary constraints. Comparing these allocated shares with the baseline, differences in allocations observed across social strata are mostly due to differences in consumption priorities rather than differences in the consumption budget, thereby confirming the notion that consumption priorities vary substantially across social strata, either due to class distinctions in "taste" (Bourdieu, 1984), or to the signaling value of conspicuous consumption (Hirsch, 1976; Kamakura & Du, 2012; Schor, 1999). The last six columns of Table 8 quantify the budget effect by showing how the allocations would change if each household had a budget 10% larger than their actual budget. Again, comparing these results to the baseline confirms that most of the differences across the three segments are due to differences in consumption priorities. They also show that the differences in allocations across the upper and middle strata (1 to 5) are due entirely to consumption priorities. In contrast, share allocations for *Professional Services*, *Private Health Insurance* and *Home Maintenance* are expected to increase by 6–7% with a 10% increase in the consumption budget among consumers in the three lowest social strata (6–8), suggesting that these categories are affected the most by the budget constraints faced by consumers in the lower social strata.

5. Conclusions

This study had two main components. In the first portion we develop a framework for social stratification based on the theoretical concepts of social class and of socioeconomic status. The concept of social class implies the categorization of households into a few social classes based on income and the occupation of the head of the household, while socioeconomic status requires the stratification of households along the theoretical construct of *permanent income*, inferred through a continuous unidimensional wealth index on the basis of observed social indicators such as current income, education and possession of assets. Our proposed framework for social stratification combines the concepts of social class and SES by stipulating latent classes that are empirically identified on the basis of indicator variables measuring both social standing (e.g., occupation, education, access to public services) and permanent income (e.g., per-capita income and possession of assets). Rather than positioning households along a single, unidimensional continuum and arbitrarily partitioning the population along this continuum, our framework avoids the assumption of continuity and unidimensionality in permanent income by specifying latent classes defined on the basis of intuitively appealing constraints on the class parameters. The most valuable practical feature of our proposed social-stratification framework is the fact that because of its latent class formulation, our social stratification framework is robust to missing data, and therefore respondents to different surveys can be classified into our proposed stratification scheme, even when they answer different subsets of socioeconomic indicators, as we demonstrated in Table 5. This seemingly trivial feature allows the marketing researcher to stratify a market using only a subset of the items listed in Table 1, and to relate data from different sources via the social strata, as long as the two sources contain enough socioeconomic indicators out of the 36 listed in Table 1. In contrast, wealth indices, widely applied in commercial marketing research, can only be applied if every respondent in the survey provided data on all indicators.

Obviously, given the dynamism of modern societies and the dramatic shifts in economic power and relevance underway in emerging economies, a framework for social stratification should not be expected to remain relevant for more than a few years, perhaps no longer than a decade. For this reason, the latent class model will have to be re-calibrated, perhaps with the inclusion of new indicators of social standing and permanent income (e.g., access to the internet). However, if the purpose is to analyze changes in social standing over time, a common framework must be used as we have done here to compare social standing between 2003 and 2009 in Brazil.

The second main component of our study utilized the socioeconomic stratification obtained in the first half of this article to understand consumption differences across social strata. Our parameter estimates reported in Table 7 show that socioeconomic stratification explains differences in consumption priorities that go beyond the differences due to household composition. Furthermore, the results from the two counterfactual simulations reported in Table 8 suggest that between the two possible ways that socioeconomic status may affect consumption (budget effect and shifts in consumption priorities), differences in consumption priorities across strata have the strongest effect on consumption. A comparison of consumption expenditures across categories and social strata (Table 6) leads to two interesting and useful insights. First, while the relative size of the social strata changed dramatically between 2003 and 2009, with noticeable shifts towards the upper strata, the concentration of expenditures across strata (measured by the Gini coefficient) did not change as much. This suggests that consumption within each social stratum did not change as much relative to the shifts in stratum sizes. Second, and most importantly, the concentration of expenditures across socioeconomic strata varies considerably across consumption categories, being much less concentrated in essential categories such as *Grains*, *Starches*, and *Urban Transportation*, and for categories of interest to packaged-goods manufacturers such as dairy, bakery, beverages, hygiene and personal care, and cleaning products. Our results suggest that in these product categories, there is a substantial and growing (based on what we observed between 2003 and 2009) market for brands targeted towards the middle to lower socioeconomic strata, who are probably more price-sensitive and more interested in basic, functional brands, making them a prime market for "good-enough" products/services.

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