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Abstract

As environmental, social, and governance (ESG) information increasingly reaches consumers through certifications, labels, and package claims, it remains unclear whether such information translates into measurable preferences and willingness to pay (WTP). Focusing on China's fast-moving consumer goods (FMCG) market, this study examines consumer preferences, willingness to pay, and preference heterogeneity for ESG labels in two product categories: bottled drinks and shampoo. A discrete choice experiment is employed, and the data are analyzed using multinomial logit (MNL), random parameters logit (RPL), and latent class logit (LCL) models to estimate the marginal utilities of ESG labels across product contexts and consumer segments. The results show that consumers generally exhibit positive preferences for ESG labels and make meaningful trade-offs between label attributes and price, while substantial heterogeneity exists across labels, product categories, and consumer segments. Among the tested labels, ISO Certification shows the strongest and most consistent positive effect across both product categories and is associated with the highest WTP. The findings highlight differences in the valuation of specific ESG-related cues across product contexts and consumer groups, suggesting that how such information reaches consumers warrants attention alongside its ESG dimension.

Keywords: ESG labels; willingness to pay; discrete choice experiment; Chinese FMCG market; consumer preferences

JEL classification: C35; D12; Q56

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1. Introduction

ESG-related information increasingly reaches consumers through certifications, labels, and on-package claims. As firms incorporate environmental, social, and governance (ESG) themes into market communication, such information is no longer confined to corporate reports or investor-oriented disclosures, but is increasingly presented at the point of purchase in forms that consumers can directly observe and evaluate. A key question in this context is whether such consumer-facing ESG information is translated into measurable preferences and willingness to pay (WTP).

Existing research suggests that sustainability-related information can influence consumer evaluations and purchase intentions, but the findings remain mixed (Bastounis et al., 2021; Gorton et al., 2021; Rashid & Byun, 2018). Consumer responses may vary across types of labels, product contexts, and consumer characteristics, and recent studies suggest that these differences depend not only on the sustainability dimension being communicated, but also on how the information is presented, processed, and perceived in the purchase context (Majer et al., 2022; Sonntag et al., 2023; Piracci et al., 2024). However, less is known about how consumers value multiple ESG-related labels relative to price within a common choice setting. Comparing labels across product contexts can reveal whether their relative valuations are consistent or vary with the specific cues presented to consumers.

To examine these questions, this study uses a discrete choice experiment (DCE) within a random utility framework to estimate consumer preferences for ESG labels (Louviere et al., 2000; Train, 2009). We focus on two representative fast-moving consumer goods (FMCG) categories, bottled drinks and shampoo. This is because products in these markets are purchased frequently and often with limited deliberation, so that visible label information may play an especially important role in consumer evaluation and choice at the point of purchase (Donato et al., 2022). We begin with a multinomial logit (MNL) model and further employ random parameters logit (RPL) and latent class logit (LCL) models to capture preference heterogeneity (Train, 2009; Greene & Hensher, 2003). This design allows us to identify the marginal utilities of different ESG labels, estimate the implied WTP, and compare the distribution of preferences across consumer segments and product categories.

Against this background, the study makes three contributions. First, it provides quantitative evidence on consumer preferences and WTP for consumer-facing ESG labels in China's FMCG market. Second, it compares the valuation of specific ESG labels across product contexts, showing that labels grouped within broad ESG dimensions need not receive similar consumer valuations. Third, by incorporating heterogeneity models, the study identifies differences in preference structures across consumer segments and offers implications for firms seeking to design more effective ESG-related communication at the point of purchase. More broadly, the study contributes not only to the ESG and sustainable consumption literature, but also to the literature on point-of-purchase communication, retail choice, and consumer responses to product-level signals in FMCG settings.

The remainder of the paper is organized as follows. Section 2 introduces China's ESG institutional background and reviews the related literature. Section 3 presents the conceptual econometric framework. Section 4 describes the research design and data. Section 5 reports the empirical results, and Section 6 discusses the findings. Finally, conclusions, limitations and future implications are provided in Section 7.

2. Literature Review

2.1 China's ESG Context in Consumer Markets

China's ESG framework has changed considerably in recent years, particularly with the gradual standardization of sustainability disclosure in capital markets. In 2024, the Shanghai, Shenzhen, and Beijing stock exchanges issued guidelines on sustainability reporting for listed companies, reflecting a broader institutional effort to improve the consistency and transparency of ESG-related disclosure. These developments suggest that China's ESG framework is taking clearer shape and moving closer to international sustainability disclosure standards such as IFRS S1 and S2[1] (Shanghai Stock Exchange, 2024; IFRS Foundation, 2025; Shen et al., 2023).

However, the transmission of ESG-related information to end consumers remains far less standardized. In consumer goods markets, firms typically communicate environmental, social, or governance information through package claims, brand communication, single certifications, third-party labels, or self-declared statements, rather than through a unified and widely adopted consumer-facing ESG labeling system (OECD, 2025). As a result, consumers in real market settings are exposed not to a single standardized signal, but to a fragmented set of ESG-related cues that differ in source, verification mechanism, and comparability. This fragmented information environment makes China's FMCG market a useful context for examining how different forms of consumer-facing ESG-related information are received and evaluated at the point of purchase (Kumar, 2023).

This fragmented information environment also means that consumers' trust in and use of ESG-related labels may depend on their ability to identify, interpret, and evaluate such information. More broadly, prior research suggests that trust plays an important role in shaping consumers' responses to sustainability-related products and market actors (Ladwein & Romero, 2021). In the Chinese context, information acquisition ability, institutional trust, and label knowledge also significantly affect consumers' trust in eco-labels (Yang et al., 2024). Therefore, in a market where no unified consumer-facing ESG labeling system has yet been established, China provides a meaningful setting for examining how consumers respond to different ESG-related labels and whether such labels function as effective market signals at the point of purchase.

[1] IFRS S1 and IFRS S2 are sustainability disclosure standards issued by the International Sustainability Standards Board (ISSB). IFRS S1 provides general requirements for the disclosure of sustainability-related financial information, while IFRS S2 focuses specifically on climate-related disclosures.

2.2 ESG Signals and Consumer Preferences

Prior research suggests that sustainability-related information can influence consumer evaluations, purchase intentions, and willingness to pay, but the effects are far from uniform (Bastounis et al., 2021; Conrads et al., 2025; Lyu & Kim, 2025). In consumer markets, such information often reaches consumers through labels, certifications, and package claims that function as visible cues at the point of purchase. From this perspective, consumer responses may vary not only across environmental, social, and governance dimensions, but also according to how the information is presented, interpreted, and verified in the purchase context (Majer et al., 2022; Kumar, 2023; Piracci et al., 2024). Information related to the environmental and social dimensions is often easier to perceive and communicate through labels and package cues, whereas governance-related information tends to be more abstract and may depend more strongly on transparency, external verification, and credible endorsement (Gorton et al., 2021; Amasino et al., 2025). Accordingly, differences in consumer responses should not be understood simply as a result of ESG dimension alone, but also in relation to whether the information works as a clear, comparable, and credible market signal for consumers (Rupprecht et al., 2020; Sonntag et al., 2023; Soe & Ketkaew, 2025).

In terms of WTP, previous studies also suggest that consumers may, on average, be willing to pay a premium for sustainable attributes, but both the significance and magnitude of such premiums vary considerably across studies (Bastounis et al., 2021; Li & Kallas, 2021; Piracci et al., 2024). This variation reflects not only differences in consumer preferences, but also differences in product category, study context, and the way sustainability-related information is expressed. Even for the same type of sustainability information, WTP estimates can differ substantially depending on label design, product context, and the institutional environment in which consumers interpret the signal (Piracci et al., 2024). In this sense, heterogeneity in WTP reflects not only preference differences across consumers, but also variation in how consumers process and value the label–price trade-off in specific market settings.

Overall, the existing literature has three main limitations. First, many studies focus on a single product category or a single label type, and relatively few compare multiple consumer-facing ESG-related labels within a unified framework (Majer et al., 2022). Second, alongside comparisons across sustainability dimensions, more evidence is needed on how consumers value specific label cues presented at the point of purchase (Rupprecht et al., 2020; Tan et al., 2026). Third, the pathways through which ESG-related information reaches consumers differ substantially across countries and institutional settings, which limits the transferability of existing findings and highlights the need for context-specific evidence (Li & Kallas, 2021; Piracci et al., 2024). These limitations are particularly relevant in China's FMCG market, where consumer-facing ESG-related information remains fragmented across package claims, certifications, and other product-level cues, while institutional standardization has progressed more rapidly in capital-market disclosure than at the point of purchase (OECD, 2025;

Shanghai Stock Exchange, 2024).

Discrete choice experiments (DCEs) are well suited to this purpose. Compared with attitude scales or direct WTP questions, DCEs present respondents with alternatives that jointly vary in price and multiple attributes, requiring explicit trade-offs among product features. This design allows researchers to identify marginal utilities, WTP, and their heterogeneity in a framework that is close to real purchase decisions (Louviere et al., 2000; Train, 2009). Building on this literature and our research objectives, we incorporate ESG-related information as label-like attributes in a DCE in China's FMCG market. We then combine the multinomial logit model, the random parameters logit model, and the LCL to identify consumer preferences, WTP, and heterogeneity across ESG dimensions and their labels.

3. Econometric Framework

3.1 Model Specification

The econometric framework of the DCE is built on Lancaster's characteristics theory of value and random utility theory (RUT). Lancaster (1966) argues that consumer utility is derived from the bundle of attributes embodied in a product rather than from the product itself. Accordingly, this study treats consumer-facing ESG labels as a set of product attributes that enter the utility function. Under the random utility framework, the total utility that individual i derives from alternative $j$can be written as the sum of an observable deterministic component and an unobservable error term:

$$U_{ij} = V_{ij} + \varepsilon_{ij} \quad (1)$$

where V_{ij} denotes deterministic utility and $\varepsilon_{ij}$is a random disturbance term. The deterministic component is specified in a linear-additive form:

$$V_{ij} = \alpha \cdot ASC_j + \beta' X_{ij} + \beta_p \cdot Price_{ij} \quad (2)$$

where X_{ij} denotes the vector of attributes, which includes the six ESG labels retained for the formal DCE (E1, E2, S1, S2, G1, and G2) as discussed in the next section. $Price_{ij}$ represents the price attribute, and ASC_j denotes the alternative-specific constant, capturing systematic preference differences not explained by the observed attributes. The ESG label attributes (E1–G2) enter the utility function as binary variables, taking the value of 1 if the corresponding label is present in a given alternative and 0 otherwise. This coding scheme is applied across both product categories to ensure comparability. The price variable enters the model in its original continuous (numeric) form.

If the disturbance term ε_{ij} is assumed to be independently and identically distributed with a Type I extreme value distribution, the model reduces to the MNL model (McFadden, 1974; Train, 2009). The corresponding choice probability is given by:

$$P_{ij} = \frac{\exp(V_{ij})}{\sum_{k \in C_i} \exp(V_{ik})} \quad (3)$$

where P_{ij} denotes the probability that individual i chooses alternative j and C_i represents the set of alternatives available to individual i. We first use the MNL model as the benchmark specification to identify the average effects of ESG labels on choice probabilities. The MNL model is simple and convenient to estimate, but it relies on the independence of irrelevant alternatives (IIA) assumption. In the present setting, where consumers trade off multiple ESG labels against price and where preferences may be substantially heterogeneous, this assumption may be restrictive.

To relax the IIA assumption and capture continuous preference heterogeneity, we further estimate a RPL model, also known as the mixed logit model (Revelt & Train, 1998; Train, 2009; Hensher & Greene, 2003; Hensher et al., 2015). In the RPL model, the preference parameters are allowed to vary across individuals according to a specified distribution. Let β_i denote the individual-specific parameter vector. Conditional on β_i, the choice probability takes the standard logit form:

$$P_{ij}(\beta_i) = \frac{\exp(V_{ij}(\beta_i))}{\sum_{k \in C_i} \exp(V_{ik}(\beta_i))} \tag{4}$$

The unconditional choice probability is obtained by integrating over the distribution of β:

$$P_{ij} = \int \left[\frac{\exp(V_{ij}(\beta))}{\sum_{k \in C_i} \exp(V_{ik}(\beta))} \right] f(\beta|\theta) d\beta \tag{5}$$

where $f(\beta|\theta)$ denotes the density function of the random parameters, and θ is the vector of distributional parameters governing this density. The integral does not have a closed-form solution and is therefore typically approximated using simulation-based methods. In the RPL specification, the coefficients associated with ESG label attributes are specified as random parameters following a normal distribution. This specification relaxes the IIA assumption and allows for flexible substitution patterns as well as continuous preference heterogeneity across individuals.

In addition, we employ a LCL model to capture discrete preference heterogeneity (Swait, 1994; Greene & Hensher, 2003; Boxall & Adamowicz, 2002). The LCL model assumes that the population consists of a finite number of latent classes $c = 1, \dots, C$, each characterized by a class-specific parameter vector β_c. Conditional on class membership, the choice probability follows a standard logit form:

$$P_{ij|c} = \frac{\exp(V_{ij}(\beta_c))}{\sum_{k \in C_i} \exp(V_{ik}(\beta_c))} \tag{6}$$

The unconditional choice probability is given by a weighted sum across classes:

$$P_{ij} = \sum_{c=1}^{C} s_{ic} \cdot P_{ij|c} \tag{7}$$

where s_{ic} denotes the probability that individual i belongs to class c, with $\sum_{c=1}^{C} s_{ic} = 1$. These class probabilities are typically modeled as a function of observable characteristics or, alternatively, estimated as constants. The LCL framework captures discrete segments of consumers with systematically different preferences,

thereby allowing for discrete heterogeneity in contrast to the continuous heterogeneity captured by the RPL model.

However, the LCL model cannot be estimated unless C (the number of classes) in Eq. (7) is given, because C is discrete but maximum likelihood estimation theory requires that the parameter space be continuous and estimates be in the interior of the space. Therefore, the central issue in the LCL model is how to determine C. The literature has recommended a number of information criteria for this purpose (e.g., Boxall & Adamowicz, 2002; Greene & Hensher, 2003; Louviere et al., 2000). Among these, two measures (Akaike Information Criterion: AIC; and Bayesian Information Criterion: BIC) based on the log likelihood at convergence with c classes, sample size, and number of parameters are popular for determining C.

Taken together, the MNL serves as a benchmark, the RPL model captures continuous preference heterogeneity, and the LCL model identifies discrete heterogeneity. These three models thus provide complementary perspectives on consumer preferences. All models are estimated separately for each product category using NLOGIT 6 (Econometric Software, Inc.), thereby accounting for differences in price levels and product contexts.

3.2 Individual-level Posterior Expected WTP

In DCE studies, the implicit WTP for an attribute is commonly obtained as the ratio of the attribute coefficient to the price coefficient (Train, 2009):

$$WTP_k = -\frac{\beta_k}{\beta_p} \tag{8}$$

where β_k is the coefficient of attribute k, and β_p is the coefficient of price. Since higher prices usually reduce utility, β_p is expected to be negative. Within the LCL framework, class-specific WTP for attribute k in class c is calculated as:

$$WTP_k^{(c)} = -\frac{\beta_{k,c}}{\beta_{p,c}} \tag{9}$$

where $\beta_{k,c}$ and $\beta_{p,c}$ are the coefficients of attribute k and price in class c, respectively.

Because class membership in the LCL model is probabilistic rather than deterministic, we further construct individual-level posterior expected WTP as a probability-weighted average of class-specific WTP, using individuals' posterior class membership probabilities:

$$WTP_{ik} = \sum_{c=1}^{C} p_{ic} WTP_k^{(c)} \tag{10}$$

where p_{ic} is the posterior probability that individual i belongs to class c, $WTP_k^{(c)}$ class-specific WTP obtained from Eq. (9), and C is the total number of latent classes.[2]

[2] As the results reported in Section 5 show that the LCL model provides a better overall fit (e.g., in terms of log-likelihood and predictive power) than the MNL and RPL models, the subsequent WTP analysis focuses on the

4. Research Design and Data

4.1 Attribute Creation

A key step in a DCE is to translate the research object into attributes that are both meaningful in practice and recognizable and comparable to respondents (Louviere et al., 2000; Coast & Horrocks, 2007). As this study aims to identify consumer preferences and WTP for ESG labels, the attributes included in the DCE must be grounded in real-world ESG-related information and presented in a manner that closely resembles information encountered at the point of purchase. To achieve this, we adopted a three-step attribute development process: candidate measure generation, consumer screening, and label-like presentation (Coast et al., 2012; Föhn et al., 2023).

First, we constructed a pool of candidate measures around the environmental (E), social (S), and governance (G) dimensions. Four candidate measures were initially specified for each dimension. These candidates were derived from three primary sources: prior studies on sustainable consumption and ESG communication; policy initiatives and industry practices; and common observed consumer-facing ESG claims and expressions in the marketplace. This process produced a total of 12 candidate measures, with four measures under each dimension (as shown in Table 1).

Table 1. Candidate ESG measures and their sources

Dimension	Candidate ESG Measure	Source	Number of Selections
Environmental	Recyclable Packaging	Nguyen et al. (2020)	143
	Carbon-Neutral Production	Liu et al. (2023)	56
	Renewable Energy Use	Ndebele (2020)	62
	Free from Harmful Ingredients	Zollo et al. (2021)	183
Social	Fair Labor Practices	Rashid & Byun (2018)	172
	Community Support	Lyu & Kim (2025)	127
	Inclusive Employment	ILO guidance on disability inclusion	105
	Gender Equality in Employment	UN Women materials on workplace gender equality	126
Governance	Supply Chain Traceability	Tran et al. (2024)	196
	External Verification (e.g., ISO)	Rupprecht et al. (2020)	139
	Regular ESG Disclosure	ESG disclosure standards and reporting frameworks	80
	Consumer Feedback Mechanism	Wang et al. (2018)	137

measures derived from the LCL model. For this reason, the WTP calculation for the RPL model is not presented separately.

Note: N = 261. In the screening survey, respondents were allowed to select multiple options from four candidates within each ESG dimension. "Number of Selections" refers to the total number of times each candidate attribute was selected.

Second, we conducted a screening survey [3] to identify the measures that consumers perceived relatively more important and relevant within each ESG dimension. Respondents were allowed to select multiple measures from the four candidates within each dimension based on their perceived importance and relevance. Selection frequency was used as the retention criterion: the two most frequently selected measures in each dimension were retained for the formal DCE survey. The screening questionnaire was administered online and yielded 261 valid responses. The results showed that "Recyclable Packaging" and "Free from Harmful Ingredients" were selected in the environmental dimension, "Fair Labor Practices" and "Community Support" in the social dimension, and "Supply Chain Traceability" and "External Verification" in the governance dimension.

Finally, as respondents in the main sample may not possess a high level of ESG knowledge, [4] the six selected measures were translated into label-like expressions suitable for presentation in a purchase context. This translation followed three principles: preserving the core meaning of the original measure, enhancing ease of recognition and comparison at the point of purchase, and maintaining concise wording appropriate for DCE presentation. Based on this process, the six final ESG labels were coded as E1, E2, S1, S2, G1, and G2 (see Table 2), and together constitute the ESG attribute set in the formal DCE.

Table 2. Final ESG labels and codes used in the DCE

Dimension	Selected Measure	Final DCE Label	Code
Environmental	Recyclable Packaging	Recyclable Packaging	E1
	Free from harmful ingredients	Organic Product	E2
Social	Fair Labor Practices	Labor Rights Protection	S1
	Community Support	Support for Rural Children	S2
Governance	Supply Chain Traceability	Supply Chain Traceability	G1
	External Verification (e.g., ISO)	ISO Certification	G2

It should be noted that the final labels presented in Table 2 are not literal restatements of the candidate measures. Rather, they are consumer-oriented signal representations designed to retain the core meaning of each measure while enhancing salience and usability in the choice task. For measures that were relatively abstract or technical, wording closer to real market communication was adopted. For measures

[3] The original questionnaire was developed and administered in Chinese. The English version is provided in the Appendix A for reference only.

[4] In the screening questionnaire, 59.39% of respondents reported that they "knew a little" about ESG, 34.10% reported that they were "not familiar at all," and only 6.51% reported that they were "very familiar".

with broader meanings, a moderate degree of concretization was applied to reduce interpretive variation across respondents. For example, “External Verification” was presented as “ISO Certification” in the formal experiment to emphasize third-party verification and external endorsement. “Community Support” was specified as “Support for Rural Children” to make the social responsibility content more concrete and relatable. “Free from Harmful Ingredients” was presented as “Organic Product” to convey cues related to natural ingredients and perceived safety. These final labels should therefore not be interpreted as exact equivalents of the original candidate measures, but rather as consumer-facing expressions of their core perceptible meaning within a choice setting.

4.2 DCE Design

This study employs a DCE to examine consumer preferences and WTP for ESG labels. The DCE design enables the identification of the causal effects of ESG label attributes under controlled experimental variation. By asking respondents to choose among alternatives characterized by multiple attributes, the DCE framework allows for the estimation of the marginal utilities associated with each attribute and, in conjunction with a price attribute, facilitates the derivation of WTP for specific attributes. It is therefore particularly well suited to evaluating product characteristics that do not have an explicit market price but nonetheless significantly influence consumer decision-making (Kanninen, 2007). The formal questionnaire focused on two fast-moving consumer goods (FMCG) categories: bottled drinks and shampoo. Each respondent completed two product modules in a fixed order, with bottled drinks presented first and shampoo second.

The core component of the questionnaire consisted of product choice tasks. In each choice set, respondents were asked to select their most preferred option from three product alternatives (A, B, and C). No opt-out option was provided; instead, a forced-choice format was employed to strengthen trade-offs between product attributes and price, thereby facilitating the identification of respondents’ relative preference structure (Mangham et al., 2009).

The formal experiment included six ESG labels and price as attributes. The six ESG labels corresponded to those selected from the environmental (E), social (S), and governance (G) dimensions described earlier. The price attribute was included to capture the trade-off between ESG labels and monetary cost and to provide the basis for WTP estimation. Price levels were set at 2, 4, 6, 8, 10, and 12 RMB for bottled drinks, and 20, 40, 60, 80, 100, and 120 RMB for shampoo.

We adopted a D-optimal design controlling for the main effects of each attribute, which was implemented in Design-Expert 9.0 (Stat-Ease, Inc.), to generate six choice sets for each product. This design maximizes the efficiency of parameter estimation given the number of attributes and levels by optimizing a specified optimality criterion under the assumed model structure. In total, each respondent needed to complete 12 choice tasks. Examples of the choice sets for bottled drinks and shampoo are shown in

Tables 3 and 4, respectively, and the full questionnaire is provided in Appendix B.

Table 3. Example of choice sets for bottled drinks

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	No	Yes	Yes
Organic Product	Yes	Yes	Yes
Labor Rights Protection	No	Yes	No
Support for Rural Children	Yes	No	No
Supply Chain Traceability	No	Yes	No
ISO Certification	Yes	Yes	No
Price (RMB)	6	10	10
Your Choice (Please choose one)	□	□	□

Table 4. Example of choice sets for shampoo

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	Yes	No	Yes
Organic Product	No	Yes	No
Labor Rights Protection	Yes	No	No
Support for Rural Children	Yes	Yes	No
Supply Chain Traceability	No	No	Yes
ISO Certification	Yes	Yes	Yes
Price (RMB)	40	20	20
Your Choice (Please choose one)	□	□	□

Before the formal survey, a pilot survey involving approximately 200 participants was conducted. Based on the feedback from the pilot, two attention-check questions (see Q4 and Q11 in Appendix B) were incorporated into the final questionnaire to identify potentially low-quality responses. After completing the choice tasks, respondents answered eight questions on individual characteristics, including demographic information and other variables for the subsequent heterogeneity analysis.

4.3 Survey Implementation and Sample Characteristics

The formal survey was conducted online in October 2025 using a professional Chinese survey platform (Wenjuanxing) with targeted sampling capabilities. Respondents were recruited through the platform to approximate the distribution of Chinese internet users with respect to key demographic characteristics such as gender and urban-rural residence. Data collection was completed over an eight-day period, and

all respondents participated voluntarily and anonymously.

A total of 880 questionnaires were collected. To ensure data quality, we sequentially excluded: (1) questionnaires with an unusually short completion time (less than 120 seconds), (2) those that failed the attention-check questions, and (3) those exhibiting repeated mechanical choices of the same option across multiple DCE tasks. After these screening steps, 600 valid responses were retained for the empirical analysis.

Table 5 reports the socio-economic characteristics of the final sample and, where official benchmark data are available, compares them with the overall profile of Chinese internet users. During data collection, the gender and urban-rural distribution of Chinese internet users were used as reference targets, and the survey platform's targeted sampling service was employed to help control sample composition.

In the final sample, males account for 51.0% and females 49.0%, closely matching the corresponding shares among Chinese internet users (51.1% male and 48.9% female). Urban respondents account for 72.0% and rural respondents 28.0%, which is also broadly consistent with the national profile (71.8% urban and 28.2% rural) (CNNIC, 2025). By contrast, the sample is younger, with most respondents concentrated in the 20-39 age range. This pattern is consistent with the well-documented tendency of online surveys to attract younger participants.

Table 5. Socioeconomic characteristics of the final sample and comparison with Chinese internet users

Characteristics	Online survey sample		Chinese internet users
	n	%	%
Gender $(\chi^2 = 0.086\ p = 0.77)$			
Male	306	51.00	51.1
Female	294	49.00	48.9
Age $(\chi^2 = 643.6\ p < 0.001)$			
Below 20	10	1.67	16.7
20~29	201	33.50	13.1
30~39	272	45.33	19.0
40~49	72	12.00	17.1
50~59	32	5.33	20.0
Over 60	13	2.17	14.1
Education level			
High school or below	48	8.00	N/A
Technical degree	110	18.33	N/A
Undergraduate degree	375	62.50	N/A
Graduate degree or above	67	11.17	N/A
Monthly income			

<3000 RMB	61	10.17	N/A
3000~5999 RMB	149	24.83	N/A
6000~9999 RMB	213	35.50	N/A
10000~14999 RMB	135	22.50	N/A
15000~24999 RMB	32	5.33	N/A
>25000 RMB	10	1.67	N/A
Region of residence			
North China	78	13.00	N/A
Northeast China	55	9.17	N/A
East China	190	31.66	N/A
Central China	93	15.50	N/A
South China	102	17.00	N/A
Southwest China	61	10.17	N/A
Northwest China	21	3.50	N/A
Residence type $(\chi^2 = 0.144\ p = 0.705)$			
Urban	432	72.00	71.8
Rural	168	28.00	28.2

Because no sufficiently authoritative official benchmark for Chinese internet users aligns with our specific categorizations of education, income, and region, these variables are reported descriptively rather than subjected to direct one-to-one comparisons. Overall, the sample exhibits a relatively high proportion of respondents with a bachelor's degree or above, income levels concentrated in the middle and upper-middle ranges, and coverage across China's seven major regions, with a higher representation from more economically developed areas such as East China and South China. Accordingly, the results are best interpreted as evidence on Chinese online consumers—particularly younger and more highly educated groups—with respect to their preferences and WTP for ESG labels, and should be generalized to the broader population with appropriate caution.

5. Results

5.1 Results of the MNL and RPL Models

Tables 6 and 7 report the estimation results of the MNL, RPL, and LCL models for the bottled drinks and shampoo samples, respectively. In the RPL specification, ESG label coefficients are treated as random parameters following a normal distribution.

Across both product categories, all six ESG label coefficients are positive and statistically significant in the MNL model and in the mean estimates of the RPL model, indicating a general preference for ESG labels. In the RPL specification, the estimated standard deviations of the ESG label coefficients are statistically significant in most cases, providing evidence of preference heterogeneity among consumers. The only

exception is the coefficient for “Supply Chain Traceability” in the shampoo sample, for which the standard deviation is not statistically significant. In addition, the price coefficient is negative and highly significant across both models and product categories, consistent with theoretical expectations.

A comparison of marginal utilities (i.e., the estimated coefficients) shows that consumers do not assign equal importance to all labels. “ISO Certification” exhibits the strongest and most consistent positive effect across both product categories. In the bottled drinks sample, its MNL coefficient is 1.0352, the highest among all labels; in the shampoo sample, its coefficient is 0.7299, also among the highest. The mean estimates from the RPL model support the same pattern, suggesting that labels associated with external certification are particularly attractive to consumers.

In the bottled drinks sample, besides “ISO Certification”, “Support for Rural Children”, “Supply Chain Traceability”, and “Recyclable Packaging” also show relatively high marginal utilities, while “Organic Product” and “Labor Rights Protection” show comparatively weaker effects. The pattern is different in the shampoo sample, in which “ISO Certification”, “Organic Product”, “Labor Rights Protection”, “Support for Rural Children”, and “Recyclable Packaging” all have relatively high marginal utilities, whereas “Supply Chain Traceability” is weaker. This pattern suggests that the relative importance of ESG labels varies across product categories rather than following a fixed ranking order, which is consistent with previous studies (Rupprecht et al., 2020; Amasino et al., 2025).

In terms of model comparison, the LCL models outperform the MNL and the RPL models in terms of pseudo-R^2 and prediction accuracy. Predictive power presented in Tables 6 and 7 is defined as the proportion of choice situations in which the alternative with the highest predicted probability coincides with the observed choice. As shown in the tables, the MNL and RPL models yield similar predictive performance, while the LCL model achieves the highest predictive accuracy in both samples. This suggests that, although the RPL model captures continuous preference heterogeneity, it does not substantially alter the ranking of predicted probabilities. In contrast, the LCL model more effectively captures discrete preference segmentation. Accordingly, the subsequent WTP analysis focuses on the LCL results.

Table 6. Estimation results of the MNL, RPL, and LCL models for bottled drinks

Attribute	MNL	RPL		LCL	
		Mean	S.D.	Class 1	Class 2
Asc for _Option A	0.2336***	0.1447*	0.1171	0.1747	0.3440***
	(0.06506)	(0.08436)	(0.22547)	(0.12989)	(0.09865)
Asc for _Option B	0.4478***	0.4276***	0.3837***	0.0852	0.6755***
	(0.06996)	(0.09763)	(0.12669)	(0.20292)	(0.09524)
Recyclable Packaging	0.5044***	0.7791***	1.1167***	1.1593***	0.2339***
	(0.04879)	(0.08405)	(0.09878)	(0.17652)	(0.07282)
Organic Product	0.4025***	0.3637***	0.5945**	1.0504***	0.0931
	(0.07813)	(0.10180)	(0.15604)	(0.23070)	(0.11845)
Labor Rights Protection	0.4236***	0.5197***	0.4495***	0.7269***	0.2653***
	(0.06320)	(0.08144)	(0.12881)	(0.20569)	(0.09269)
Support for Rural Children	0.5250***	0.6172***	0.7466***	1.1524***	0.1850***
	(0.05002)	(0.06937)	(0.09153)	(0.17362)	(0.07134)
Supply Chain Traceability	0.5201***	0.6354***	0.4776***	0.9900***	0.2680***
	(0.06154)	(0.07395)	(0.14957)	(0.20327)	(0.07909)
ISO Certification	1.0352***	1.1825***	0.4540***	1.5177***	0.7493***
	(0.06559)	(0.08561)	(0.14673)	(0.17173)	(0.09684)
Price	−0.1422***	−2.5505***	1.7425***	−0.2741***	−0.0588***
	(0.00787)	(0.16076)	(0.11721)	(0.02370)	(0.01473)
Class probability				0.477	0.523
Log-likelihood	-3456.17	-3331.68		-3305.54	
Pseudo R^2	0.1212	0.1576		0.1642	
Predictive power	54.11%	54.11%		57.14%	
Observations	3600	3600	3600	3600	3600

Note: Each cell reports the estimated coefficient, with standard errors in parentheses. Predictive power is defined as the proportion of choice situations in which the alternative with the highest predicted probability coincides with the observed choice. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7. Estimation results of the MNL, RPL, and LCL models for shampoo

Attribute	MNL	RPL		LCL	
		Mean	S.D.	Class 1	Class 2
Asc for _Option A	0.2082^{***}	-0.1301	0.0383	-0.9872^{**}	0.3012^{**}
	(0.08077)	(0.10166)	(0.37509)	(0.41529)	(0.12268)
Asc for _Option B	0.2020^{**}	0.3013^{***}	0.3707^{***}	0.0406	0.7483^{***}
	(0.08295)	(0.09629)	(0.10849)	(0.47436)	(0.12336)
Recyclable Packaging	0.3262^{***}	0.5181^{***}	0.7886^{***}	0.9574	0.3316^{***}
	(0.08447)	(0.10447)	(0.10075)	(0.62624)	(0.10465)
Organic Product	0.4025^{***}	0.3045^{***}	0.6632^{***}	0.0648	0.0964
	(0.07822)	(0.10035)	(0.10592)	(0.35780)	(0.11865)
Labor Rights Protection	0.3525^{***}	0.4592^{***}	0.7408^{***}	0.5248^{***}	0.1421
	(0.05775)	(0.08353)	(0.09735)	(0.14143)	(0.09797)
Support for Rural Children	0.3444^{***}	0.4375^{***}	0.5207^{***}	1.2635^{***}	0.1475
	(0.06978)	(0.08606)	(0.12593)	(0.43616)	(0.11360)
Supply Chain Traceability	0.1909^{***}	0.3719^{***}	0.1170	0.4834	0.1658^{**}
	(0.05855)	(0.06795)	(0.29936)	(0.40473)	(0.07489)
ISO Certification	0.7299^{***}	0.7388^{***}	0.3551^{*}	1.5414^{***}	0.1827
	(0.08691)	(0.09578)	(0.18118)	(0.48155)	(0.12273)
Price	-0.0123^{***}	-4.9904^{***}	1.6840^{***}	-0.0313^{***}	-0.0078^{***}
	(0.00140)	(0.24145)	(0.13662)	(0.00886)	(0.00238)
Class probability				0.558	0.442
Log-likelihood	-3463.94	-3399.06		-3360.17	
Pseudo R^2	0.0919	0.1406		0.1504	
Predictive power	52.47%	52.47%		56.00%	
Observations	3600	3600	3600	3600	3600

Note: Each cell reports the estimated coefficient, with standard errors in parentheses. Predictive power is defined as the proportion of choice situations in which the alternative with the highest predicted probability coincides with the observed choice. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.2 Results of the LCL Model

5.2.1 Estimation Results

A key issue in applying the LCL approach is determining the appropriate number of latent classes. To this end, we computed the Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) for models with different numbers of classes (1, 2, 3, and 4) in each product category. In both categories, the minimum AIC favored a 4-class model, whereas the minimum BIC supported a 2-class model. Given that BIC imposes a stronger penalty for model complexity and is often preferred for determining the number of classes in latent class models (e.g., Raftery, 1995; Train, 2009), we place greater weight on the BIC results. Moreover, the improvement of AIC from the 2-class to the 4-class specification (i.e., 6665.1-6577.7=87.4 for bottled drinks and 6815.8-6736.5=79.3 for shampoo) is relatively modest compared to the corresponding increase in BIC when moving from four to two classes (i.e., 7215.1-6980.7=234.4 for bottled drinks and 7374.0-7131.4=242.6 for shampoo). Based on these considerations, we selected a 2-class specification for the LCL models in both product categories.

As shown in Table 6, in the bottled drinks sample, both classes exhibit significantly positive preferences for most ESG labels. One exception is "Organic Product," for which the coefficient is not statistically significant in Class 2. Consistent with the MNL and RPL results, "ISO Certification" remains the most influential label, with the highest coefficient in both classes, indicating that externally certified labels are particularly attractive in this product context. At the same time, the strength of preferences for the other labels is not identical across classes. For example, "Support for Rural Children" has a larger coefficient than "Labor Rights Protection" in Class 1, whereas the opposite holds in Class 2. Similarly, "Supply Chain Traceability" has a larger coefficient than "Labor Rights Protection" in Class 1, whereas the two are of similar magnitude in Class 2. These patterns suggest that consumer responses to ESG labels are not homogeneous but instead exhibit clear discrete preference differentiation.

In the shampoo sample (see Table 7), the difference in preference structures between the two classes is more pronounced. Class 1 respondents exhibit significantly positive preferences for "Labor Rights Protection," "Support for Rural Children," and "ISO Certification," whereas Class 2 respondents show significantly positive preferences for other labels, such as "Recyclable Packaging" and "Supply Chain Traceability." These findings reveal clear differences in preferences across the two classes, further highlighting the presence of discrete preference heterogeneity and underscoring the value of the LCL model in capturing such heterogeneity.

5.2.2 Interpretation of Latent Classes

The above results also reveal differences in preference patterns across the two product categories. Accordingly, the interpretation of Classes 1 and 2 should be defined separately for each product.

For the bottled drinks sample, Class 1 respondents can be characterized as having broadly positive preferences for all ESG labels, with the strongest preference for "ISO Certification" and the weakest for "Labor Rights Protection". In contrast, Class 2 respondents exhibit positive preferences for most ESG labels except "Organic Product", with the strongest preference for "ISO Certification" and the weakest for "Support for Rural Children".

For the shampoo sample, Class 1 respondents can be characterized as those who prefer "Labor Rights Protection", "Support for Rural Children", and "ISO Certification", whereas Class 2 respondents show stronger preferences for "Recyclable Packaging" and "Supply Chain Traceability".

5.2.3 Factors Affecting the Probability of Class 1 Membership

We employed an ordinary least squares (OLS) regression to examine the factors (i.e., respondents' socio-demographic characteristics) associated with the probability of Class 1 membership. To this end, we first obtained each respondent's posterior probability of belonging to each class from NLOGIT 6 and used the probability of belonging to Class 1 as the dependent variable in the OLS regression.

The independent variables include gender, age, education level, income, region, current residence, ESG knowledge level, and ESG-related purchase behavior. gender is defined as a dummy variable, with male coded 1 and female as 0. Age refers to the respondent's age in years. Education level is coded as an ordinal variable: 1=high school or below, 2= technical degree, 3=undergraduate degree, and 4=graduate degree or above. Monthly income is also defined as an ordinal variable: 1=below 3000 RMB, 2= 3000~5999 RMB, 3=6000~9999 RMB, 4=10000~14999 RMB, 5=15000~24999 RMB, and 6=above 25000 RMB. Regional differences are captured using six dummy variables (Northeast China, East China, Central China, South China, Southwest China, and Northwest China), with North China serving as the reference category. Current residence is defined as a dummy variable, with urban coded as 1 and rural as 0. Finally, based on responses on Q21 and Q22 (see Appendix B), ESG knowledge and ESG-related purchase behavior are constructed as ordinal variables. ESG knowledge level is coded as: 1=not familiar at all, 2=have heard of them but not very familiar, 3= somewhat familiar, and 4=very familiar. ESG-related purchase behavior is coded as: 1=do not pay attention to ESG labels at all and never use them as a basis for choosing products, 2=do not pay much attention to them but occasionally notice ESG labels promoted by sellers, 3=notice ESG labels and may consider them when other attributes are difficult to compare, and 4=actively pay attention to and use ESG labels as a purchase criterion.

The OLS regression results for bottled drinks and shampoo samples are presented in Table 8. It should be noted that, although we report only the factors affecting the probability of Class 1 membership, the effects on the probability of Class 2 membership can be inferred to have the same magnitude but opposite signs, given that the probabilities of belonging to Classes 1 and 2 sum to one.

As shown in Table 8, for both the bottled drinks and shampoo samples, education level, urban residence, and ESG knowledge are positively and significantly associated with the probability of belonging to Class 1. In contrast, income has a significantly negative effect in the bottled drinks sample, while being male is associated with a significantly lower probability of belonging to Class 1 in the shampoo sample. Despite differences in the characteristics of the two latent classes across product categories, the results suggest a consistent pattern: urban respondents with higher education levels and greater ESG knowledge are more likely to exhibit broader positive preferences for ESG labels, which is somewhat consistent with earlier evidence on consumer labeling in China (Shen & Saijo, 2009). This interpretation is supported by the fact that the number of ESG labels with statistically significant positive coefficients is more in Class 1 than in Class 2 for both products.

A plausible mechanism is that higher education enhances individuals' cognitive ability to process complex, multi-dimensional information embedded in ESG labels, thereby increasing their sensitivity to such attributes. In addition, greater ESG knowledge reduces information asymmetry and uncertainty regarding the credibility and meaning of ESG signals, making consumers more willing to incorporate these labels into their decision-making. Urban residence may further reinforce these effects by providing greater exposure to ESG-related information, marketing, and social norms that emphasize sustainability.

Table 8. Factors affecting the probability of Class 1 membership for bottled drinks and shampoo

	Bottled drinks	**Shampoo**
Socio-demographic variables		
Gender (1 = male, 0 = female)	-0.0467	-0.1165^{***}
	(0.02985)	(0.03046)
Age	-0.0010	-0.0001
	(0.00143)	(0.00151)
Education level	0.1101^{***}	0.0610^{***}
	(0.01802)	(0.01921)
Income (per month)	-0.0314^{**}	0.0029
	(0.01410)	(0.01422)
Region (reference: North China)		
Northeast China	-0.0081	0.5616^{***}
	(0.05725)	(0.06346)
East China	0.0492	0.1381^{***}
	(0.04711)	(0.04755)
Central China	0.0026	0.0642
	(0.05420)	(0.05814)

South China	0.0537	0.0855
	(0.05250)	(0.05439)
Southwest China	0.1055	0.1752***
	(0.05616)	(0.05630)
Northwest China	−0.0425	0.1038
	(0.09122)	(0.08616)
Current residence (1 = urban, 0 = rural)	0.4660***	0.3945***
	(0.02948)	(0.03418)
ESG-related variables		
ESG knowledge level	0.0793***	0.0642***
	(0.02151)	(0.02241)
ESG purchase behavior	0.0124	0.0145
	(0.01880)	(0.01859)
R-square	0.3612	0.3026
Observations	600	600

Note: Each cell reports the estimated coefficient, with standard errors in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

5.3 Willingness-to-pay estimates

To express the preference differences discussed above in comparable economic terms, this study further estimates the individual-level posterior expected WTP for each ESG label based on Eq. (10). The descriptive statistics of the WTP estimates for the full sample, Class 1 respondents, and Class 2 respondents are presented in Table 9. Respondents are classified into Class 1 or Class 2 based on their posterior probability of belonging to Class 1: those with a probability greater than 0.5 are assigned to Class 1, and the others to Class 2. Consequently, 277 (46.2%) and 323 (53.8%) respondents are classified into Classes 1 and 2, respectively, in the bottled drinks sample, while 334 (55.7%) and 266 (44.3%) respondents are classified into Classes 1 and 2, respectively, in the shampoo sample. These proportions are broadly consistent with the class probabilities reported in Tables 6 and 7.

For the full example, the mean WTP for “ISO Certification” is the highest among the six tested labels in both product categories, indicating a relatively high valuation of this specific certification cue in the stated-choice setting. In contrast, the WTP for “Organic Product” is the lowest, implying that this label is relatively less valued in monetary terms by respondents. In addition, the WTPs for the remaining labels exhibit slightly different ranking across the two product categories, suggesting that the relative valuation of these labels by respondents is product-dependent. Moreover, the mean WTP for each label is higher in the shampoo sample than for the corresponding label

in the bottled drinks sample. This pattern is plausible, as shampoo generally has a higher price level than bottled drinks, leading to a larger monetary scale for consumers' willingness to pay.

For the class-specific WTPs, in the bottled drinks sample, the rankings of mean WTP across labels in Classes 1 and 2 are broadly consistent with the magnitudes of respondents' preferences (i.e., the estimated coefficients reported in Table 6). In the shampoo sample, mean WTPs marked with the superscript "a" in Table 9 should be interpreted with caution, as the corresponding coefficients are not statistically significant. Nevertheless, for labels with statistically significant coefficients, the rankings of mean WTP remain consistent with the magnitudes of respondents' preferences (i.e., the estimated coefficients reported in Table 7) in both classes.

In addition, the standard deviations of WTP for each label are smaller in Class 1 than in Class 2, indicating that Class 1 respondents are relatively more homogeneous in translating their preferences into monetary terms. Combining with the results reported in Subsection 5.2.3 that education level and ESG knowledge are positively and significantly associated with the probability of belonging to Class 1, this pattern suggests that higher education and greater ESG knowledge may be associated with lower heterogeneity in consumers' willingness to pay for ESG labels.

Overall, the WTP results further indicate that heterogeneity across latent classes is reflected not only in differences in overall valuation, but more importantly in differences in the priority assigned to special ESG attributes. This suggests that consumer segmentation operates through distinct preference structures rather than a simple contrast in valuation strength, which is broadly consistent with recent evidence that consumer readiness and green awareness shape sustainability-related purchase responses in different ways (Shehawy & Khan, 2024). More broadly, market responses to ESG labels are not one-dimensional in the sense that consumers who care more about ESG are always willing to pay more. Instead, such responses are jointly shaped by label type, product context, and consumer characteristics. Accordingly, when designing consumer-facing ESG signals, firms should not only consider whether ESG information is communicated, but also what type of information is conveyed and whether it aligns with the preference structure of the target consumer group.

Table 9. Individual-level posterior expected WTP for ESG Labels from the 2-class LCL model (RMB)

Attribute	Full sample				Class 1				Class 2			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Bottled drinks												
Recyclable packaging	4.13	0.10	3.98	4.23	4.22	0.01	4.19	4.23	4.03	0.06	3.98	4.18
Organic product	2.90	0.95	1.58	3.83	3.76	0.10	3.44	3.83	2.04[a]	0.56	1.58	3.42
Labor Rights Protection	3.43	0.78	2.65	4.51	2.71	0.08	2.65	2.98	4.13	0.46	3.00	4.51
Support for Rural Children	3.76	0.44	3.15	4.20	4.17	0.05	4.02	4.20	3.37	0.26	3.15	4.01
Supply Chain Traceability	4.01	0.40	3.61	4.56	3.64	0.04	3.61	3.78	4.37	0.24	3.79	4.56
ISO certification	8.54	3.04	5.54	12.75	5.78	0.32	5.54	6.80	11.27	1.79	6.87	12.75
Shampoo												
Recyclable packaging	34.59	4.63	30.64	42.34	31.01[a]	0.46	30.64	32.90	39.43	3.08	33.02	42.34
Organic product	5.54	4.05	2.09	12.31	2.42[a]	0.40	2.09	4.07	9.77[a]	2.69	4.18	12.31
Labor Rights Protection	17.25	0.54	16.79	18.15	16.83	0.05	16.79	17.05	17.81[a]	0.36	17.06	18.15
Support for Rural Children	33.52	8.78	18.84	41.01	40.30	0.88	36.72	41.01	24.34[a]	5.83	18.84	36.49
Supply Chain Traceability	17.39	2.26	15.47	21.17	15.65[a]	0.22	15.47	16.57	19.75	1.50	16.63	21.17
ISO certification	40.49	10.27	23.33	49.25	48.42	1.02	44.24	49.25	29.77[a]	6.81	23.33	43.96

Note: The superscript “a” indicates that the estimated coefficient of the corresponding label is not statistically significant.

6. Discussion

The first theoretical implication of this study is that ESG labels should not be treated as a homogeneous or interchangeable construct in consumer choice. From an economic perspective, ESG labels can serve as informational cues about product attributes and firm practices that consumers may incorporate into their choices and willingness to pay. Their valuation may reflect both the information conveyed and how particular cues are recognized and interpreted in the purchase context.

The results show systematic differences across ESG labels in both marginal utilities and WTP, suggesting that consumers do not respond to "ESG" in a purely abstract sense. Rather, they respond to specific label cues that differ in recognizability, clarity, and credibility (Majer et al., 2022; Sonntag et al., 2023; Donato et al., 2022). The observed differences suggest that an environmental, social, or governance classification alone does not fully describe the relative valuation of specific consumer-facing labels. For example, the "ISO Certification" cue is associated with relatively high utility and WTP in both product categories. This pattern is also consistent with the view that consumer responses to sustainability-related products depend not only on the content of sustainability claims, but also on trust in the actors and processes through which such information is conveyed (Ladwein & Romero, 2021). Conversely, when sustainability-related claims are perceived as misleading or inauthentic, consumers may respond negatively, which further highlights the importance of credibility in shaping market responses to ESG-related information (Sajid et al., 2024). Treating ESG as a single attribute may therefore obscure meaningful variation in how consumers value specific labels.

The second point is that the economic value of ESG labels is conditional rather than fixed. The relative importance of different labels varies across product contexts, and consumer heterogeneity is reflected not only in preference intensity but also in structured segmentation (Piracci et al., 2024; Zhao et al., 2025). Related evidence from retail contexts also suggests that consumers' reactions to sustainability-related product features, including packaging, depend on broader communication and perception contexts rather than on sustainability claims alone (Plotkina et al., 2025). Different consumer groups assign systematically different weights and economic values to the same labels. This shifts the analytical focus from whether ESG labels are effective to the conditions under which they are effective, highlighting the joint role of label design, product context, and consumer heterogeneity.

These findings also have practical implications for firms' ESG communication strategies. First, firms should consider not only whether ESG-related information is provided to consumers, but how it is presented. The relatively high valuation of the ISO Certification cue suggests that certification-related information may be useful in consumer-facing communication, consistent with prior research on label trust and presentation (Gorton et al., 2021; Yang et al., 2024; Donato et al., 2022). Second, ESG labeling strategies should be tailored to product contexts and target consumer segments. The results indicate that the valuation of specific labels varies across products and

consumer groups, cautioning against assuming that a single labeling approach will be equally valued in every setting. Firms should therefore design label combinations and communication priorities that align with specific product characteristics, communication settings, and consumer preferences (Plotkina et al., 2025).

7. Conclusion

The empirical results of this study show that consumers in the Chinese FMCG market respond positively to ESG labels and that these preferences are reflected in measurable willingness to pay. The significantly negative price coefficients indicate that respondents made explicit trade-offs between ESG attributes and price in the experimental choice tasks, suggesting that ESG-related information can enter consumer evaluations even for frequently purchased products. These findings contribute to understanding the valuation of specific consumer-facing ESG cues in a controlled choice setting.

The findings further indicate that the effectiveness of ESG labels is context-dependent rather than uniform. The relative importance of labels varies across product categories, and consumer heterogeneity is reflected not only in differences in preference intensity but also in structured market segmentation. Different consumer groups assign systematically different values to the tested ESG attributes, highlighting the relevance of specific label cues, product context, and consumer heterogeneity for stated preferences.

This study also has several limitations. First, as a stated preference study based on a discrete choice experiment, the estimated WTP may be affected by hypothetical bias and may not fully correspond to actual purchasing behavior in real markets (Carlsson & Martinsson, 2001). In addition, real-world consumer choices are influenced by factors such as brand familiarity, promotional information, and budget constraints; therefore, the results should be interpreted as reflecting latent valuations rather than actual market premiums. Second, the analysis focuses on only two FMCG categories, which limits the generalizability of the findings. Moreover, the fixed order of product modules and the absence of a block design imply that potential order, learning, and fatigue effects cannot be fully identified or separated from product-context differences (Campbell et al., 2015). Finally, the presentation of ESG labels is relatively simplified and does not account for variation in visual design, information density, or certification communication.

There are still several ways in which this study can be extended in future research. First, using real-market data or field experimental settings, future studies may examine whether consumer responses to ESG labels translate into actual purchasing behavior and compare stated and revealed preferences (Beyer et al., 2024). Second, future research may test the robustness of these findings across a broader range of product categories and employ more flexible experimental designs to better isolate product-context, order, and learning effects. Third, further work may explore how firms combine different ESG signals and how variations in label design, verifiability, and

information presentation influence consumer responses, thereby contributing to a deeper understanding of how ESG information is translated from firm practices into market outcomes.

Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work, the authors used ChatGPT for language editing and phrasing refinement. After using this tool, the authors reviewed and edited the manuscript as needed and take full responsibility for the content of the published article.

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Appendix A. Screening Questionnaire

Note: The original questionnaire was administered in Chinese. This English version is provided for reference only.

Which FMCG Measures Matter Most to You?
A Survey of Consumer Attention to ESG-Related Measures

Thank you for participating in this survey.
The purpose of this questionnaire is to investigate how Chinese consumers perceive and respond to information related to environmental protection, social responsibility, and corporate governance when purchasing fast-moving consumer goods (FMCG), such as bottled water and daily necessities.
This survey is anonymous, and the information collected will be used for academic research purposes only. All responses will be kept strictly confidential, and no personal information will be disclosed. The survey will take approximately 3–5 minutes to complete.

Q1. How familiar are you with concepts such as ESG, sustainability, eco-labels, and corporate social responsibility?
A. Not familiar at all
B. Somewhat familiar
C. Very familiar

Q2. Which of the following environmental measures do you pay the most attention to when purchasing FMCG (such as bottled water or shampoo)? (Select all that apply.)
A. Recyclable Packaging
B. Carbon-Neutral Production
C. Renewable Energy Use
D. Free from Harmful Ingredients

Q3. Which of the following social measures do you pay the most attention to when purchasing FMCG (such as bottled water or shampoo)? (Select all that apply.)
A. Fair Labor Practices
B. Community Support
C. Inclusive Employment
D. Gender Equality in Employment

Q4. Which of the following governance measures do you pay the most attention to when purchasing FMCG (such as bottled water or shampoo)? (Select all that apply.)
A. Supply Chain Traceability
B. External Verification (e.g., ISO)

C. Regular ESG Disclosure
D. Consumer Feedback Mechanism

Q5. What is your gender?
A. Male
B. Female

Q6. Which age group do you belong to?
A. Under 20
B. 20-29
C. 30-39
D. 40-49
E. 50 or above

Appendix B. Main Questionnaire

Note: The original questionnaire was administered in Chinese. This English version is provided for reference only.

A Survey on Chinese Consumers' Acceptance of and Willingness to Purchase ESG-Innovative Products

Thank you for participating in this survey.
The purpose of this questionnaire is to examine Chinese consumers' acceptance of and willingness to purchase ESG (Environmental, Social, and Governance) innovative products. This survey is anonymous, and all information collected will be used for academic research purposes only.
The questionnaire consists of two parts and includes a total of 22 questions. It will take approximately 3–5 minutes to complete.

Part I. Choice Tasks for Bottled Drinks and Shampoo (Single Choice)

Suppose that you are purchasing two products: a 500 ml bottled drinks and a 500 ml bottle of shampoo. Assuming that all available products are identical in quality, which option would you choose from the three alternatives presented in each choice task?

Some of the following choice scenarios may be hypothetical. Please do not consider whether these situations are likely to occur in reality. Instead, select the product that you would be most willing to purchase based on your actual preferences.

Please note that, in each question, you only need to compare the three alternatives presented in that specific choice task and select one of them. You do not need to consider the alternatives shown in other questions.

The following example illustrates how to read the table and record your answer.

Example. When purchasing a 500ml bottled drinks, which of the following three products would you choose?

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	Yes	No	No
Organic Product	No	No	Yes
Labor Rights Protection	Yes	Yes	Yes
Support for Rural Children	Yes	No	No
Supply Chain Traceability	No	No	No
ISO Certification	No	Yes	Yes
Price (RMB)	4	6	8
Your Choice (Please choose one)	□	□	□

Instructions: The first row presents three alternative products, A, B, and C, which are assumed to be identical in quality.
From the second row to the seventh row, the table shows the labels associated with each alternative product. “Yes” indicates that the product has the corresponding label, while “No” indicates that it does not. Each label is independent and does not affect the others.

The labels are explained as follows:
Recyclable Packaging: indicates that the outer packaging of the product is recyclable or biodegradable.
Organic Product: indicates that the product is made with natural ingredients, contains no harmful chemicals or artificial additives, and emphasizes environmental friendliness as well as health and safety during the production process.
Labor Rights Protection: indicates that the producer of the product protects labor safety, ensures fair wages and working hours, prohibits forced labor, and does not employ child labor.
Support for Rural Children: indicates that the producer of the product donates part of the product’s revenue to support children in rural mountainous areas.
Supply Chain Traceability: indicates that information on the product’s supply chain can be traced and is available for government supervision and record-keeping, with the aim of improving product safety transparency and enhancing consumer trust.
ISO Certification: indicates that the producer of the product has established sound systems for quality management, anti-bribery management, and related practices in accordance with international standards, making its operations, decision-making, and information disclosure more open and transparent.

The last row shows the prices of products A, B, and C, expressed in Chinese yuan (RMB).

After reading the table, please choose the one product that you would be most willing to purchase among products A, B, and C, and select the corresponding option below each question.

The following questions will be presented in the same tabular format. There are six questions for bottled drinks, six questions for bottled shampoo, and two attention-check questions (for the attention-check questions, please answer according to the instructions provided), for a total of 14 questions.

The following questions present choice tasks for a 500ml bottled drinks.

Q1. When purchasing a 500ml bottled drinks, which of the following three products would you choose?

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	No	Yes	Yes
Organic Product	Yes	Yes	Yes
Labor Rights Protection	No	Yes	No
Support for Rural Children	Yes	No	No
Supply Chain Traceability	No	Yes	No
ISO Certification	Yes	Yes	No
Price (RMB)	6	10	10
Your Choice (Please choose one)	□	□	□

Q2. When purchasing a 500ml bottled drinks, which of the following three products would you choose?

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	Yes	No	Yes
Organic Product	No	No	No
Labor Rights Protection	No	No	Yes
Support for Rural Children	No	No	Yes
Supply Chain Traceability	No	No	No
ISO Certification	Yes	No	No
Price (RMB)	12	8	4
Your Choice (Please choose one)	□	□	□

Q3. When purchasing a 500ml bottled drinks, which of the following three products would you choose?

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	No	No	No
Organic Product	Yes	No	Yes
Labor Rights Protection	No	Yes	Yes
Support for Rural Children	No	Yes	Yes
Supply Chain Traceability	Yes	No	Yes
ISO Certification	No	No	No
Price (RMB)	4	10	12
Your Choice (Please choose one)	☐	☐	☐

Q4. This is an attention-check question. To ensure that you are answering carefully, ***please select Option C***.

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	~~Yes~~	~~No~~	No
Organic Product	~~No~~	~~No~~	Yes
Labor Rights Protection	~~Yes~~	~~Yes~~	Yes
Support for Rural Children	~~Yes~~	~~No~~	No
Supply Chain Traceability	~~No~~	~~No~~	No
ISO Certification	~~No~~	~~Yes~~	Yes
Price (RMB)	~~4~~	~~6~~	8
Your Choice (Please choose one)	☐	☐	☐

Q5. When purchasing a 500ml bottled drinks, which of the following three products would you choose?

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	Yes	No	Yes
Organic Product	No	Yes	Yes
Labor Rights Protection	Yes	Yes	No
Support for Rural Children	Yes	No	Yes

Supply Chain Traceability	Yes	No	Yes
ISO Certification	Yes	Yes	No
Price (RMB)	8	8	8
Your Choice (Please choose one)	☐	☐	☐

Q6. When purchasing a 500ml bottled drinks, which of the following three products would you choose?

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	No	No	Yes
Organic Product	No	No	Yes
Labor Rights Protection	Yes	Yes	No
Support for Rural Children	No	No	Yes
Supply Chain Traceability	No	Yes	No
ISO Certification	Yes	No	Yes
Price (RMB)	6	2	2
Your Choice (Please choose one)	☐	☐	☐

Q7. When purchasing a 500ml bottled drinks, which of the following three products would you choose?

ESG Labels	500ml bottled drinks		
	Option A	Option B	Option C
Recyclable Packaging	No	Yes	No
Organic Product	No	No	No
Labor Rights Protection	No	No	No
Support for Rural Children	Yes	No	No
Supply Chain Traceability	Yes	Yes	Yes
ISO Certification	Yes	No	Yes
Price (RMB)	10	6	4
Your Choice (Please choose one)	☐	☐	☐

The following questions present choice tasks for a 500ml bottled shampoo.

Q8. When purchasing a 500ml bottled shampoo, which of the following three products would you choose?

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	Yes	No	Yes
Organic Product	No	Yes	No
Labor Rights Protection	Yes	No	No
Support for Rural Children	Yes	Yes	No
Supply Chain Traceability	No	No	Yes
ISO Certification	Yes	Yes	Yes
Price (RMB)	40	20	20
Your Choice (Please choose one)	☐	☐	☐

Q9. When purchasing a 500ml bottled shampoo, which of the following three products would you choose?

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	No	Yes	Yes
Organic Product	No	No	Yes
Labor Rights Protection	No	No	No
Support for Rural Children	Yes	Yes	Yes
Supply Chain Traceability	Yes	No	Yes
ISO Certification	No	No	Yes
Price (RMB)	80	120	60
Your Choice (Please choose one)	☐	☐	☐

Q10. When purchasing a 500ml bottled shampoo, which of the following three products would you choose?

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	No	No	No
Organic Product	No	No	Yes
Labor Rights Protection	No	No	Yes
Support for Rural Children	No	No	Yes
Supply Chain Traceability	Yes	No	No
ISO Certification	No	Yes	Yes
Price (RMB)	100	80	100
Your Choice (Please choose one)	☐	☐	☐

Q11. This is an attention-check question. To ensure that you are answering carefully, ***please select Option A***.

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	No	~~Yes~~	~~No~~
Organic Product	No	~~No~~	~~No~~
Labor Rights Protection	No	~~No~~	~~No~~
Support for Rural Children	Yes	~~No~~	~~No~~
Supply Chain Traceability	Yes	~~Yes~~	~~Yes~~
ISO Certification	Yes	~~No~~	~~Yes~~
Price (RMB)	100	~~60~~	~~40~~
Your Choice (Please choose one)	☐	☐	☐

Q12. When purchasing a 500ml bottled shampoo, which of the following three products would you choose?

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	No	Yes	Yes
Organic Product	Yes	Yes	Yes
Labor Rights Protection	No	Yes	Yes
Support for Rural Children	No	No	Yes
Supply Chain Traceability	No	Yes	Yes
ISO Certification	No	Yes	No
Price (RMB)	120	80	100
Your Choice (Please choose one)	☐	☐	☐

Q13. When purchasing a 500ml bottled shampoo, which of the following three products would you choose?

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	No	No	Yes
Organic Product	No	Yes	Yes
Labor Rights Protection	Yes	No	Yes
Support for Rural Children	Yes	No	No

Supply Chain Traceability	Yes	Yes	No
ISO Certification	No	No	No
Price (RMB)	20	40	20
Your Choice (Please choose one)	□	□	□

Q14. When purchasing a 500ml bottled shampoo, which of the following three products would you choose?

ESG Labels	500ml bottled shampoo		
	Option A	Option B	Option C
Recyclable Packaging	Yes	No	No
Organic Product	No	No	No
Labor Rights Protection	No	Yes	Yes
Support for Rural Children	No	No	No
Supply Chain Traceability	No	Yes	No
ISO Certification	Yes	Yes	No
Price (RMB)	100	120	60
Your Choice (Please choose one)	□	□	□

Part II. Respondent Information

The following questions are for academic research purposes only. Your personal information will be kept confidential and will not be disclosed.

Q15. What is your gender?

A. Male

B. Female

Q16. How old are you?

Please enter your age in the blank:_____

Q17. What is your highest level of education?

A. High school or below

B. Technical degree

C. Undergraduate degree

D. Graduate degree or above

Q18. What is your monthly income?

A. <3000 RMB

B. 3000~5999 RMB

C. 6000~9999 RMB

D. 10000~14999 RMB

E. 15000~24999 RMB
F. >25000 RMB

Q19. What is your region of residence?
A. North China
B. Northeast China
C. East China
D. Central China
E. South China
F. Southwest China
G. Northwest China

Q20. Is your current place of residence urban or rural?
A. Urban
B. Rural

Q21. How familiar are you with ESG concepts or ESG-innovative products?
A. Not familiar at all
B. Have heard of them, but am not very familiar
C. Somewhat familiar
D. Very familiar

Q22. When purchasing products in daily life, how much attention do you pay to ESG-related labels?
A. I do not pay attention to them at all and never use them as a basis for choosing products.
B. I do not pay much attention to them, but I am occasionally curious about ESG-related labels that are strongly promoted by sellers.
C. I notice them and may consider them when other product attributes are difficult to compare.
D. I pay attention to them and actively use them as one of my purchase criteria.