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The economic sustainability of farmers' markets in Europe

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Farmers' markets (FMs) represent one of the oldest and most prevalent forms of short food supply chains (SFSCs), serving as a vital retail outlet for local products. While the broader literature on SFSCs has a strong European focus, quantitative studies examining consumers' willingness to pay (WTP) at FMs have predominantly focused on the United States. By focusing specifically on FMs, this study extends the existing SFSC literature through a harmonised,

cross-country analysis of consumers' WTP in three European countries, where FMs have rich traditions and cultural significance. We investigated consumer WTP for various points of sale, with a particular emphasis on FMs, utilizing a discrete choice experiment centered around a typical FM product: apples. Data were gathered through an online survey conducted in October-November 2023, involving representative samples from Hungary (n=614), Italy (n=600), and the UK (n=600). Latent class modelling was applied to explore preference heterogeneity and to identify consumer segments with distinct WTP patterns across the three countries. The findings confirm that FMs hold a unique position in the retail market, often commanding a price premium compared to grocery stores and supermarkets. However, the FM premium is not uniform across consumer segments or countries, and product-specific attributes, especially visual quality, origin and geographical indication, often play an equally important or even stronger role in shaping consumers' WTP. British consumers exhibited the highest WTP, followed by Hungarian and Italian consumers. These differences can be attributed to variations in food retail dynamics, public attitudes towards local food, and the prevalence of SFSCs in each country. The findings provide useful insights for public policy, producers, and farmers' market organizers by showing how FMs can support locally embedded food systems, strengthen short supply chains, and contribute to the economic viability of local producers.

Keywords: farmers' markets, WTP, consumers, discrete choice experiment, sustainability

1. Introduction

The complexity of food supply chains in the second half of the 20th century led to numerous challenges, including food scandals, product waste, and controversies surrounding quality and sustainability issues [1]. In response, as well as due to consumers' commitment to healthier and more sustainable food, short food supply chains (SFSCs) emerged and spread [2].

SFSCs are based on a direct relationship between producers and consumers, usually within a limited geographical distance, and are associated with several advantages for both parties, including fewer commercial intermediaries [3-5]. SFSCs involve a variety of sales channels, such as direct sales to farms, farm stores, farmers' markets (FMs), and producer-consumer partnerships. SFSCs are often associated with lower environmental impacts, mainly due to shorter transport distances and closer producer–consumer relationships. However, an increasing body of literature questions the assumption that SFSCs are inherently or automatically more environmentally sustainable than conventional food supply chains. Their sustainability performance depends on multiple factors, including transportation efficiency, logistics organisation, production practices, scale of operation, seasonality, and the broader territorial context in which these chains operate. Moreover, the overall environmental performance of SFSCs remains difficult to assess because consistent and comparable data on carbon emissions and other environmental indicators are often limited [6-10]. Recent studies therefore argue that SFSCs should be assessed through a multidimensional

sustainability lens, considering not only environmental effects, but also economic viability, social embeddedness, producer benefits, and rural development outcomes [11, 12]. While consumers often associate SFSCs with sustainability, these perceptions do not necessarily correspond to objectively superior environmental outcomes, as sustainability performance involves complex trade-offs across environmental, economic, and social dimensions [13, 14].

While SFSCs primarily refer to the organisational structure of the supply chain, particularly the limited number of intermediaries between producers and consumers, local food is more closely linked to the geographical proximity of production and consumption [3]. However, the definition of “local” varies across countries, regions, and even states, depending on distance thresholds, administrative boundaries, policy frameworks, and consumer perceptions [15]. Since the beginning of the 2000s, consumer interest in locally produced food has increased [16-20]. Many studies confirm that consumers are willing to pay a premium for local products [16, 21-23]. Price and quality primarily drive demand for local food; if local food is perceived as superior, consumers are more likely to pay a premium for it. Consumers are also motivated to buy local food because they believe that buying local products helps local farmers and that local food is better for the environment [24].

SFSCs are also important venues for producers and FMs represent one of the most visible and widely researched forms of these chains as they allow

producers to obtain a price premium through direct sales. They promote entrepreneurial skills and information dissemination intended to satisfy consumer preferences [25-27].

FMs are the oldest and most popular type of SFSCs, and one of the most common retail outlets for local products [20, 28]. The renaissance of modern FMs began in the 1970s [29]. In the USA and Canada, government regulations encouraged the strengthening of FMs [30], which trend has continued ever since. In Europe, FMs began to regain their strong earlier position in the 1980s [2], and recent studies continue to emphasise the role of SFSC outlets and direct marketing channels in supporting local food systems and sustainable rural development [11, 28].

From a broader sustainability perspective, FMs can be linked to several objectives of the United Nations Sustainable Development Goals (SDGs), although this relationship should be interpreted as a potential contribution rather than direct evidence of impact. By supporting local food access, small-scale producers, localised food provisioning systems, and shorter supply chains, FMs are relevant to discussions on SDG 2 (Zero Hunger), SDG 8 (Decent Work and Economic Growth), SDG 11 (Sustainable Cities and Communities), and SDG 12 (Responsible Consumption and Production) [8, 31].

Although the literature on FM consumers is abundant, studies focus primarily on American consumers, and European FMs are underrepresented, despite

their strong historical and cultural role in European food systems [32, 33]. More broadly, a substantial body of literature has examined consumers' WTP within SFSCs, including several European studies [34]. However, harmonised cross-country evidence on consumers' WTP for FMs in Europe remains limited. This gap persists partly because FMs are embedded in different national food retail systems, institutional settings, and local food traditions, while previous studies often apply different product contexts, attributes, and methodological designs. As a result, WTP studies are often single-country analyses or focus primarily on the United States, making it difficult to assess whether FMs generate comparable consumer value across different European food retail contexts. Against this background, the present study addresses this gap by applying the same discrete choice experiment to analyse consumers' WTP for FMs in three European countries: Hungary, Italy and the United Kingdom.

The study contributes to the literature in three ways. First, it provides harmonised cross-country evidence on consumers' WTP for FMs in three European countries using the same experimental design. Second, in addition to estimating overall WTP premiums for farmers' markets, the study investigates preference heterogeneity through latent class modelling. This model-based segmentation approach allows us to identify consumer groups with distinct valuation patterns and to compare whether similar preference-based segments emerge across the three countries. Third, it links consumers'

valuation of FMs to the broader discussion on the economic viability of locally embedded SFSCs and their potential role in local food system sustainability.

2. Background

According to transactional utility theory, the WTP for the same product may differ at different points of sale [35]. This is particularly relevant in the case of FMs, which combine product-related attributes, such as freshness, origin and quality, with channel-related attributes, such as direct producer–consumer interaction, trust and local embeddedness [36, 37]. Numerous studies have therefore examined the relationship between points of sale and WTP, especially by comparing FMs with grocery stores, supermarkets and other retail formats (see Table 1).

Several studies indicate that consumers are willing to pay more for products purchased at FMs than for comparable products sold through conventional retail channels [38-43]. The FM is often associated with local products, producer proximity and freshness, and previous research suggests that the price premium is usually around 15–25% [32]. However, the empirical evidence is far from consistent. While many studies find higher WTP at FMs than at grocery stores or supermarkets [44-48], others report no significant differences across points of sale or show that preferences for local food are not necessarily tied to FMs as a specific channel [22, 49]. Other research even suggests that certain consumer groups prefer grocery stores [23, 50, 51] or supermarkets [52, 53], particularly when price sensitivity, income

constraints, or convenience considerations dominate purchasing decisions [54, 55].

These mixed findings indicate that the effect of FMs on WTP is neither universal nor unconditional. Rather than acting as an independent value driver, the point of sale appears to interact with product attributes, consumer characteristics, and contextual factors. Evidence suggests that visual quality, origin cues, different labels and perceived fairness may outweigh the market channel itself in shaping consumer valuation, while socio-demographic differences further contribute to heterogeneous outcomes across studies [23, 28, 56, 57]. In addition, the added value associated with FMs is likely to depend on service-related and relational conditions, such as trust in producers, the quality of producer–consumer interaction, and the physical environment of the point of sale. Previous research shows that trust is an important driver of consumer behaviour in SFSCs [58], while customer satisfaction is strongly shaped by the sales process and producers, and may be weakened by shortcomings related to place or purchase environment [59]. Accordingly, the FM premium should be interpreted as context-dependent: poorly maintained, unclean, or low-service-quality market environments may reduce the positive valuation usually associated with direct producer–consumer exchange.

Table 1: Studies of consumers' WTP for food at different points of sale

Authors	Method	Country	Point of Sales Investigated	Product focus
Toler et al. [22]	survey, field experiment	USA	grocery store, FM	general
Onken et al. [44]	survey, choice experiment	USA	grocery store, **FM**	strawberries preserves
Carroll et al. [49]	choice experiment	USA	grocery store, FM	tomatoes
Ellison et al. [42]	field experiments	USA	**FM, fresh format,** supercenter, supermarket	organic grapes tomatoes
Taylor & Villas-Boas [52]	survey, choice model	USA	**Superstore**, **Supermarket**, Grocery Store, Combo Retail, Convenience, FM, Restaurant, Fast Food	general
Lim et al. [56]	survey, choice experiment	USA	**supermarkets**, FM, online stores	beef
Printezis & Grebitus [51]	choice experiment	USA	FM, urban farm, **grocery store**	general
Czine et al. [48]	discrete choice experiment	Hungary	**FM**, butcher, hyper-/supermarket	pork sausages
Printezis & Grebitus [23]	choice experiment	USA	**Grocery store**, FM, Urban farm	general
Solanki & Inumula [47]	survey	India	**FM,** retail outlet, supermarket	general
Chenarides et al. [50]	survey, calibrated choice experiment	USA	FM, urban farm, **grocery store**	tomatoes
Qi et al. [46]	discrete choice experiment	USA	**FM,** grocery store	carrots

Seo & Hudson [45]	discrete choice experiment	USA	supermarket, **FM**, CSA	tomatoes
Horvath et al. [28]	discrete choice experiment	France	**farm sales**, FM, supermarket, farmer drive-through, CSA	fresh vegetables
Ortez et al. [57]	discrete choice experiment	USA	farmer's market, **direct from the farm** (sweet corn), or **retail/grocery store** (barbecue)	sweet corn Barbecue sauce

Notes: Points of sale associated with a higher WTP are marked in bold.

Since the present study uses apples as the examined product, apple-related WTP evidence is also relevant. Wang et al. [60] found that consumers were willing to pay significantly more for locally grown apples, especially when local origin was combined with organic production and certification. Other apple-focused choice studies also show that consumers' valuation of apples is shaped by price, origin, production method, health-related claims, packaging and other quality cues [61, 62]. These findings support the use of apples as a suitable fresh-produce context for examining how point of sale interacts with product attributes in consumer decision-making.

The existing literature does not provide a clear and consistent conclusion regarding whether consumers are systematically willing to pay a price premium at FMs. They differ in terms of product focus, retail formats, tested attributes and methodological approaches, which partly explains the variation in reported WTP premiums. While a substantial body of research reports positive WTP premiums associated with FMs, other studies

demonstrate context-dependent or non-significant effects, and in some cases even stronger preferences for alternative retail formats. Fruit- and apple-related studies further indicate that WTP premiums are not shaped by the retail channel alone, but by the interaction of point of sale with product-specific attributes such as origin, appearance, production method and certification. These inconsistencies in the empirical findings not only point to theoretical uncertainty regarding the existence of a systematic price premium at FMs, but also highlight two key limitations of existing research.

First, many studies focus on single countries, predominantly the United States, and often analyse only a limited number of markets. However, even US-based evidence may reflect substantial regional variation between urban and rural contexts, local food cultures, and market structures. Second, methodological heterogeneity across studies complicates direct comparison of results. These factors make it difficult to assess the generalisability of findings.

Our study therefore provides a comparative overview of FMs in three European countries where these markets have traditionally and historically played a distinguished role, despite substantial differences in food cultures across Central and Eastern Europe (Hungary), Mediterranean Europe (Italy), and Western Europe (the United Kingdom). Previous research indicates that the presence and importance of FMs are particularly strong in these regions, albeit for different historical and institutional reasons [32, 63, 64].

In Anglocentric contexts such as the United Kingdom, modern FMs have re-emerged and gained importance as alternative market channels following their decline during the expansion of hyper- and supermarkets [65, 66]. In Mediterranean countries such as Italy, FMs represent a long-established and traditional form of food retailing, closely linked to regional food cultures and origin-based quality schemes [65, 67]. In many Central and Eastern European countries, including Hungary, FMs have developed alongside traditional food self-provisioning practices and remain more locally embedded and institutionally fragmented [6].

Moreover, in all three selected countries, governmental incentives and policy interventions have contributed to the renaissance of FMs, resulting in a substantial increase in their number over the past three decades [68-70]. Comparing these three countries helps to better understand how consumers' WTP for FMs is shaped by differing cultural, institutional, and market environments. This is significant because very limited research in the European context has examined WTP in relation to FMs. The questionnaire and sampling procedure we used increased the comparability of results and involved less bias than single-country studies, while also enabling a more robust assessment of how consumer preferences may support more sustainable food systems.

3. Methods

3.1 Research process, description of sample

The focus of our research is consumers' valuation of FMs as points of sale. We examine this indirectly by eliciting consumer preferences and WTP for FM–related attributes of a typical FM product (apples) in a discrete choice experiment. Apples were selected because they are available at FMs in all three countries and were in season at the time of the survey.

To investigate consumer preferences for apples, we conducted a discrete choice experiment with the following attributes (Table 2):

Table 2: Attributes of the discrete choice experiment

Attribute	Attribute level	Description of attribute	Supporting literature
Point of sale	Farmers' market	Hypothetical point of sale of apples.	[32, 71, 72]
	Supermarket		
	Grocery store		
Appearance	Perfect	Perfectly sized and symmetrical apples.	[73-76]
	Slightly perfect	Apple with slight aesthetic imperfections.	
	Fully imperfect	Totally misshapen apple.	
Organic label	Yes	Whether the apple has the EU organic label.	[77, 78]
	No		
Geographical indication	Yes	Whether there is a geographical indication (either the EU GI logo in Hungary or Italy, or the UK	[77, 79, 80]
	No		

		GI logo in the United Kingdom) on the apple.	
Origin	Local	The apple comes from within a short distance (in accordance with national regulation, which usually means within 40 km in Hungary and the UK, and 70 km in Italy).	[77, 81]
	National	The apple originates within the country.	
	Imported	The apple originates from another country.	
Colour	Red	Colour of the apple.	[74, 82, 83]
	Green		
	Yellow		
	Mix of colour		
Price (local currency/kg)	329 Ft / €1.49 / £1.99	Price of apples per kilogram in local currency (Hungary: Hungarian Forint (Ft), Italy: Euro (€), and the UK: British Pound (£), respectively – reference year: 2023, based on real market data).	[72, 74, 75]
	659 Ft / €2.39 / £3.39		
	989 Ft / €3.29 / £4.69		
	1 299 Ft / €4.19 / £5.99		

After defining the attributes (and their levels) based on a review of the relevant literature on FMs and SFSCs, we tested the design of our discrete choice experiment through a pilot survey. This was implemented in October 2023 with 120 participants (n=40 in each country). The design of our experiment was based on a parameter combination of 16-3-7 (number of

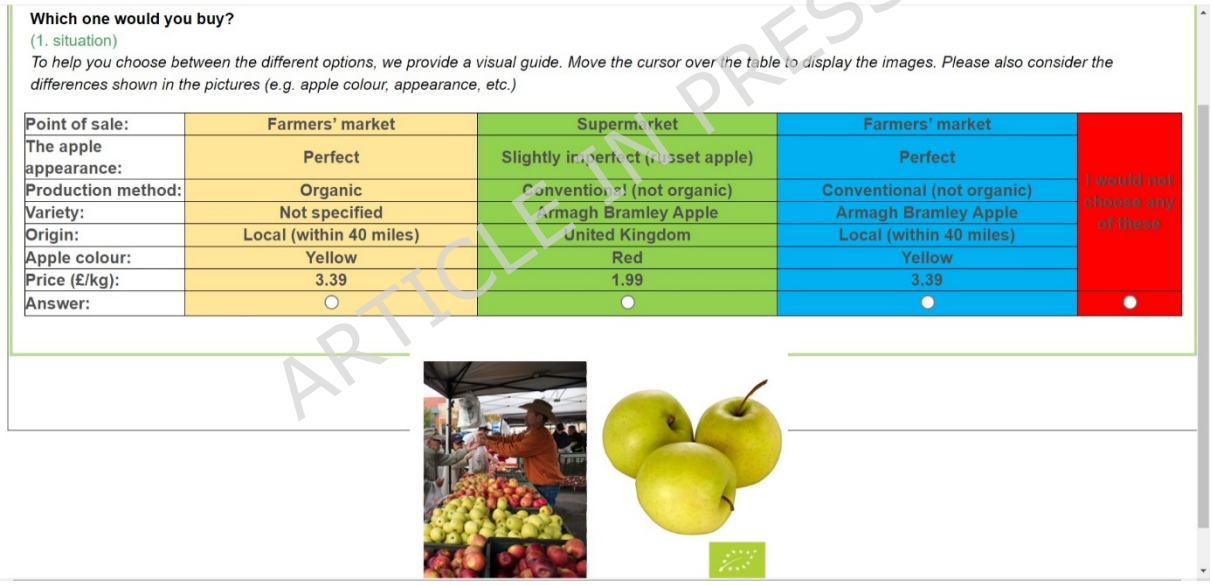
decision situations, number of alternatives included in decision situations, number of attributes characterizing the alternatives) in the context of a D-efficient experimental design [84]. Given the large number of decision situations, we used blocking in the pilot survey, arranging our 16 decision situations into two blocks, so that our respondents were confronted with only eight choice situations. In addition, to better replicate real market conditions in which consumers may decide not to purchase any of the offered alternatives, we included a "No choice" option in all choice sets, which may also help reduce hypothetical bias [85].

Data from the pilot survey were analysed using conditional logit (CL) model estimations by country. Based on these results, such as the fact that attributes like the aesthetic appearance of the apple did not affect decision making at all (in contrast to the results of previous research), we decided to make changes in the way we presented our decision situations (accordingly, we did not draw any major conclusions from our pilot survey, but nor did we find any reason to exclude any attributes).

Instead, we used a mixed version of the approaches commonly used in discrete choice experiments: (1) presenting decision situations in tabular form, and (2) presenting decision situations with visual alternatives, without visual illustrations. Basically, the alternatives included in the decision situations were presented to the respondents in tabular (no picture) form, but when they zoomed in on the alternative (using the computer cursor or its smart device equivalent), they were presented with a picture of the

alternative. An example of this is shown in Figure 1. The decision scenarios were introduced with the following text: "*Please imagine the situation that you want to buy apples. Let's say you have to choose between three types of apples, all of which are the same size but differ in some of their product attributes. Please decide which of the three options you would select, or mark 'no choice' if you would not buy any of them. You will be presented with eight different FICTITIOUS decision scenarios. Please consider each decision-scenario as a completely independent one from the others!".*

Figure 1: Example of a decision situation



Our experimental design for the final survey was also D-efficient, again with three apple options (with seven attributes) and one no-choice option. The final experimental design achieved a D-error of 0.1226, indicating a high level of statistical efficiency of the design. As an additional check on the number of choice situations, we considered a simple rule-of-thumb based on the number

of estimable parameters [86]. In the main-effects specification, the design included 13 parameters to be estimated, including the no-choice constant. Since each choice situation included three apple alternatives and one no-choice option, the calculation gives $13 / (4 - 1) = 4.33$, suggesting a minimum of approximately five choice situations. Even when this rounded value is multiplied several times to ensure greater variability, the 32 choice situations used in the final design clearly exceeded this benchmark while maintaining a manageable respondent burden. Compared with the pilot survey, the number of choice situations was increased from 16 to 32 in order to generate more variability in the data. Accordingly, the number of blocks was doubled to four, so each respondent evaluated eight choice situations.

Data were collected through an online survey in October-November 2023 based on representative samples in Hungary (n=614), Italy (n=600), and the UK (n=600). Participants were recruited by a market research company called Szinapszis Ltd., a member of the Quercus Consulting Group. A stratified quota sampling procedure was applied using marginal quotas for age, gender, education, region and settlement type. During the recruitment process, two filtering criteria were used to screen potential respondents: 1) currently residing in the respective country, and 2) being responsible or co-responsible for food purchases in the household.

The survey consisted of four main parts. The first section collected data on general socio-demographic characteristics (e.g., gender, age, etc.). The following section focused on general food purchasing habits (e.g., typical

place for food shopping). Then, we collected information on respondents' FM-related behaviour and attitudes. Respondents who had visited an FM in the previous six months were asked about their visit frequency, while those who had not were asked about their reasons for not visiting. The discrete choice experiment was presented to all respondents included in the analytical sample, regardless of whether they had visited an FM in the previous six months. However, the analytical sample was restricted to respondents who had purchased apples in the previous six months, therefore, all respondents participating in the DCE had recent apple purchasing experience. The final section collected the remaining (including specific socio-economic) information from respondents (e.g., occupation, income situation).

The details of the sample are presented in Table 3.

Table 3: Characteristics of the samples

	Total sample (*n*=1,814)	**HU sample** (*n*=614)	**IT sample** (*n*=600)	**UK sample** (*n*=600)
Gender (%)				
Female	51.16	50.33	51.00	52.17
Male	48.68	49.51	49.00	47.50
Other/Prefer not to say	0.17	0.16	0.00	0.33
Age				
Average (Median) [Standard deviation]	45.00 (45.00) [14.34]	44.55 (45.00) [14.43]	46.95 (48.00) [13.80]	43.52 (42.00) [14.59]

	Total sample (*n*=1,814)	**HU sample** (*n*=614)	**IT sample** (*n*=600)	**UK sample** (*n*=600)
Residence type (%)				
City	39.09	41.53	36.17	39.50
Medium/Large town	45.31	39.25	52.00	44.83
Village	15.60	19.22	11.83	15.67
Highest level of education (%)				
Lower secondary education or below	9.48	2.77	9.50	16.33
Upper secondary education or a college qualification below a degree	51.43	59.45	57.00	37.67
Higher education	39.09	37.79	33.50	46.00
Employment status (%)				
White-collar employee	41.73	42.35	38.17	44.67
Blue-collar employee	17.26	24.76	10.33	16.50
Self-employed/freelance	7.88	3.75	12.50	7.50
Retired/no longer working	11.36	15.64	9.17	9.17
Student	5.29	4.72	6.83	4.33
Homemaker	6.89	3.42	12.50	4.83

	Total sample (*n*=1,814)	**HU sample** (*n*=614)	**IT sample** (*n*=600)	**UK sample** (*n*=600)
Unemployed	7.17	3.42	9.83	8.33
Other	2.43	1.95	0.67	4.67
Number of persons living in the household (%)				
1 person	14.00	12.54	13.00	16.50
2 persons	32.30	39.74	25.00	32.00
3 persons	23.65	23.13	28.17	19.67
4 or more persons	30.04	24.59	33.83	31.83
Number of children in the household (%)				
No children	64.11	65.47	69.00	57.83
1 child	18.19	18.89	16.00	19.67
2 or more children	17.70	15.64	15.00	22.50
Subjective income status				
Average (Median) [Standard deviation]	20.28 (21.00) [7.68]	19.67 (20.00) [7.85]	20.91 (21.00) [7.35]	20.29 (21.00) [7.80]

Note: Subjective income status is calculated as the sum of responses to five statements adapted from the Consumer Financial Protection Bureau [87], measured on a seven-point agreement scale (1 = strongly disagree, 7 = strongly agree): (1) A large, unexpected expense would be difficult for me to handle; (2) I am just getting by financially; (3) In a given month, a gift intended for a wedding, birthday, or other event would burden me financially; (4) By the end of the month, I have no money left to spend; (5) Sometimes I have unpaid bills. Higher values indicate higher financial vulnerability. The table reports the mean, median, and standard deviation of the aggregated score.

3.2 Discrete choice modelling

The method used to investigate consumer preferences (discrete choice experiment - DCE) is a stated preference (SP) type procedure, which means that preferences are tested in a hypothetical (designed by the researcher) situation [88]. DCE decisions are analysed through so-called random utility theory (RUT), which decomposes total utility into a systematic (observable) and a random (unobservable) part according to **Equation 1** and in most cases assumes random utility maximization (RUM) [89].

$$U_{n,i,t} = V_{n,i,t} + \varepsilon_{n,i,t}, \quad (1)$$

where U represents the total utility, V the observable part of the utility, ε the random part of the utility, n *the* individual, i the alternative, and t the decision situation.

A major issue in modelling DCEs is always the issue of handling preference heterogeneity, for which a commonly used approach is so-called latent class modelling (LC modelling) [90]. In LC modelling, groups with different preferences are formed, within which the preferences of the members are treated homogeneously, similar to one of the most basic conditional logit (CL) models. In the case of LC modelling, the systematic part of the utility is modified from the standard CL specification (**Equation 2**) according to **Equation 3** [91, 92].

$$V_{n,i,t} = \beta' X_{n,i,t}, \quad (2)$$

where X is the vector of observed attributes and β' is the parameter vector estimated for the observed attributes.

$$V_{n,i,t} = \beta_q^{'} X_{n,i,t}, \quad (3)$$

where $\beta_q^{'}$ is the parameter vector estimated for the observed attribute for the q-th class.

For our modelling, we derived the utility function in **Equation 4** from **Equation 3.**

$$\begin{aligned} V_{n,i,t} = ASC_i + \beta_{Farmers'market,q_{Point\ of\ sale}} Farmers'\ market_{Point\ of\ sale_{n,i,t}} + \\ \beta_{Supermarket,q_{Point\ of\ sale}} Supermarket_{Point\ of\ sale_{n,i,t}} + \beta_{Perfect,q_{Ugliness}} \\ Perfect_{Ugliness_{n,i,t}} + \beta_{Slightly\ perfect,q_{Ugliness}} Slightly\ perfect_{Ugliness_{n,i,t}} + \\ \beta_{Organic,q_{Label}} Organic_{Label_{n,i,t}} + \beta_{GI,q_{GI\ indication}} GI_{GI\ indication_{n,i,t}} + \beta_{Local,q_{Origin}} \\ Local_{Origin_{n,i,t}} + \beta_{National,q_{Origin}} National_{Origin_{n,i,t}} + \beta_{Red,q_{Colour}} Red_{Colour_{n,i,t}} + \\ \beta_{Green,q_{Colour}} Green_{Colour_{n,i,t}} + \beta_{Yellow,q_{Colour}} Yellow_{Colour_{n,i,t}} + \beta_{Price,q} Price_{n,i,t}, \end{aligned} \quad (4)$$

where ASC_i is the alternative-specific constant estimated for the i-th alternative, and βs denote the coefficients estimated for the attributes for the q-th class. In our modelling, we used a dummy specification for categorical attributes, so that for these attributes we always treated one category as the reference category: namely, grocery store (point of sale), fully imperfect (appearance), no organic (organic label), no GI (GI indication), imported (origin), mix of colour (colour).

In addition to the estimation of utility coefficients, WTP calculations were carried out using a WTP-space approach [93]. To this end, the specification of **Equation 4** was modified – see **Equation 5.**

$$V_{n,i,t} = ASC_i + \beta_{Price,q} * (WTP_{Farmers'market,q_{Point\ of\ sale}} Farmers'market_{Point\ of\ sale_{n,i,t}} + WTP_{Supermarket,q_{Point\ of\ sale}} Supermarket_{Point\ of\ sale_{n,i,t}} + WTP_{Perfect,q_{Ugliness}} Perfect_{Ugliness_{n,i,t}} + WTP_{Slightly\ perfect,q_{Ugliness}} Slightly\ perfect_{Ugliness_{n,i,t}} + WTP_{Organic,q_{Label}} Organic_{Label_{n,i,t}} + WTP_{GI,q_{GI\ indication}} GI_{GI\ indication_{n,i,t}} + WTP_{Local,q_{Origin}} Local_{Origin_{n,i,t}} + WTP_{National,q_{Origin}} National_{Origin_{n,i,t}} + WTP_{Red,q_{Colour}} Red_{Colour_{n,i,t}} + WTP_{Green,q_{Colour}} Green_{Colour_{n,i,t}} + WTP_{Yellow,q_{Colour}} Yellow_{Colour_{n,i,t}} + Price_{n,i,t}), \quad (5)$$

where *WTP* is the estimated willingness-to-pay coefficient for a given attribute.

Ngene 1.2 software was used to create the D-efficient experimental design, while all conditional logit, latent class and WTP-space model estimations were performed in R using the Apollo package [94-97].

The relationship between the groups defined by LC modelling and certain sociodemographic variables (largely present in the sample presentation) was tested using Pearson's Chi-square test, a non-parametric statistical procedure. The null hypothesis of the test (H_0) assumes the independence of the variables under investigation (provided they are measured at the ordinal level) [98]. The probability of committing a Type I error for the test was maximized at 10% (α=10%).

3.3 Justification of the modelling strategy

To enhance the transparency and accessibility of the methodological approach, the following section briefly justifies the choice of the focal product, as well as the modelling and estimation strategies applied in the analysis.

Justification for selecting apples as the focal product

Although the focus of the study are FMs as points of sale, their valuation cannot be examined directly without embedding them in a concrete purchasing context within the discrete choice framework. For this reason, a single, typical product was selected to operationalise FMs empirically in the modelling process. Apples represent a widely available and commonly purchased FM product in all three countries examined. As a fresh, unprocessed food item, apples allow consumers to base their choices on clearly interpretable attributes – such as origin, appearance, certification labels and point of sale – without product-specific technological complexity. Moreover, apples are neither niche nor luxury products, making them suitable for analysing FM–related preferences in a general, everyday purchasing context. Accordingly, the purpose of using apples is not to study preferences for this product per se, but to provide a neutral and consistent empirical vehicle through which consumers' valuation of FMs and alternative sales channels can be examined within the applied modelling strategy.

Latent class modelling

Consumer decisions related to FMs and SFSCs are often structured along different value orientations, attitudes and patterns of price sensitivity. Consequently, accounting for preference heterogeneity is a key methodological concern in this type of research. Latent class modelling allows consumers to be grouped into discrete and well-differentiated segments with relatively homogeneous preference structures within each group. This approach is particularly suitable in the context of FMs, where consumer motivations tend to cluster around distinct patterns (such as price-sensitive, quality-oriented or value-driven consumer groups), rather than varying smoothly along a continuous scale.

WTP-space estimation

WTP was estimated in WTP space rather than preference space. The primary motivation for this choice is that WTP estimates derived from preference-space models are typically calculated as the ratio of non-price coefficients to the price coefficient, which may result in unstable or extreme values, particularly in the presence of heterogeneous preferences. Estimating the model directly in WTP space avoids these issues by treating WTP as a model parameter, leading to more robust and methodologically sound estimates. This approach is especially appropriate in studies where the magnitude of price premiums and WTP constitutes a central research question.

Attribute non-attendance

Attribute non-attendance was not explicitly addressed in the present study, as the survey did not include follow-up questions on whether respondents ignored specific attributes during the choice tasks. This issue is therefore acknowledged as a methodological limitation of the analysis.

4. Results

4.1. Preference space estimates for the countries under study

In the first stage of our analysis, we performed discrete choice modelling with the following structure:

1. Conditional logit (CL) model estimation for the Hungarian, Italian, and British samples
2. Latent class (LC) model estimation for the Hungarian sample
3. Latent class (LC) model estimation for the Italian sample
4. Latent class (LC) model estimation for the British sample

The results of the CL model estimates for the three countries under study are presented in **Table 4.**

Table 4: Preference-space estimates based on CL specification for the countries under survey

Attributes and Model Details	**CL estimates**					
	Hungary		**Italy**		**UK**	
	Coeff.	**S.E.**	**Coeff.**	**S.E.**	**Coeff.**	**S.E.**
ASC no choice	-1.41***	0.11	-1.80***	0.12	-2.00***	0.11

Farmers' market	0.37***	0.05	0.18***	0.05	0.28***	0.05
Supermarket	-0.02	0.06	0.01	0.06	-0.00	0.05
Perfect	0.61***	0.08	0.25***	0.08	0.15**	0.08
Slightly perfect	0.19***	0.05	0.10	0.05	0.08*	0.05
Organic	-0.07*	0.04	0.21***	0.05	0.07*	0.04
GI	0.40***	0.05	0.40***	0.04	0.25***	0.05
Local	0.48***	0.06	0.46***	0.06	0.33***	0.07
National	0.26***	0.07	0.29***	0.08	0.10	0.08
Red	0.17***	0.04	-0.08**	0.04	0.01	0.05
Green	0.04	0.06	0.07	0.06	0.09*	0.06
Yellow	-0.10*	0.07	0.09*	0.07	-0.01	0.07
Price	-0.21***	0.01	-0.65***	0.04	-0.49***	0.03
Observations	4 912		4 800		4 800	
PsR-squared	0.12		0.12		0.12	
Log-likelihood (0)	-6 809.48		-6 654.21		-6 654.21	
Log-likelihood (final)	-5 947.79		-5 856.00		-5 847.08	
AIC	11 975.58		11 737.99		11 720.17	
BIC	12 060.07		11 822.19		11 804.36	

Note: S.E. denotes robust standard errors.; ASC represents the alternative-specific constant.; ASC choice, Grocery store, Fully imperfect, No organic label, No geographical indication, Imported, Mix of colour were defined as the reference categories in the estimates; ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively; AIC denotes the Akaike Information Criterion.; BIC denotes the Bayesian Information Criterion. For the Hungarian sample, the price has been rescaled in the database (divided by 100).

Based on the CL model estimates reported in Table 4, the alternative-specific constant is negative in all three countries, indicating that the "no choice"

option was less preferred by respondents than the purchase alternatives. The results further show that several product attributes significantly contribute to consumer choice across all three countries. Purchasing apples at FMs, local origin, and the presence of geographical indication (GI) labels are associated with positive utility across countries, while the valuation of organic labels differs across contexts. In addition, preferences for perfect appearance are positive and significant across all three countries, indicating that visual quality constitutes an important decision factor regardless of the point of sale.

Cross-country differences primarily emerge in the sign and statistical significance of specific attribute levels. Preferences regarding apple colour differ markedly across countries, while organic labels are positively valued in Italy and the United Kingdom but exhibit a negative sign in the Hungarian sample. These differences indicate that the effects of individual product attributes on consumer choice vary across national contexts.

As part of our LC modelling, we examined samples from all three countries, and in all three cases, we chose the three-class LC model**.** Details are provided in the Appendix Table 1-6.

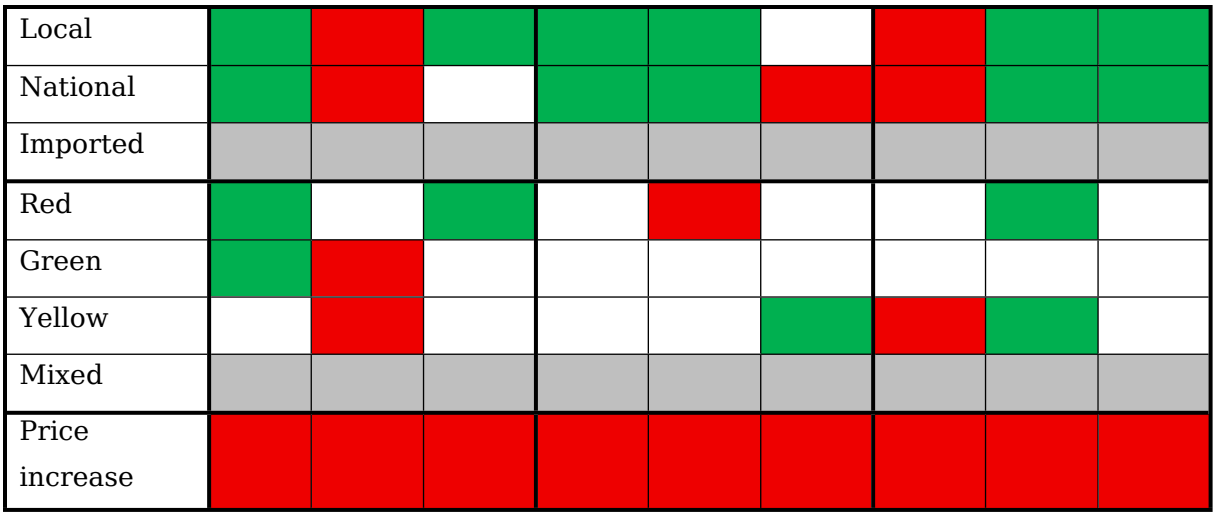
Summary description of the clusters in the three countries

The results obtained from the latent class modelling were interpreted as consumer segments in order to analyse preference heterogeneity in a more informative way. To this end, rather than treating the classes merely as

statistical groupings, descriptive labels were assigned to each class. These labels were developed on the basis of the dominant WTP patterns and, where relevant, the sociodemographic characteristics of the classes. Table 5 provides a summary of how the effects of significantly positive, significantly negative, and non-significant attributes were evaluated across the countries. LC1, LC2 and LC3 denote the three latent classes identified within each country-specific model; the percentages in parentheses indicate the proportion of respondents assigned to each class.

Table 5: Summary table – characteristics of clusters

	Hungary			**Italy**			**UK**		
	LC1 (44 %)	LC2 (25%)	LC3 (31%)	LC1 (36%)	LC2 (25%)	LC3 (39%)	LC1 (38%)	LC2 (34%)	LC3 (28%)
Farmers' market									
Supermarket									
Grocery store									
Perfect									
Slightly perfect									
Fully Imperfect									
Organic									
Non organic									
GI									
No GI									



In the figure, the reference category of the attributes is marked in grey. The white colour indicates that there is no significant effect compared to the reference level. The green colour indicates that there is a significant preference for the level compared to the reference level. Red indicates that the level is significantly less preferred than the reference level.

Based on the identified latent classes, in Hungary, Class 1 (**local and national origin-oriented consumers**) can be described as consumers attached to local and national origin. Members of this segment positively evaluate local and national origin, while also being more tolerant of imperfections in external appearance. In Class 2 (**visual appearance-oriented consumers**), external appearance comes to the fore, as members of this segment primarily prefer products with perfect visual appearance. At the same time, products with a geographical indication continue to be evaluated positively, whereas organic labelling is associated with a negative preference. Consumers belonging to Class 3 (**farmers' market-oriented premium consumers**) can be interpreted as premium-oriented consumers

with a strong preference for farmers' markets, as they show stable positive preferences for products purchased at farmers' markets, with perfect appearance, local origin and geographical indication labelling.

In Italy, Class 1 (**origin- and certification-oriented consumers**) can be interpreted as an origin- and certification-oriented consumer group, as their preferences are primarily shaped by local and national origin, organic production and geographical indications. The main difference between Class 2 (**visual quality-oriented mainstream consumers**) and Class 1 is that, in this group, consumers primarily prefer products with perfect external appearance. Finally, the third Italian class, Class 3 (**farmers' market- and visual-quality-oriented premium consumers**), can be described as premium-oriented consumers who favour farmers' markets and visual quality. This is because positive preferences are observed in this class for farmers' markets, perfect external appearance and products with geographical indication labelling.

In the United Kingdom, Class 1 (**farmers' market- and certification-oriented premium consumers**) represents a group of premium-oriented consumers. This can be explained by the fact that members of this class show stable positive preferences for farmers' markets, perfect external appearance, organic production and geographical indications. The preferences of Class 2 (**local- and national-origin-oriented, imperfectness-tolerant consumers**) are primarily shaped by local and national origin, while consumers belonging to this class are less attached to

perfect visual appearance. Members of Class 3 (**origin-oriented but certification-sceptical consumers**) are characterised by origin orientation, but also by scepticism towards certification. This is because members of this class positively evaluate local and national origin, while showing a negative attitude towards products with geographical indication labelling.

Overall, the results indicate that preferences are not uniform across the three countries examined. Based on the latent classes, preference heterogeneity is reflected not only in the different evaluation of individual attributes, but also in the different ways these attributes are combined. In some countries, origin-related attributes play a more decisive role in distinguishing consumer segments, while in others visual quality, certifications or the farmers' market sales channel are more important.

Although the latent classes were estimated separately for each country and therefore should not be interpreted as statistically identical groups, comparable preference patterns can be identified across countries. Origin-oriented segments are present in all three countries, while farmers' market- and quality-oriented premium segments can also be observed, although their specific attribute combinations and sociodemographic profiles differ by national context.

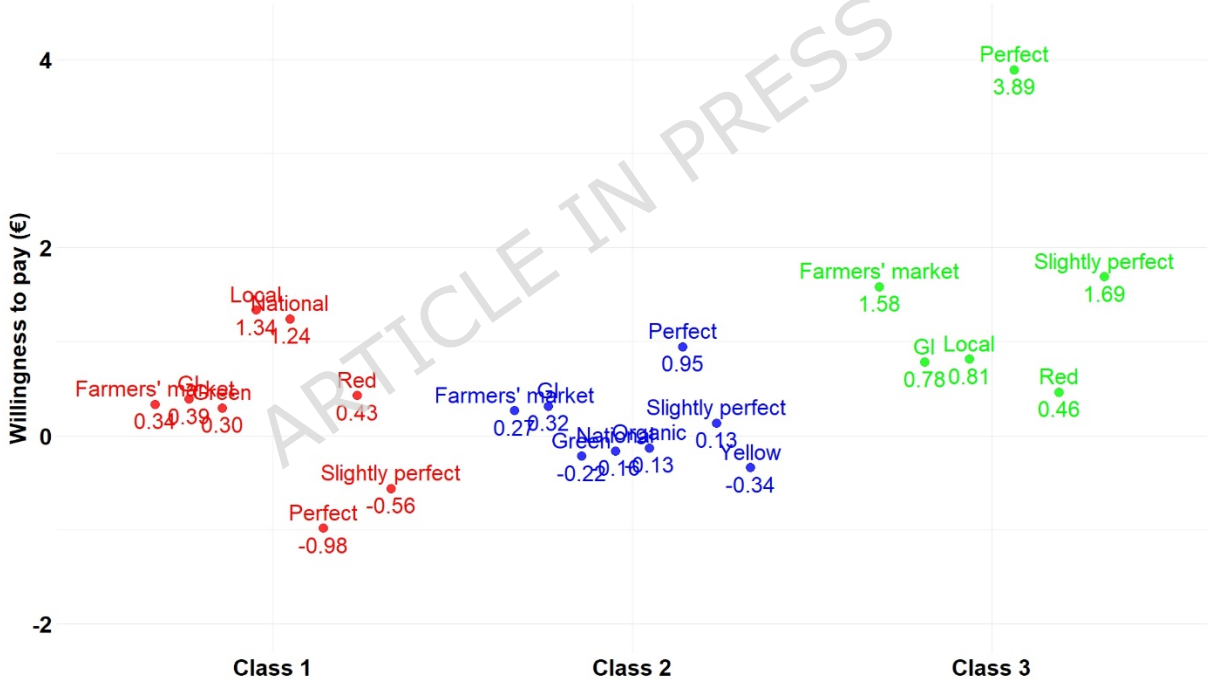
4.2. WTP space estimates for the countries under examination

In the next stage of our analysis, we estimated WTP for the classes constructed for the three countries.

Hungary

The WTP values for the classes constructed for the Hungarian sample are illustrated in **Figure 2.**

Figure 2 WTP estimates for the classes in the Hungarian sample



Note: Only WTPs with a significance level of at least 10% are presented in the figure; Grocery store, Fully imperfect, No organic label, No geographical indication, Imported, Mix of colour were defined as the reference categories in the estimates.

Figure 2 shows that Class 1 (**local and national origin-oriented consumers**) has a relatively high WTP for national products (approximately

€1.24) and local products (approximately €1.34) compared to imported ones. However, they would pay about € 0.98 more for a fully imperfect product than a perfect product.

The preferences of the members of Class 2 (**visual appearance-oriented consumers**) are almost completely the opposite for the appearance trait. Members of this group would pay approximately €0.95 more for a perfect product than a fully imperfect one.

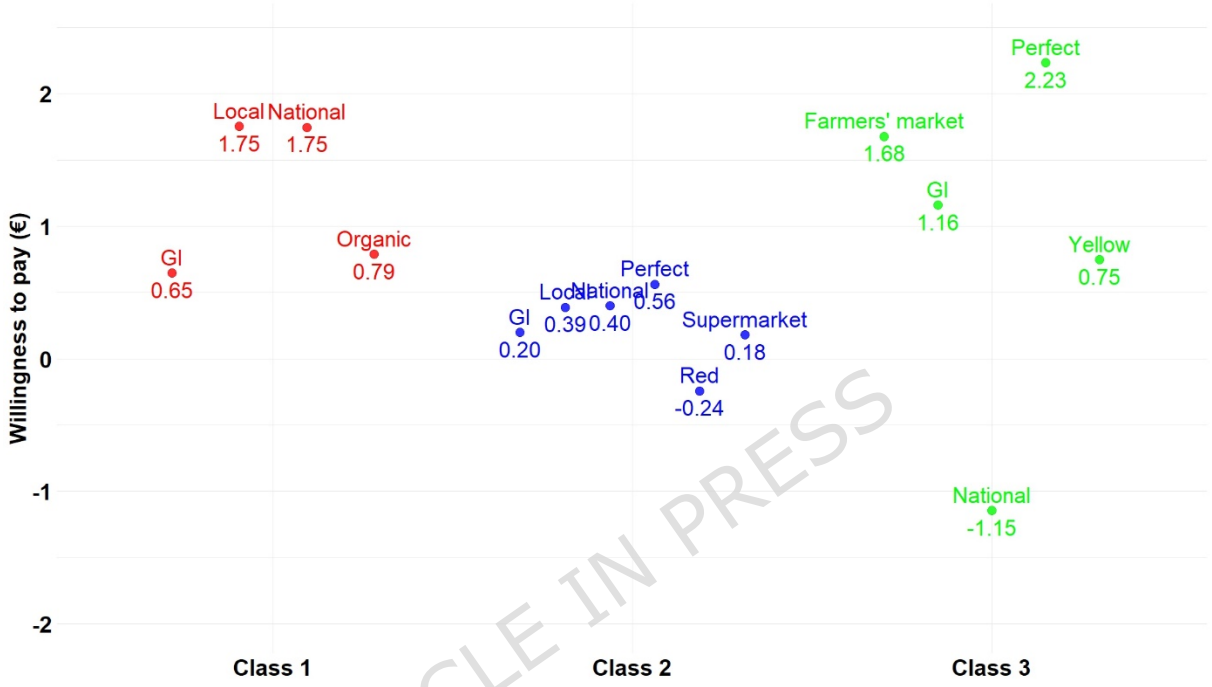
Respondents in Class 3 (**farmers' market-oriented premium consumers**) also exhibit (as in Class 2) a higher WTP for a perfect product (approximately €3.89 more than a fully imperfect one). Members of the group also show a fairly high WTP for products from an FM (approximately €1.58 more than for grocery store products), local (approximately €0.81 more than for imported products), and GI-labelled products (approximately €0.78 for the label).

Across countries, the class-specific WTP profiles shown in Figures 2–4 indicate heterogeneity in how different attributes underpin consumer valuation patterns: some classes are characterised by positive WTP for origin-related attributes (e.g., local or national origin), whereas other classes exhibit positive WTP for appearance-related attributes (e.g., perfect appearance). This highlights that different attributes drive valuation patterns across latent classes within countries.

Italy

The WTP values of the classes constructed for the Italian sample are illustrated in **Figure 3.**

Figure 3 WTP estimates for the classes in the Italian sample



Note: Only WTPs associated with a significance level of at least 10% are presented in the figure.; Grocery store, Fully imperfect, No organic label, No geographical indication, Imported, Mix of colour were defined as the reference categories in the estimates.

The results displayed in Figure 3 show that for the first class (**origin- and certification-oriented consumers**) of Italian respondents, the highest WTP (approximately €1.75) is for the traits of local and national origin compared to the imported products. There is also a positive WTP premium for the presence of organic and GI labels (approximately €0.79 for organic and approximately €0.65 for GI).

With Class 2 (**visual quality-oriented mainstream consumers**), as in the first class, a positive WTP for local, national, and GI properties is present, but it is significantly weaker. However, the greatest WTP for this class is for a perfect product (approximately €0.56 more for a perfect product than a fully imperfect one).

For the third class (**farmers' market- and visual-quality-oriented premium consumers**), we identify a relatively high WTP for a perfect product (about €2.23 WTP premium compared to fully imperfect), FM (about €1.68 more than apple from grocery store), GI label (about €1.16 WTP premium if label is present) and yellow colour (about €0.75 WTP premium compared to a mix of colours) attributes.

United Kingdom

The WTP values for the classes constructed for the British sample are illustrated in Figure 4.

Figure 4 WTP estimates for classes in the British sample

Note: Only WTPs associated with a significance level of at least 10% are presented in the figure.; Grocery store, Fully imperfect, No organic label, No geographical indication, Imported, Mix of colour were defined as the reference categories in the estimates.

Figure 4 shows that for Class 1 (**farmers' market- and certification-oriented premium consumers**), the ideal apples (i.e., highest WTP) would be perfect (approximately €4.36 more than for a fully imperfect apple), from an FM (approximately €2.59 more than a grocery store), and have a GI label (approximately €1.88 more than a non-GI label). There is also a significant WTP for imported apples. The WTP of -2.69 € for the national category is approximately how much less respondents would pay if the apple were national rather than imported.

For Class 2 (**local- and national-origin-oriented, imperfectness-tolerant consumers**), the opposite conclusion can be drawn regarding the origin of

the apples. Respondents would pay around €2.21 more for national and €2.89 more for local apples, compared to imported apples. It is also interesting to note that the group members would pay approximately €3.97 more on average for fully imperfect apples (fixed as the reference category), compared to perfect ones.

In the case of Class 3 (**origin-oriented but certification-sceptical consumers**), we observe a reduction in the number of significant WTP estimates, with significant values only for GI mark and origin. For the former, there is a WTP premium of around €0.17 among respondents for a product without GI (compared to one with GI). For the latter, the WTP is approximately 0.70 € for national origin and 0.76 € for local origin compared to imported products.

4.3. Characteristics of the LC modelling classes

The characteristics of the groups identified for each country were examined in the next step of our analysis based on the characteristics (and three statements about farmes' market) presented in Table 3. The characteristics of the classes delimited for the samples are presented in Table 6.

Table 6 Characteristics of classes based on latent class modelling

	Hungary			**Italy**			**UK**		
	Class 1 (44 %)	**Class 2** (25 %)	**Class 3** (31 %)	**Class 1** (36 %)	**Class 2** (25 %)	**Class 3** (39 %)	**Class 1** (38 %)	**Class 2** (34 %)	**Class 3** (28 %)

Gender (%)									
Female	48.47	53.85	50.10	49.40	53.91	50.62	51.86	50.72	54.33
Male	51.50	45.57	49.89	50.60	46.09	49.38	48.14	49.27	44.49
Other/Prefer not to say	0.03	0.58	0.01	0.00	0.00	0.00	0.00	0.01	1.18
Age category (%)									
18–24	8.83	9.91	12.03	6.81	2.84	**12.77**	**18.76**	9.62	4.49
25–34	20.03	13.55	18.98	14.03	7.19	**20.39**	**32.65**	19.03	9.92
35–44	21.47	19.40	21.13	18.12	17.79	18.03	**23.72**	17.90	15.10
45–54	23.63	22.72	23.26	23.09	**29.95**	19.37	12.77	24.21	**25.33**
55–64	16.20	19.70	12.62	26.68	**32.32**	20.96	8.71	21.54	**25.76**
65–70	9.84	14.72	11.98	11.27	9.91	8.48	3.39	7.70	**19.40**
Education level (%)									
Lower secondary education or below	2.93	2.55	2.71	9.04	11.57	8.62	10.85	19.10	20.43
Upper secondary education or a college qualification below a degree	56.43	59.86	63.35	55.19	60.98	56.14	38.05	38.16	36.55
Higher education	40.64	37.59	33.94	35.77	27.45	35.24	**51.10**	42.74	43.02
Residence (%)									
City	40.86	45.16	39.55	34.54	31.43	40.65	**47.07**	38.91	29.93
Medium/Large town	38.22	39.65	40.38	51.32	59.11	48.12	40.66	42.66	**53.13**

Village	20.92	15.19	20.07	14.14	9.46	11.23	12.27	18.43	16.94
Household size (%)									
1 person	12.45	14.38	11.19	14.15	13.25	11.79	10.59	15.42	**25.83**
2 persons	38.54	45.61	36.70	23.20	33.01	21.57	24.70	36.42	36.58
3 persons	23.19	21.64	24.24	27.97	21.08	32.82	20.95	19.59	18.01
4 or more persons	25.82	18.37	27.87	34.68	32.66	33.82	**43.76**	28.57	19.58
Income level category (%)									
Very high	12.92	16.68	17.04	11.12	12.02	10.66	9.71	12.65	**22.65**
High	9.28	5.56	11.23	5.13	9.70	4.03	5.02	7.72	8.22
Medium high	14.29	16.83	13.94	12.96	11.96	10.73	12.91	11.61	13.62
Medium low	14.81	12.54	14.06	17.13	15.41	17.46	16.87	12.49	13.11
Low	13.57	15.07	14.81	16.11	13.69	13.97	12.27	16.65	11.96
Very low	35.13	33.32	28.92	37.55	37.22	43.15	**43.22**	38.88	30.44
At farmers' markets the farmers receive a fairer price, than selling it through a supermarket. (%)									
Strongly disagree	2.38	1.94	2.41	1.95	1.46	1.96	2.14	0.55	0.60
Disagree	4.78	2.84	2.50	3.35	3.10	4.74	4.86	2.37	2.42
Somewhat disagree	9.99	7.11	7.43	5.05	8.59	9.04	6.55	5.08	3.39
Neither agree nor disagree	13.88	17.44	16.65	17.25	25.31	14.92	12.61	14.17	17.47

Somewhat agree	16.78	24.57	17.82	39.73	34.17	36.72	33.56	28.82	29.57
Agree	31.39	22.83	34.23	22.11	19.07	21.20	24.05	30.54	30.30
Strongly agree	20.80	23.27	18.96	10.56	8.30	11.42	16.23	18.47	16.25

Note: Numbers highlighted in bold indicate that the Pearson's adjusted residual is greater than 2 for the significant Chi-square test. Income level categories are based on the aggregated subjective income score described in Table 3. The summed scores were converted into percentages and categorized as follows: 0–29 very low; 30–37 low; 38–49 medium low; 50–57 medium high; 58–67 high; 68–100 very high. For ease of interpretation, category labels were reversed, as higher scores indicate worse financial conditions. Accordingly, “very low” refers to the weakest income situation, while “very high” indicates the most stable income situation.

The sociodemographic characterisation of the previously identified latent classes provides further insight into the structure of preference heterogeneity across the three countries examined. In Hungary, no significant association was identified between class membership and the sociodemographic variables examined. This suggests that the differences between the Hungarian segments are not strongly structured along the observed sociodemographic characteristics.

In Italy, class membership is significantly associated only with age. This is reflected in the fact that respondents under the age of 35 are more frequently represented in Class 3 (farmers’ market- and visual-quality-oriented premium consumers), while respondents aged 45–64 are more common in Class 2 (visual quality-oriented mainstream consumers). This suggests that, in Italy, the joint valuation of farmers’ markets and visual quality is more

characteristic of younger consumers, whereas the more moderate, visual-quality-oriented segment is more strongly represented among middle-aged and older respondents.

In the United Kingdom, the latent classes are more clearly differentiated by sociodemographic characteristics. Class 1 (farmers' market- and certification-oriented premium consumers) includes a higher proportion of respondents under the age of 44, respondents with higher education, urban residents, members of larger households, and consumers in a less favourable income situation. By contrast, Class 3 (origin-oriented but certification-sceptical consumers) includes a higher proportion of older respondents, single-person households, and respondents in a more favourable income situation. These results suggest that preference heterogeneity in the United Kingdom is more strongly structured along sociodemographic characteristics than in Hungary or Italy.

Regarding perceived price fairness at farmers' markets, we tested the following statement among consumers: "At farmers' markets the farmers receive a fairer price, than selling it through a supermarket". Since the link between the statement on FMs and the classes could not be correctly tested in the present form (the condition of the Chi-squared test that a maximum of 20% of the cells should have an expected frequency below five and there are no cells with an expected frequency of below one was violated [98]), the seven (agreement) categories originally used for the statement were reduced to three as follows: (1) Strongly Disagree + Disagree + Somewhat Disagree =

Disagree; (2) Neither Agree nor Disagree = **Neither Agree nor Disagree**; (3) Strongly Agree + Agree + Somewhat Agree = **Agree**.

The data indicate that the majority of respondents fall into the 'Agree' category, particularly in Hungary, where the highest levels of agreement are observed. For example, combining the three agreement subcategories, the levels of agreement are 68.97% in Hungary, 60.86% in Italy, and 62.05% in the UK. This suggests that there is general agreement that farmers receive fairer prices at FMs. The proportion of respondents in the 'Disagree' category is considerably smaller in all countries, typically less than 15%, indicating minimal disagreement with the statement. Meanwhile, the proportion of respondents who neither agree nor disagree is moderate, ranging between 13% and 25% across countries, reflecting respondents' uncertainty or neutrality.

Overall, these results indicate broad agreement with the statement that farmers receive fairer prices at FMs. However, some variability exists across countries, with differences in the distribution of responses. For example, in Italy, the "Somewhat agree" category accounts for a higher proportion of responses than in other countries, suggesting more cautious agreement among Italian consumers.

Taken together, these findings show that the latent classes differ not only in their attribute-level preferences, but also in the extent to which they are socially structured across countries: weakly in Hungary, mainly by age in

Italy, and more broadly by several sociodemographic characteristics in the United Kingdom.

5. Discussion

This study provides comparative empirical evidence on consumers' WTP for apples purchased at FMs in three European countries. Using a discrete choice experiment, the analysis provides insight not only into the general magnitude of price premiums associated with FMs, but also into cross-country differences and heterogeneity in consumer preferences. By estimating WTP premiums for FMs within a harmonised experimental design, the study allows direct comparison across three distinct European food retail contexts. The study contributes to the literature on SFSCs by extending the predominantly single-country analyses to a cross-country European analysis.

From a sustainability perspective, these findings should primarily be interpreted in relation to the economic dimension of locally embedded food systems. The positive WTP premiums indicate that consumers may be willing to support FMs as market channels that can improve the economic viability of small-scale producers and strengthen short food supply chains. This is consistent with previous literature suggesting that SFSCs may contribute to local economic resilience, producer–consumer proximity and more transparent food provisioning systems [8, 11]. However, this should not be interpreted as direct evidence that FMs are environmentally more sustainable than conventional retail channels. Rather, our results show that

consumers assign economic value to a retail format that is often associated with local embeddedness, producer support and shorter supply chains.

A central finding of our results is that European consumers are generally willing to pay a premium for apples bought at FMs. FMs were preferred over grocery stores, highlighting the value placed on local markets. More specifically, the estimated WTP premiums for purchasing apples at FMs amount to approximately €1.6 per kilogram in Hungary, €1.7 per kilogram in Italy, and up to €2.6 per kilogram in the United Kingdom, depending on the consumer segment. These figures illustrate the economic magnitude and practical relevance of FMs as valued points of sale across European contexts. In all three countries we examined, the positive and significant coefficients associated with buying at FMs in our discrete choice models are consistent with previous research [44-47], confirming the hypothesis that consumers associate these venues with higher product value. This observation is consistent with transactional utility theory, which posits that the perceived value of a product is influenced by its point of sale [35].

The latent class analysis further reveals substantial heterogeneity in consumer preferences. While some consumer segments show a strong willingness to pay a premium for FM products, others remain highly price-sensitive. This finding aligns with earlier research demonstrating that participants in short food supply chains are not a homogeneous group, but differ in their motivations, constraints, and value perceptions [23, 24]. Our results further show that FM-oriented segments differ across countries not

only in terms of WTP patterns, but also in their socio-demographic composition. In Hungary, the segment with the strongest FM preference is mainly characterised by its valuation of FMs, perfect appearance, local origin and GI labelling, rather than by a clearly distinct socio-demographic profile. In Italy and the UK, by contrast, the segments with stronger FM preferences are more closely associated with younger consumers, while in the UK this pattern is also linked to higher education and urban residence. These findings indicate that FMs primarily attract specific consumer segments rather than the population as a whole, and that these segments are socially structured in different ways across countries.

When the FM attribute is compared with other product attributes, it becomes clear that some product characteristics have a stronger impact on consumer valuation. Across all three countries, visual quality plays a particularly important role, as perfect apples are associated with higher WTP premiums than the FM attribute itself, confirming the continued importance of aesthetic appeal in food choice, even in alternative markets [99, 100].

Origin-related attributes also strongly influence consumers' WTP. Both local and national origins often generate a higher price premium than buying at a FM, suggesting that geographical origin may carry stronger or more immediately recognizable value signals than the market channel itself. Similarly, products with a GI often command a higher premium, especially in Italy. This result is consistent with existing literature that emphasizes the importance of certification schemes in contexts where they are well-

established and widely trusted by consumers, such as in Italy [101]. This may also help explain why the farmers' market channel appears to be a less general value signal in Italy: while positive WTP was identified in all three Hungarian latent classes and in two UK classes, it was significant only in one Italian class. In a food culture where high-quality fresh products, regional traditions and origin-based quality cues are strongly embedded in the broader retail environment, farmers' markets may provide additional value mainly for specific consumer segments. However, our data do not allow us to directly test whether this reflects cultural factors, favourable production conditions or the quality of alternative retail channels.

While the findings are consistent with previous research on the importance of product attributes, the added value of the present study lies in showing how these attributes interact with FM across three different European food retail contexts.

Attitudinal factors related to perceived fairness further explain differences in WTP. In all three countries, the vast majority of respondents agreed with the statement that farmers receive fairer prices at FMs than in supermarkets. Agreement with the statement was particularly high in Hungary (68.97%), followed by the UK (62.05%) and Italy (60.86%). Consumers who strongly agreed with this opinion also showed a higher premium for FM products, suggesting that ethical motivations also play a significant role in shaping evaluation.

At the same time, the results also point to potential trade-offs from a sustainability perspective. While higher price premiums contribute to the economic sustainability of FMs, they may also limit accessibility for lower-income consumers. This highlights the importance of considering inclusivity aspects when promoting short food supply chains, as sustainability involves not only economic and environmental, but also social dimensions.

In summary, these findings demonstrate that FMs should not be viewed merely as alternative retail outlets, but as economically meaningful market channels whose success depends on clearly communicated value propositions. While consumers are willing to pay a premium for products sold at FMs, this premium is neither uniform nor unconditional: it is shaped by product quality, origin, certification labels, ethical considerations and the perceived quality of the market environment. In real-world settings, poor service quality, limited trust in producers, or an unclean market environment may weaken the positive valuation associated with FMs. Importantly, the results show that the market channel itself is often less influential than these accompanying attributes. This insight helps explain why FMs succeed in some contexts but struggle in others, and underscores the need to move beyond generic promotion of local markets towards more targeted, evidence-based strategies.

Implications for policy makers and market managers

These results suggest a number of implications for policymakers and market managers.

The findings indicate that FMs can play a meaningful role in supporting locally embedded food systems, particularly by strengthening local producer networks and improving the economic viability of small-scale producers. From a policy perspective, this suggests that targeted support for FMs, such as infrastructure development, local market regulations, or municipal-level initiatives, may help strengthen these market channels.

At the same time, the empirical findings suggest that market managers and producers should not rely solely on the farmers' market channel as a value signal. Since origin-related attributes, geographical indication and visual quality often generated higher WTP premiums than the point of sale itself, communication strategies should emphasize these attributes more explicitly. In particular, combining the FM setting with clear origin information, certification labels and production-related cues may strengthen consumers' perceived value. Such multi-attribute communication, including combinations of origin and production method, could help producers better differentiate their products and target consumer segments that value locally embedded and quality-oriented food choices.

Policymakers should also support the development and promotion of trusted labelling schemes, such as geographical indications, which may enhance

consumer confidence and contribute to price premiums, especially in countries such as Italy, where such labels are already highly valued.

The results further suggest that fair pricing (prices that contribute to a fair income level) for producers is an important driver of consumer support for FMs. Communication campaigns that emphasise the role of FMs in supporting local producers and offering fairer returns may strengthen consumer engagement, particularly among consumers who already associate FMs with ethical and locally embedded purchasing.

Additionally, country-specific approaches are necessary for effectively engaging consumers. In Italy and the UK, digital marketing and social media outreach targeting younger consumers may be particularly effective, whereas in Hungary, traditional communication methods may be more suitable for reaching older age groups who already have a stronger preference for FMs. At the same time, in Hungary, it would also be worthwhile launching targeted campaigns to engage the younger generation and expand the customer base of FMs.

Finally, education and awareness-raising efforts should focus on the specific attributes that consumers value, including origin, certification, product quality, and fairer returns for producers.

Limitations and future research

This study has several limitations that should be acknowledged. First, the analysis focused solely on apples as the test purchase product, which may

limit the generalizability of findings to other food items. Different products may be associated with different consumer preferences and WTP patterns.

Second, as in all discrete choice experiments, preferences were elicited in a hypothetical context. Although visual elements and a no-choice option were included to enhance realism, stated preferences may not fully correspond to actual purchasing behaviour, implying potential hypothetical bias.

Third, the use of predefined attributes and levels necessarily simplifies real-world decision-making contexts. While this is required for experimental tractability, it may limit external validity, as real purchase decisions may be influenced by additional product characteristics (e.g., sensory qualities, sustainability-related information) and contextual factors not captured in the experiment.

Future research could further extend the experimental design by comparing small local food brands with global food brands. This would make it possible to examine whether consumers' valuation of farmers' markets reflects a broader preference for local embeddedness, trust and producer proximity, or whether the observed preference pattern is specific to the farmers' market channel.

Fourth, the modelling approaches applied (conditional logit and latent class models) rely on specific assumptions and specification choices that may influence the robustness and generalizability of the results. While these approaches are well established in the literature, alternative model

specifications could yield different estimates of preference heterogeneity and WTP.

Finally, data were collected at a single point in time (October–November 2023), which does not allow seasonal or temporal changes in preferences to be captured. In addition, as the survey was administered online, variations in respondents' attention and interpretation of the choice tasks cannot be fully ruled out, despite pre-testing and detailed instructions.

6. Conclusion

This study examined consumers' willingness to pay (WTP) for products sold through farmers' markets (FMs) in Hungary, Italy, and the United Kingdom using a harmonised discrete choice experiment and latent class modelling approach. The results show that consumers generally value farmers' markets and are willing to pay a premium for products purchased through this channel, although the magnitude of this premium varies across countries and consumer segments.

The study contributes to the literature in three ways. First, it provides harmonised cross-country evidence on consumers' valuation of farmers' markets in Europe. Second, it demonstrates substantial preference heterogeneity by identifying distinct consumer segments with different valuation patterns. Third, it highlights the role of farmers' markets in supporting the economic viability of short food supply chains and local food systems.

The findings further reveal that the value consumers attach to farmers' markets is strongly influenced by product attributes such as local origin, geographical indication labels, and visual quality, which often generate higher premiums than the market channel itself. These results suggest that the success of farmers' markets depends not only on direct producer–consumer exchange but also on effectively communicating quality, authenticity, and trust.

From a practical perspective, farmers, market operators, and policymakers should focus on strengthening these value attributes while ensuring that local food systems remain accessible and socially inclusive. Overall, the study demonstrates that farmers' markets can contribute to more sustainable and economically viable food systems, but their effectiveness depends on consumer preferences, product characteristics, and national context.

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8. Appendix

Table 1: Indicators of the LC models tested for the Hungarian sample

Aspect	Two-class model	Three-class model	Four-class model
Number of parameters estimated	26	39	52
Log-likelihood (final)	-5 507.04	-5 340.84	-5 296.21
Pseudo R^2	0.19	0.22	0.22
AIC	11 066.09	10 759.68	10 696.41
BIC	11 235.07	11 013.16	11 034.38

Table 2: Three-class LC model estimation for the Hungarian sample

Attributes and Model Details	LC estimates					
	Class 1		Class 2		Class 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
ASC no choice	-2.30***	0.14	-2.30***	0.14	-2.30***	0.14
Farmers' market	0.28***	0.10	0.61***	0.16	0.60***	0.10
Supermarket	0.06	0.13	-0.03	0.19	-0.14	0.13
Perfect	-0.84***	0.27	2.15***	0.24	1.47***	0.31
Slightly perfect	-0.48***	0.13	0.30**	0.18	0.64***	0.15
Organic	0.03	0.09	-0.29***	0.12	-0.02	0.09
GI	0.33***	0.09	0.72***	0.14	0.29***	0.09
Local	1.14***	0.14	-0.28*	0.22	0.31**	0.15
National	1.05***	0.14	-0.37**	0.22	-0.04	0.19
Red	0.36***	0.09	0.05	0.13	0.17**	0.10
Green	0.25**	0.13	-0.50***	0.20	-0.15	0.15
Yellow	0.04	0.13	-0.77***	0.18	-0.15	0.13

Price (scaled by 100)	-0.22***	0.02	-0.58***	0.04	-0.10***	0.02
Class allocation probability	0.44		0.25		0.31	
Observations	4 912					
PsR-squared	0.22					
Log-likelihood (0)	-6 809.48					
Log-likelihood (final)	-5 340.84					
AIC	10 759.68					
BIC	11 013.16					

Note: S.E. denotes the robust standard errors.; ASC represents the alternative-specific constant.; ASC choice, Grocery store, Fully imperfect, No organic label, No geographical indication, Imported, Mix of colour were defined as the reference categories in the estimates.; ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively; AIC denotes the Akaike Information Criterion.; BIC denotes the Bayesian Information Criterion.

Table 3: Indicators of the LC models tested for the Italian sample

Aspect	Two-class model	Three-class model	Four-class model
Number of parameters estimated	26	39	52
Log-likelihood (final)	-5 338.60	-5 223.83	-5 156.02
Pseudo R^2	0.20	0.22	0.23
AIC	10 729.21	10 525.66	10 416.04
BIC	10 897.59	10 778.24	10 752.81

Table 4: Three-class LC model estimation for the Italian sample

Attributes and Model Details	LC estimates					
	Class 1		Class 2		Class 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
ASC no choice	-2.93***	0.16	-2.93***	0.16	-2.93***	0.16
Farmers' market	0.09	0.17	0.01	0.16	0.48***	0.12
Supermarket	0.12	0.20	0.37*	0.27	-0.16*	0.12
Perfect	-1.20**	0.72	1.17***	0.29	0.64**	0.36
Slightly perfect	-0.83**	0.36	0.07	0.15	0.09	0.16
Organic	0.57*	0.35	0.22	0.22	0.12	0.17
GI	0.46***	0.11	0.41***	0.14	0.33***	0.08
Local	1.26***	0.22	0.81***	0.22	-0.01	0.13
National	1.26***	0.28	0.83***	0.21	-0.33***	0.16
Red	-0.02	0.13	-0.50***	0.15	0.01	0.07
Green	0.02	0.25	-0.30	0.25	0.11	0.15
Yellow	-0.21	0.18	-0.08	0.24	0.22*	0.14
Price	-0.72**	0.42	-2.08***	0.17	-0.29***	0.11
Class allocation probability	0.36		0.25		0.39	

Observations	4 800
PsR-squared	0.22
Log-likelihood (0)	-6 654.21
Log-likelihood (final)	-5 223.83
AIC	10 525.66
BIC	10 778.24

Note: S.E. denotes the robust standard errors.; ASC represents the alternative-specific constant.; ASC choice, Grocery store, Fully imperfect, No organic label, No geographical indication, Imported, Mix of colour were defined as the reference categories in the estimates.; ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively; AIC denotes the Akaike Information Criterion.; BIC denotes the Bayesian Information Criterion.

Table 5: Indicators of the LC models tested for the British sample

Aspect	Two-class model	Three-class model	Four-class model
Number of parameters estimated	26	39	52
Log-likelihood (final)	-5 205.07	-5 048.97	-4 988.30
Pseudo R^2	0.22	0.24	0.25
AIC	10 462.14	10 175.93	10 080.59
BIC	10 630.53	10 428.51	10 417.36

Table 6: Three-class LC model estimation for the British sample

Attributes and Model Details	LC estimates					
	Class 1		Class 2		Class 3	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
ASC no choice	-3.25***	0.17	-3.25***	0.17	-3.25***	0.17
Farmers' market	0.48***	0.10	0.36***	0.15	0.11	0.14
Supermarket	-0.08	0.13	0.24*	0.16	-0.10	0.14
Perfect	0.81***	0.20	-1.77***	0.53	0.23	0.25
Slightly perfect	0.19**	0.10	-0.63***	0.21	0.10	0.16
Organic	0.09*	0.07	0.19**	0.10	0.10	0.12
GI	0.35***	0.08	0.12	0.14	-0.23*	0.15
Local	-0.17*	0.12	1.29***	0.37	1.03***	0.20
National	-0.50***	0.19	0.98***	0.29	0.94***	0.22
Red	0.03	0.08	0.15*	0.11	-0.04	0.13
Green	0.00	0.11	0.00	0.19	0.03	0.18
Yellow	-0.29***	0.12	0.35*	0.24	0.12	0.17
Price	-0.21***	0.05	-0.51***	0.09	-1.56***	0.07
Class allocation probability	0.38		0.34		0.28	
Observations	4 800					
PsR-squared	0.24					
Log-likelihood (0)	-6 654.21					

Log-likelihood (final)	-5 048.97
AIC	10 175.93
BIC	10 428.51

Note: S.E. denotes the robust standard errors.; ASC represents the alternative-specific constant.; ASC choice, Grocery store, Fully imperfect, No organic label, No geographical indication, Imported, Mix of colour were defined as the reference categories in the estimates.; ***, **, * indicate statistical significance at the 1%, 5% and 10% levels, respectively; AIC denotes the Akaike Information Criterion.; BIC denotes the Bayesian Information Criterion.

Declarations

Disclosure statement: The authors report there are no competing interests to declare.

Ethical Approval: The Authors state that the manuscript obtained ethics approval from the Ethical Committee of the Corvinus University of Budapest (Reference No: KRH/261/2023). The ethical approval date is July 27, 2023. All research procedures involving human participants were reviewed and approved by the Corvinus University of Budapest Ethical Committee. This study has been conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and with all relevant institutional and national guidelines.

Consent to Participate: Informed consent was obtained from all participants involved in the study. This study used an anonymous, self-administered online questionnaire (October–November 2023) to examine consumers' WTP for different points of sale—especially FMs—via a discrete choice experiment on apples in Hungary, Italy, and the United Kingdom. Before participation, respondents were informed that (i) their anonymity was fully assured, (ii) the purpose of the research was to compare consumer preferences and WTP across the three countries, (iii) their data would be analysed in aggregate for research and publication only. Proceeding to complete the questionnaire constituted informed consent.

Consent to Publish: Not applicable. The manuscript does not contain any identifiable personal data, images, individual responses of participants. All data are reported only in aggregated and anonymised form.

Competing interests: The authors declare no competing interests.

Data availability: The dataset, survey instruments, and statistical codes used in this study are available in the Supplementary Files accompanying the manuscript.

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