



MARKETING ANALYTICS CENTRE WORKING PAPER SERIES

WORKING PAPER NUMBER:

MAC.2026.001

Title:

National Culture, Brand Positioning, and 9-Ending Pricing Across Markets

Authors:

Xiao Ling, Sourav Ray, Ruoqing Zhang

National Culture, Brand Positioning, and 9-Ending Pricing Across Markets

Xiao Ling*
School of Business, Central
Connecticut State University
New Britain, CT, USA
x.ling@ccsu.edu

Sourav Ray
Dept. of Marketing & Consumer
Studies, G.S. Lang School of
Business & Economics,
University of Guelph, Guelph,
ON, Canada
s_ray@uoguelph.ca

Ruoqing Zhang
School of Business, Central
Connecticut State University
New Britain, CT, USA
rzhang@ccsu.edu

WORKING PAPER

Last Revision: August 27, 2026

* **Corresponding author**

National Culture, Brand Positioning, and 9-Ending Pricing Across Markets

Abstract

In this paper we study multinational retailers' 9-ending usage across global markets and how they vary with national cultural dimensions. Using directly observed daily online prices from four multinational retailers during 2008–2013, covering nearly 120,000 products across technology, apparel, and home-furnishings categories in 61 countries, we find that uncertainty avoidance (UAI) and long-term orientation (LTO) are negatively associated with 9-ending usage, whereas individualism (IDV) is positively associated with it. We also find the Culture–9-ending associations differ by brand positioning and are generally stronger for the premium-oriented focal brand than for the value-oriented brands. Supplementary analyses show different patterns for 8- and 5-endings. To the best of our knowledge, the study provides the widest country coverage in cross-cultural price-ending research to date. It links national cultural dimensions to 9-ending usage, identifies brand positioning as a boundary condition, and extends the standardization-adaptation discussion to a highly codifiable element of multinational retail pricing.

Keywords: price endings; 9-ending pricing; national culture; brand positioning; multinational retailing; standardization-adaptation

1. Introduction

In this paper we study how retail price ending practices exist at the intersection of national cultural context, brand positioning, and global pricing standardization.

Price endings are seen as an important retail decision. The difference between \$4.99 and \$5.00 is only one cent, but the ending digit 9 in a price can influence how consumers perceive value and can signal a low-price or deal appeal (Stiving & Winer, 1997; Thomas & Morwitz, 2005; Schindler, 2006). Such 9-endings are among the most common just-below price formats in retailing (Schindler & Kirby, 1997; Stiving & Winer, 1997). For retailers, price endings are also easy to embed in pricing systems and apply across large assortments. This combination makes 9-ending usage a simple but strategically meaningful pricing choice and a seemingly natural candidate for standardization across global markets.

Yet price-ending practices need not be used uniformly across markets. Research in cross-cultural consumer behavior documents cross-national differences in digit symbolism and in how consumers interpret persuasive and marketplace signals (e.g., Simmons & Schindler, 2003; Westjohn *et al.*, 2017). These differences suggest that even a widely used format such as 9-ending pricing may not follow the same pattern across global markets. It remains unclear whether and how national cultural context is reflected in multinational retailers' 9-ending pricing practices across markets.

Existing research provides incomplete guidance. Although price endings have been studied extensively in behavioral pricing and national culture has been studied extensively in cross-cultural consumer research, direct research connecting the two remains limited. Earlier studies document cross-national differences in price endings, but generally examine a limited number of countries (e.g., Simmons & Schindler, 2003; Nguyen *et al.*, 2007; Schindler, 2009; Jeong & Crompton, 2017; Westjohn *et al.*, 2017). Ventura *et al.* (2025) provide one of the few direct examinations of national cultural dimensions and just-below pricing prevalence, using a global C2C online marketplace. However, prices on C2C platforms are set by individual sellers, whereas multinational retailers coordinate pricing across markets and face stronger incentives for consistency (Jain, 1989; Theodosiou & Leonidou, 2003; Swoboda & Elsner, 2013). The role of national culture in coordinated multinational retailing therefore remains largely unresolved.

We examine this question through uncertainty avoidance (UAI), individualism (IDV), and long-term orientation (LTO), the three Hofstede dimensions examined in prior research on culture and price-ending practices (Ventura *et al.*, 2025). Existing theory provides plausible links between these cultural orientations and the interpretation of price cues, but their implications for retailer-level pricing behavior are not unambiguous, and prior evidence shows that observed relationships can differ from their predicted directions (Ventura *et al.*, 2025). We examine how these cultural dimensions are associated with multinational retailers' use of 9-ending prices and how these associations vary by brand positioning. Because 9-endings are associated with value and promotional images, whereas round prices can be perceived to be more consistent with quality or premium positioning (Stiving, 2000; Schindler, 2006; Schindler *et al.*, 2011), cultural associations with 9-ending use may consequently depend on brand positioning.

Our analysis uses directly observed daily online prices for nearly 120,000 products spanning technology, apparel, and home-furnishings categories from four multinational retailers across 61 countries and regions during 2008–2013. The results show that national cultural dimensions are associated with 9-ending prevalence, but these relationships differ substantially between premium- and value-oriented brands, with similar patterns persisting in the stricter robustness tests.

This study contributes in three ways. First, it connects behavioral pricing and cross-cultural research by clarifying how uncertainty avoidance, individualism, and long-term orientation are associated with multinational retailers' 9-ending pricing practices across global markets. Second, it shows that these associations vary by brand positioning, consistent with positioning as a boundary condition: national context is not reflected uniformly in retailers' use of 9-ending prices. Third, it extends the standardization-adaptation discussion to a highly codifiable pricing practice. The paper also provides strong cross-market comparability and, to the best of our knowledge, is the widest country coverage in cross-cultural price-ending research to date.

2. Price Endings, Culture, and Brand Positioning

2.1. Behavioral and signaling foundations of 9-ending pricing

Price endings can influence how consumers perceive and evaluate otherwise similar prices. Research on just-below pricing documents both a numerical-processing mechanism and a

signaling mechanism. First, consumers often process prices imperfectly and place disproportionate weight on the leftmost digits, causing a just-below price such as \$9.99 to be perceived as meaningfully lower than an economically similar round price (Thomas & Morwitz, 2005; Bizer & Schindler, 2005). This left-digit effect helps explain why 9-endings can affect price perceptions even when the objective price difference created by the final digit is small.

Repeated marketplace use can also give price endings learned meanings. In particular, 9-endings are frequently associated with low-price and deal appeals (Schindler, 2006; Macé, 2012). This image effect allows a 9-ending to function as a price cue. Field evidence also shows 9-endings can affect demand (Anderson & Simester, 2003), and vary with product, brand, and promotional conditions (Macé, 2012). Round prices, by contrast, can better fit settings in which price signals quality or premium positioning (Stiving, 2000; Schindler et al., 2011).

Retail pricing evidence further suggests that firms treat 9-endings differently from other endings. Levy *et al.* (2020) find that 9-ending prices exhibit greater rigidity than other endings and are more rigid upward than downward. Such patterns indicate that price endings are not simply incidental numerical outcomes but can form a persistent part of firms' pricing practices.

This literature establishes 9-endings as a meaningful element of retail price communication, reflecting both numerical-processing effects and learned marketplace meanings. These mechanisms provide the foundation for examining how retailers' use of 9-endings may vary across market and strategic contexts.

2.2. National culture and cross-market price-ending practices

Cross-national research shows that both the prevalence and meaning of price endings vary across markets. Studies link these differences to culturally embedded number meanings and marketplace conventions: Chinese advertising favors 8 and avoids 4 (Simmons & Schindler, 2003); U.S. and Polish retailers differ in 9-ending use (Suri et al., 2004); and high- versus low-context cultures show different odd- and even-ending practices (Nguyen et al., 2007). Research in other Asian markets likewise documents culturally meaningful use of 8 (Schindler, 2009; Jeong & Crompton, 2017; Ngan et al., 2018). Westjohn et al. (2017) further show that lucky-number pricing persists despite exposure to Western multinational firms and that localization can affect consumer responses.

These studies establish that cultural context matters, but they provide less evidence on whether national cultural dimensions are systematically associated with cross-country variation in price-ending prevalence. This question matters because national cultural dimensions provide a common framework for moving beyond isolated country comparisons and number-specific conventions to assess whether broader cultural orientations correspond with retailers' use of a widely adopted pricing format. Much prior work compares selected countries, examines specific number meanings, or applies particular cultural frameworks such as high- versus low-context communication (e.g., Schindler, 2009; Jeong & Crompton, 2017; Ngan et al., 2018). To the best of our knowledge, Ventura et al. (2025) provide the only direct evidence, relating UAI, IDV, and LTO to round, just-below, and precise prices in a global C2C marketplace, although several observed relationships differ from their predicted directions. That evidence provides an

important starting point, but the role of national cultural dimensions in coordinated retail organizations remains comparatively underexplored.

Multinational retailing provides a particularly useful setting to examine this question. Unlike sellers on a C2C marketplace, multinational retailers operate within coordinated organizational systems and face strong incentives to maintain consistency across countries (Jain, 1989; Theodosiou & Leonidou, 2003). Indeed, Zbaracki et al. (2004) find that the managerial and customer components are the dominant parts of the total price adjustment costs of a retailer and that these materially impact on how prices are managed and adjusted (Ray et al. 2006). So, these costs also give multinational retailers strong economic incentives to standardize pricing practices across markets. National context can still matter for multinational retailers: Swoboda and Elsner (2013) show that elements other than the core retail format are adapted to local conditions, while Ling et al. (2026) find that institutional legacy is associated with 9-ending prevalence across European markets. Multinational retailing thus allows us to examine whether national culture is associated with an easily implemented variable pricing practice despite organizational incentives for consistency.

We examine the three cultural dimensions previously examined in relation to just-below pricing prevalence (Ventura *et al.*, 2025). Because 9-endings can carry learned associations with low price, savings, and deal value (Schindler, 2006), cultural orientations may influence how this pricing cue is interpreted and used across markets.

Uncertainty avoidance reflects discomfort with ambiguity and preference for predictability and structure (Hofstede, 2001; De Mooij & Hofstede, 2011). Higher UAI is also associated with greater planning and information search under uncertainty (Quintal *et al.*, 2003), which may encourage closer scrutiny of price information, including how prices are presented. Once noticed, the 9-ending cue can work in competing ways: it may provide a familiar and recognizable signal of value, but it may also be perceived as a less transparent promotional cue (Jeong & Crompton, 2018). These competing considerations make the direction of the relationship uncertain.

Individualism emphasizes autonomy, self-expression, and individual rather than collective goals (Hofstede, 2001). Research shows that persuasive appeals emphasizing individual benefits can be more effective in individualistic cultural contexts (Han & Shavitt, 1994; Aaker & Maheswaran, 1997; De Mooij & Hofstede, 2011). Accordingly, although 9-endings can serve as cues to personal economic benefit across markets, their persuasive effectiveness may vary with individualism and may be greater in more individualistic markets.

Long-term orientation emphasizes perseverance, thrift, planning, and future-oriented rewards (Hofstede, 2001; Bearden et al., 2006). Its emphasis on thrift may increase the appeal of price cues that signal savings and value, while its emphasis on planning and future-oriented evaluation may reduce reliance on immediate price cues when assessing value. These competing tendencies make the relationship between long-term orientation and 9-ending usage difficult to predict a priori.

Together, these cultural dimensions provide theoretically grounded but directionally ambiguous lenses for examining cross-market variation in 9-ending pricing. We therefore ask:

RQ1: How are uncertainty avoidance, individualism, and long-term orientation associated with multinational retailers' use of 9-ending pricing across national markets?

2.3. Brand positioning as a boundary condition

National culture describes the broader market environment, but retailers operating within the same environment need not use price cues in the same way. Consumers form brand and retailer price images from multiple price-related and nonprice signals, and the meaning of any particular pricing cue depends partly on how it fits with these signals (Hamilton & Chernev, 2013). Price endings are one such cue. Research associates 9-endings with low-price and deal imagery, while round prices can be more compatible with quality or premium positioning (Stiving & Winer, 1997; Stiving, 2000; Schindler, 2006; Macé, 2012; Schindler *et al.*, 2011).

This distinction is particularly relevant for retailers with different market positions. For value-oriented brands, price is central to the market proposition, and 9-endings can reinforce affordability or deal value. Premium-oriented brands, which rely more on design, quality, or identity-based differentiation, may face different trade-offs when using a price format associated with low-price appeals. Retailers also vary systematically in their use of 9-endings across market and product conditions (Macé, 2012). Cultural characteristics that alter how consumers interpret price cues may consequently have different implications depending on whether the ending reinforces or sits less comfortably with the retailer's existing price image.

This perspective suggests that national culture and brand positioning may jointly shape retailers' use of 9-ending prices. Culture provides part of the market environment in which a price cue is interpreted, while brand positioning influences the role that the cue plays within the market offer. Cultural associations with 9-ending pricing may consequently vary with brand positioning even within the same national environment. Examining this interaction allows us to assess whether pooled cross-country associations conceal systematic differences associated with brand positioning.

We therefore ask:

RQ2: How do the associations between national culture and multinational retailers' use of 9-ending pricing vary by brand positioning?

3. Data and Method

3.1. Data source and panel construction

This study uses the Billion Prices Project (BPP) Global Retailer dataset (Cavallo *et al.*, 2014), containing daily online prices from four multinational retailers across 85 countries and regions during 2008–2013[1]. The four focal retailers operate in distinct product categories: one in technology, two in apparel, and one in home furnishings. The data cover nearly 120,000 products

across these retailers. Consistent product identifiers allow products to be tracked across markets and over time, providing unusually detailed evidence on multinational pricing practices.

We aggregate item-level prices to the retailer-country-month level[2] and merge them with Hofstede cultural indices and country-level economic data. Complete information for the focal cultural dimensions and controls is available for 61 countries and regions, forming the primary unbalanced panel. Supplementary Table S1 lists the countries.

Because the four retailers do not operate continuously in every market, we construct two more comparable panels for robustness analyses. A strict balanced panel contains 20 countries in which all four retailers are observed in each of eight common months (October 2012–May 2013). A complete-retailer-overlap sample strictly retains only country-months in which all four retailers are observed concurrently.

Our data capture posted prices rather than consumer responses or managerial decision processes, and the cultural measures vary primarily across countries rather than over time. We therefore interpret the estimates as conditional associations between national cultural characteristics and observed price-ending practices rather than as causal effects.

3.2. Price-ending measures

The primary dependent variable, *Share9*, measures the proportion of prices whose last non-zero digit is 9 within each retailer-country-month cell. We focus on 9-endings because they are among the most widely studied price-ending formats and have been linked to distinct numerical-processing and value-signaling mechanisms (Stiving & Winer, 1997; Schindler, 2006).

We identify each price's last non-zero digit, consistent with prior work using the rightmost salient digit (Simmons & Schindler, 2003; Schindler, 2009). This approach is comparable across prices with or without fractional currency units. *Share9* measures 9-ending prevalence rather than all forms of just-below pricing.

We construct analogous measures for prices whose last non-zero digit is 8 (*Share8*) or 5 (*Share5*). These measures are used in supplementary analyses to assess whether the relationships identified for 9-endings also characterize other salient ending digits.

3.3. National culture, brand positioning, and controls

The focal country-level variables are Hofstede's measures of *uncertainty avoidance (UAI)*, *individualism (IDV)*, and *long-term orientation (LTO)* (Hofstede, 2001). As discussed in Section 2, these are the three cultural dimensions examined in prior research on culture and price-ending practices (Ventura *et al.*, 2025). The measures are treated as national characteristics and are time invariant over the study period.

We classify the four focal brands along a premium–value positioning continuum based on their established long-term positioning. One focal brand is classified as premium oriented and the remaining three as value oriented; the indicator equals one for value-oriented brands and zero for

the premium-oriented brand. Because this classification captures strategic positioning rather than contemporaneous price level, we control separately for each brand's relative price position within a country-month.

Additional controls account for differences in relative price position, currency conventions, and country-level economic conditions. *Relative price* is measured as each brand's average price relative to the lowest brand-level average in the same country-month and is log-transformed. To account for currency conventions, the *decimal indicator* equals one when at least 10% of observed prices in a country contain a nonzero fractional component[3], while the *Lucky-8 market indicator* identifies markets with documented preferences for the digit 8 (Simmons & Schindler, 2003; Schindler, 2009; Westjohn et al., 2017)[4]. We also include the natural logarithm of *GDP per capita* (World Bank, n.d.) and *CPI inflation* (International Monetary Fund, n.d.) to account for differences in economic development and macroeconomic conditions.

Table I reports descriptive statistics for the variables used in the main analysis.

[Table I about here]

3.4. Empirical strategy

Because *Share9* is a fractional outcome bounded between zero and one, we estimate weighted fractional logit models following Papke and Wooldridge (1996). Each retailer-country-month observation is weighted by the number of underlying price observations used to calculate the ending share, so cells based on more price observations receive greater weight.

To address RQ1, we estimate a pooled specification relating the three cultural dimensions to 9-ending prevalence across the four retailers while controlling for retailer and year fixed effects:

$$E(\text{Share9}_{c b t} \mid X) = G(\beta_1 \text{UAI}_c + \beta_2 \text{IDV}_c + \beta_3 \text{LTO}_c + \theta X_{c b t} \gamma + \alpha_b + \lambda_t),$$

where c indexes countries, b brands, and t time; $G(\cdot)$ is the logistic response function; $X_{c b t}$ contains the control variables; α_b denotes retailer fixed effects and λ_t denotes year fixed effects. The retailer fixed effects absorb persistent differences in baseline 9-ending usage across the four focal retailers. This specification does not allow the associations between the cultural dimensions and 9-ending prevalence to vary with brand positioning. It is estimated with heteroskedasticity-robust standard errors.

To address RQ2, we interact the positioning indicator with each cultural dimension while retaining retailer fixed effects:

$$E(\text{Share9}_{c b t} \mid X) = G(\beta C_c + \delta(C_c \times \text{Value}_b) + \theta X_{c b t} + \alpha_b + \lambda_t),$$

where C_c represents the cultural variables (*UAI*, *IDV*, and *LTO*) and the interaction terms ($C_c \times \text{Value}_b$) provide the formal tests of moderation. Because the premium-oriented brand is the reference category, the coefficients on the cultural variables represent their conditional associations for that brand, while the interaction terms indicate how those associations change

for the value-oriented brands. We use the corresponding conditional effects and post-estimation average marginal effects to characterize the form and magnitude of the moderation.

The interaction specification is estimated using both heteroskedasticity-robust and country-clustered standard errors. Because the cultural variables vary at the country level, we emphasize country-clustered inference, which allows observations within the same country to be correlated. We also report the pooled specification with country-clustered standard errors as a sensitivity check.

Country fixed effects are not included because they would absorb the time-invariant national cultural measures that constitute the focal explanatory variables. The estimates should accordingly be interpreted as cross-country conditional associations after accounting for the observed economic, currency, temporal, and retailer characteristics included in the models.

3.5. Robustness and supplementary analyses

We conduct several checks to assess whether the main patterns depend on sample composition, inference, model specification, or the particular ending digit examined. First, we re-estimate the models using two compositionally stricter samples: the strict 20-country $\times$ 8-month balanced panel and the complete-retailer-overlap sample. We then compare price-count and equal-cell weights and assess alternative decimal-indicator and relative-price specifications. We also report country-clustered inference, weighted linear models, exploratory retailer-specific cultural slopes, and parallel fractional-response models for 8- and 5-ending pricing.

4. Results

4.1. Descriptive patterns

The data show substantial variation in price endings across national markets. As reported in Table I, 9-endings account for an average of 62.3% of prices average retailer-country-month cell, compared with 4.4% for 8-endings and 25.2% for 5-endings. Supplementary Figure S1 further illustrates the wide cross-country variation in 9-ending prevalence. This variation provides the empirical basis for examining whether national cultural characteristics are systematically associated with multinational retailers' use of 9-ending prices.

4.2. National culture and 9-ending pricing

Table II reports the fractional-logit estimates for 9-ending prevalence. Model 1 addresses RQ1 by estimating the pooled associations between the three cultural dimensions and *Share9* across the four retailers. With heteroskedasticity-robust standard errors, UAI is negatively associated with 9-ending prevalence ($\beta = -0.0056$, $p < .001$), IDV is positively associated with 9-ending prevalence ($\beta = 0.0050$, $p = .037$), and LTO is negatively associated with 9-ending prevalence ($\beta = -0.0082$, $p < .001$).

The pooled coefficients retain the same signs and similar magnitudes under country-clustered inference but become imprecise (Supplementary Table S3). Thus, pooled directional patterns are

stable, while inference about a common association across retailers remains sensitive to within-country dependence.

Among the controls, higher GDP per capita and the decimal indicator are associated with lower 9-ending prevalence, while the Lucky-8 market indicator is positively associated with *Share9* and CPI inflation is not statistically significant. The GDP association is especially stable: in the retailer-fixed-effects interaction model, it remains negative and statistically significant under country-clustered inference ($\beta = -0.7075$, $p < .001$).

[Table II about here]

4.3. Heterogeneity by brand positioning

RQ2 asks how the associations between national culture and 9-ending pricing vary by brand positioning. Models 2 and 3 in Table II estimate these interactions. The coefficients reveal substantial heterogeneity by positioning.

Relative to the premium-oriented brand, the associations between the cultural dimensions and 9-ending prevalence are generally attenuated among the value-oriented brands. Under country-clustered inference, $UAI \times Value$ is negative ($\beta = -0.0376$, $p = .006$), $IDV \times Value$ is negative ($\beta = -0.0407$, $p = .010$), and $LTO \times Value$ is positive ($\beta = 0.0370$, $p = .046$). All three interaction coefficients are statistically significant at the 5% level, indicating that the degree to which 9-ending prevalence covaries with the cultural dimensions differs systematically by positioning.

Because the fractional-logit coefficients in Table II are not expressed in percentage-point units, Figure 1 translates the interaction results into predicted differences in *Share9*. For a 10-point difference in each cultural dimension, the premium-oriented brand shows roughly a 5–8-percentage-point difference in predicted 9-ending prevalence, whereas the corresponding difference for the value-oriented brands is no more than about 2 points. Thus, the interaction results indicate materially stronger culture–9-ending associations for the premium-oriented focal brand. Figure 1 and Supplementary Table S2 provide the exact estimates.

[Figure 1 about here]

4.4. Robustness analyses

Table III evaluates the culture-by-positioning interactions using two compositionally stricter samples. The strict 20-country $\times$ 8-month panel and the complete-retailer-overlap sample both reproduce the main directional pattern: $UAI \times Value$ and $IDV \times Value$ are negative, while $LTO \times Value$ is positive. The interactions are also generally statistically significant under country-clustered inference, providing additional evidence that the main results are not driven by differences in retailer coverage across country-months.

Alternative specifications also lead to the same general conclusion. Weighted linear models and equal-cell weighting preserve the interaction pattern, and the results are stable to the decimal-indicator and relative-price checks (Supplementary Tables S3 and S5). The exploratory retailer-

specific specification is broadly consistent with the premium–value contrast while indicating some retailer-level variation around that pattern (Supplementary Table S6).

[Table III about here]

4.5. *Supplementary analyses of 8- and 5-endings*

We next examine whether the relationships documented for 9-endings extend to other price-ending digits. Parallel retailer-fixed-effects fractional-logit models for *Share5* and *Share8* are reported in Supplementary Table S4.

The 8-ending results differ markedly from those for 9-endings. The culture-by-positioning coefficients generally reverse direction relative to the 9-ending specification, and the Lucky-8 market indicator is positively associated with *Share8* ($\beta = 0.853$, $p = .034$). The retailer-specific analysis further shows a pronounced positioning contrast: the premium-oriented brand exhibits substantially greater 8-ending usage in Lucky-8 markets, whereas none of the three value-oriented brands shows a corresponding increase (Panel C in Table S4). This pattern suggests that market-specific digit conventions may be incorporated differently across brands with different positioning.

The 5-ending estimates likewise do not reproduce the 9-ending pattern. Of particular note, GDP per capita is positively associated with *Share5* ($\beta = 0.965$, $p < .001$), the opposite of its relationship with *Share9*. The remaining culture and positioning estimates are reported in Supplementary Table S4.

Overall, these supplementary analyses suggest that the main findings do not generalize uniformly from 9-ending pricing to other non-round ending digits.

5. Discussion

This study examines how national culture is associated with multinational retailers' use of 9-ending prices and whether these relationships vary with brand positioning. The results provide complementary answers to the two research questions. For RQ1, pooled estimates with robust standard errors indicate negative associations for UAI and LTO and a positive association for IDV after controlling for retailer fixed effects. Although the signs remain stable, the pooled associations become imprecise under country-clustered inference. For RQ2, the interaction estimates indicate that these associations vary by brand positioning, with all three positioning contrasts statistically significant under country-clustered inference. The results also reveal a robust secondary pattern: higher GDP per capita is associated with lower 9-ending prevalence and greater 5-ending prevalence. Together, the results add evidence on how national culture, brand positioning, and market context are associated with multinational retailers' price-ending practices.

5.1. Theoretical implications

The most immediate implication concerns the relationships between specific dimensions of national culture and 9-ending pricing. Price-ending research documents effects on numerical processing, value perceptions, signaling, and demand (Stiving & Winer, 1997; Anderson & Simester, 2003; Thomas & Morwitz, 2005; Schindler, 2006), while cross-cultural research shows that marketplace cues are interpreted within culturally shaped systems of meaning (Steenkamp, 2001; Shavitt et al., 2006; De Mooij & Hofstede, 2011). Direct evidence connecting national cultural dimensions with retailers' price-ending practices remains limited and comes mainly from a C2C marketplace (Ventura et al., 2025). By examining coordinated multinational retailers across 61 countries, nearly 120,000 products, and multiple product categories, this study provides unusually broad evidence on cross-cultural price-ending practices. The design also offers unusual cross-market comparability because the same set of multinational retailers is observed repeatedly across diverse national settings. This extends prior evidence beyond individual sellers on a C2C marketplace and shows that cultural differences are associated with price-ending practices within coordinated multinational retailing.

The observed directions also help clarify the competing mechanisms discussed in Section 2. Higher UAI is associated with lower 9-ending usage, consistent with a stronger preference for predictability and structure. Higher IDV is associated with greater usage, suggesting that price cues signaling individual economic benefit or deal value may have greater persuasive relevance in more individualistic markets. For LTO, the negative association is more consistent with greater emphasis on longer-horizon evaluation rather than immediate promotional appeal. These interpretations identify which of the proposed tendencies are more consistent with the observed retailer behavior, although the underlying consumer processes are not directly observed. The directional pattern also differs in part from that reported for just-below pricing in a C2C marketplace (Ventura et al., 2025), indicating that cultural associations may depend on the particular ending examined and the organizational setting.

The heterogeneity by brand positioning provides a further implication. Prior work associates 9-endings with low-price and deal imagery and round prices with quality or premium signals (Stiving, 2000; Schindler, 2006; Schindler et al., 2011). Our results show that when 9-endings are closely aligned with a value-oriented price image, their use may become a relatively stable component of the retailer's pricing architecture across markets. When the same ending is less central to a premium-oriented position, its use may be more sensitive to national context.

These findings also refine the standardization-adaptation perspective in international retailing. Prior research has examined standardization and adaptation primarily at the level of broader marketing programs and retail formats (Jain, 1989; Theodosiou & Leonidou, 2003; Swoboda & Elsner, 2013). Price endings are a much more codifiable element of pricing execution, yet their use still varies systematically across national markets. The results suggest that even easily standardized pricing practices can reflect both national context and their strategic role within the retailer's brand positioning.

The large sample of countries also reveals a secondary cross-country finding that has received little direct attention in the price-ending literature. Higher GDP per capita is consistently

associated with lower 9-ending prevalence, while the supplementary results show the opposite relationship for 5-endings. Prior research suggests that living standards, currency denomination, and the economic salience of particular digit positions can shape price-ending practices (Aalto-Setälä, 2005; Nguyen et al., 2007; Snir et al., 2017), but we are not aware of prior evidence linking national income systematically to the composition of price endings. The present results extend this literature by identifying national income as an additional correlate of whether multinational retailers rely more heavily on 9- versus 5-endings across global markets. The underlying mechanism remains uncertain because GDP per capita is associated with many market characteristics; differences in currency-unit salience, price sensitivity, retail structure, and other features of higher-income markets may provide directions for future research.

Supplementary analyses further delimit the findings. *Share8* and *Share5* do not reproduce the relationships observed for *Share9*, consistent with evidence that different ending digits carry distinct marketplace meanings (Simmons & Schindler, 2003; Westjohn et al., 2017). In Lucky-8 markets, the premium-oriented focal brand shows a pronounced increase in 8-ending usage, whereas none of the three value-oriented brands shows a corresponding increase. Despite these digit-specific differences, the retailer-level pattern echoes the main 9-ending results: the premium-oriented brand's price-ending usage is more responsive to local cultural context than that of the value-oriented brands. Together, the findings suggest substantial differences across brands in the cultural responsiveness of their price-ending practices.

5.2. Managerial implications

For multinational retailers, price endings warrant explicit attention in global pricing governance. Their operational simplicity makes standardized rules attractive, but the results suggest that the appropriateness of a uniform approach may vary across markets. The distinct relationships of UAI, IDV, and LTO with 9-ending usage suggest that managers should consider specific cultural characteristics rather than treat national culture as a single basis for localization, while the GDP pattern indicates that macro-level economic conditions may also shape prevailing price endings. For managers, local pricing norms and market conditions therefore merit careful consideration before assuming that a common price-ending architecture will transfer uniformly across countries.

Brand positioning provides an additional basis for evaluating global price-ending rules. Such rules should be evaluated not only for operational consistency but also for their fit with the positioning of the retailer's focal brand. Price endings are better viewed as part of the broader set of signals through which retailers communicate their market position, not simply as mechanical components of price architecture.

Cultural information may be most useful as a diagnostic input rather than a direct decision rule. In implementing global pricing policies, retailers can define a limited set of price endings consistent with brand positioning and use local pricing conventions, competitor practices, and consumer research to govern exceptions to those rules. The supplementary results further caution against treating different non-round endings as interchangeable, since individual ending digits may carry distinct market-specific meanings.

5.3. Limitations and directions for future research

Our results are derived from a large dataset of price observations (61 countries, 120,000 products, observed over six years), and, to the best of our knowledge, is the largest in terms of country coverage. That gives us confidence in the stability and robustness of our key results. However, not unlike any other similar paper, we face the trade-off between breadth versus depth as some limitations of our research results.

First, our data does not include consumer responses or managerial decision processes. This limits our ability to directly identify the mechanisms underlying the observed patterns. We call for more research to explore these mechanisms in greater details.

Second, our cross-cultural results should be interpreted as conditional associations rather than causal effects, because countries differ in institutions, competition, regulation, and other characteristics beyond the included controls. Future studies could examine cultural and institutional influences jointly, exploit within-country variation where appropriate, or use research designs that permit stronger identification.

Third, the breadth in country coverage notwithstanding, our retailer sample is small. While their brand positioning differences are observable, there may be other unobserved retailer characteristics correlated with their brand positioning that we cannot completely identify. We do not have any reason to believe that the retail brands in our sample represent unique multinational contexts. So, we have no *a priori* reasons to expect that our results will differ with a different sample; yet, our results here may best be seen as indicative, rather than completely generalizable. Future research could explore more retailer level variation of the broader cross-cultural effects.

6. Conclusion

This study uses directly observed daily prices from multinational retailers across multiple countries and regions to examine how national culture is associated with the use of 9-ending prices. To our knowledge the sample is the largest till date for similar cross-country studies. The results show distinct relationships for uncertainty avoidance, individualism, and long-term orientation, and that these relationships vary with brand positioning. We also find that price-ending usage is consistently associated with national income, with higher GDP per capita linked to lower 9-ending and higher 5-ending prevalence. These results extend price-ending research to retailers' observed cross-market practices and show how a specific pricing convention can sit at the intersection of national context, brand positioning, and global pricing standardization. So, even a potentially highly codifiable pricing practice does not operate uniformly across national markets or across brands.

Notes

- [1] A European subset of the BPP data has also been used in prior research on institutional legacy and 9-ending pricing (Ling *et al.*, 2026).
- [2] Under the terms governing use of the data, the identities of the focal retailers and their brands are not disclosed. For one retailer, we follow the product-ID classification documented by the data provider (Cavallo *et al.*, 2014) to identify and remove third-party products sold through its online store. The retained observations represent the focal retailer's own-brand assortment, consistent with the four-brand design used throughout the analysis.
- [3] The country classification is unchanged using 5% or 15% thresholds.
- [4] The Lucky-8 indicator equals one for China, Hong Kong, Japan, Singapore, and Vietnam, and zero otherwise. For Vietnam, evidence of favorable associations with the digit 8 is also reported by Phan et al. (2023).

References

- Aalto-Setälä, V. (2005), “How do markets behave? The adjustment of price endings”, *Journal of Product & Brand Management*, Vol. 14 No. 7, pp. 455–459, <https://doi.org/10.1108/10610420510633404>.
- Aaker, J.L. and Maheswaran, D. (1997), “The effect of cultural orientation on persuasion”, *Journal of Consumer Research*, Vol. 24 No. 3, pp. 315–328, <https://doi.org/10.1086/209513>.
- Anderson, E.T. and Simester, D.I. (2003), “Effects of \$9 price endings on retail sales: evidence from field experiments”, *Quantitative Marketing and Economics*, Vol. 1 No. 1, pp. 93–110, <https://doi.org/10.1023/A:1023581927405>.
- Bearden, W.O., Money, R.B. and Nevins, J.L. (2006), “A measure of long-term orientation: development and validation”, *Journal of the Academy of Marketing Science*, Vol. 34 No. 3, pp. 456–467, <https://doi.org/10.1177/0092070306286706>.
- Bizer, G.Y. and Schindler, R.M. (2005), “Direct evidence of ending-digit drop-off in price information processing”, *Psychology & Marketing*, Vol. 22 No. 10, pp. 771–783, <https://doi.org/10.1002/mar.20084>.
- Cavallo, A., Neiman, B. and Rigobon, R. (2014), “Currency unions, product introductions, and the real exchange rate”, *The Quarterly Journal of Economics*, Vol. 129 No. 2, pp. 529–595, <https://doi.org/10.1093/qje/qju008>.
- de Mooij, M. and Hofstede, G. (2011), “Cross-cultural consumer behavior: a review of research findings”, *Journal of International Consumer Marketing*, Vol. 23 Nos 3/4, pp. 181–192, <https://doi.org/10.1080/08961530.2011.578057>.
- Hamilton, R. and Chernev, A. (2013), “Low prices are just the beginning: price image in retail management”, *Journal of Marketing*, Vol. 77 No. 6, pp. 1–20, <https://doi.org/10.1509/jm.08.0204>.
- Han, S.P. and Shavitt, S. (1994), “Persuasion and culture: advertising appeals in individualistic and collectivistic societies”, *Journal of Experimental Social Psychology*, Vol. 30 No. 4, pp. 326–350, <https://doi.org/10.1006/jesp.1994.1016>
- Hofstede, G. (2001), *Culture’s Consequences: Comparing Values, Behaviors, Institutions and Organizations Across Nations*, 2nd ed., Sage, Thousand Oaks, CA.
- International Monetary Fund (n.d.), “Consumer Price Index (CPI)”, *IMF Data*, available at: [IMF Consumer Price Index data](https://data.imf.org/?ts=Consumer-Price-Index)
- Jain, S.C. (1989), “Standardization of international marketing strategy: some research hypotheses”, *Journal of Marketing*, Vol. 53 No. 1, pp. 70–79, <https://doi.org/10.1177/002224298905300106>.

- Jeong, J.Y. and Crompton, J.L. (2017), “The use of odd-ending numbers in the pricing of five tourism services in three different cultures”, *Tourism Management*, Vol. 62, pp. 135–146, <https://doi.org/10.1016/j.tourman.2017.04.002>.
- Jeong, J.Y. and Crompton, J.L. (2018), “Do subjects from high and low context cultures attribute different meanings to tourism services with 9-ending prices?”, *Tourism Management*, Vol. 64, pp. 110–118, <https://doi.org/10.1016/j.tourman.2017.08.009>
- Kopalle, P.K., Pauwels, K., Akella, L.Y. and Gangwar, M. (2023), “Dynamic pricing: definition, implications for managers, and future research directions”, *Journal of Retailing*, Vol. 99 No. 4, pp. 580–593, <https://doi.org/10.1016/j.jretai.2023.11.003>.
- Levy, D., Snir, A., Gotler, A. and Chen, H.A. (2020), “Not all price endings are created equal: price points and asymmetric price rigidity”, *Journal of Monetary Economics*, Vol. 110, pp. 33–49, <https://doi.org/10.1016/j.jmoneco.2019.01.005>.
- Ling, X., Liu, R. and Wang, S. (2026), “Institutional legacy and 9-ending price formats: evidence from multinational retailers across Eastern and Western Europe”, *Journal of Eastern European and Central Asian Research*, Vol. 13 No. 1, pp. 52–65, <https://doi.org/10.15549/jeecar.v13i1.2179>.
- Macé, S. (2012), “The impact and determinants of nine-ending pricing in grocery retailing”, *Journal of Retailing*, Vol. 88 No. 1, pp. 115–130, <https://doi.org/10.1016/j.jretai.2011.07.002>.
- Ngan, H.F.B., Ren, L. and O’Bree, G. (2018), “Lucky 8-ending – a case study on managerial price-ending beliefs in Macao”, *Journal of Hospitality and Tourism Management*, Vol. 36, pp. 22–30, <https://doi.org/10.1016/j.jhtm.2018.06.002>.
- Nguyen, A., Heeler, R.M. and Taran, Z. (2007), “High-low context cultures and price-ending practices”, *Journal of Product & Brand Management*, Vol. 16 No. 3, pp. 206–214, <https://doi.org/10.1108/10610420710751582>.
- Papke, L.E. and Wooldridge, J.M. (1996), “Econometric methods for fractional response variables with an application to 401(k) plan participation rates”, *Journal of Applied Econometrics*, Vol. 11 No. 6, pp. 619–632, [https://doi.org/10.1002/\(SICI\)1099-1255\(199611\)11:6<619::AID-JAE418>3.0.CO;2-1](https://doi.org/10.1002/(SICI)1099-1255(199611)11:6<619::AID-JAE418>3.0.CO;2-1).
- Quintal, V.A., Lee, J.A. and Soutar, G.N. (2010), “Tourists’ information search: the differential impact of risk and uncertainty avoidance”, *International Journal of Tourism Research*, Vol. 12 No. 4, pp. 321–333, <https://doi.org/10.1002/jtr.753>
- Ray, S., H. Chen., M. Bergen, and D. Levy (2006), “Asymmetric Wholesale Pricing: Theory and Evidence,” *Marketing Science* 25, 131–54.

- Schindler, R.M. (2006), “The 99 price ending as a signal of a low-price appeal”, *Journal of Retailing*, Vol. 82 No. 1, pp. 71–77, <https://doi.org/10.1016/j.jretai.2005.11.001>.
- Schindler, R.M. (2009), “Patterns of price endings used in US and Japanese price advertising”, *International Marketing Review*, Vol. 26 No. 1, pp. 17–29, <https://doi.org/10.1108/02651330910933186>.
- Schindler, R.M. and Kirby, P.N. (1997), “Patterns of rightmost digits used in advertised prices: implications for nine-ending effects”, *Journal of Consumer Research*, Vol. 24 No. 2, pp. 192–201, <https://doi.org/10.1086/209504>.
- Schindler, R.M., Parsa, H.G. and Naipaul, S. (2011), “Hospitality managers’ price-ending beliefs”, *Cornell Hospitality Quarterly*, Vol. 52 No. 4, pp. 421–428, <https://doi.org/10.1177/1938965511421168>.
- Shavitt, S., Lalwani, A.K., Zhang, J. and Torelli, C.J. (2006), “The horizontal/vertical distinction in cross-cultural consumer research”, *Journal of Consumer Psychology*, Vol. 16 No. 4, pp. 325–342, https://doi.org/10.1207/s15327663jcp1604_3.
- Simmons, L.C. and Schindler, R.M. (2003), “Cultural superstitions and the price endings used in Chinese advertising”, *Journal of International Marketing*, Vol. 11 No. 2, pp. 101–111, <https://doi.org/10.1509/jimk.11.2.101.20161>.
- Steenkamp, J.E.B.M. (2001), “The role of national culture in international marketing research”, *International Marketing Review*, Vol. 18 No. 1, pp. 30–44, <https://doi.org/10.1108/02651330110381970>.
- Snir, A., Levy, D. and Chen, H.A. (2017), “End of 9-endings, price recall, and price perceptions”, *Economics Letters*, Vol. 155, pp. 157–163, <https://doi.org/10.1016/j.econlet.2017.04.001>.
- Stiving, M. (2000), “Price-endings when prices signal quality”, *Management Science*, Vol. 46 No. 12, pp. 1617–1629, <https://doi.org/10.1287/mnsc.46.12.1617.12078>.
- Stiving, M. and Winer, R.S. (1997), “An empirical analysis of price endings with scanner data”, *Journal of Consumer Research*, Vol. 24 No. 1, pp. 57–67, <https://doi.org/10.1086/209493>.
- Suri, R., Anderson, R.E. and Kotlov, V. (2004), “The use of 9-ending prices: contrasting the USA with Poland”, *European Journal of Marketing*, Vol. 38 Nos 1/2, pp. 56–72, <https://doi.org/10.1108/03090560410511122>.
- Swoboda, B. and Elsner, S. (2013), “Transferring the retail format successfully into foreign countries”, *Journal of International Marketing*, Vol. 21 No. 1, pp. 81–109, <https://doi.org/10.1509/jim.12.0148>.
- Theodosiou, M. and Leonidou, L.C. (2003), “Standardization versus adaptation of international marketing strategy: an integrative assessment of the empirical research”, *International*

Business Review, Vol. 12 No. 2, pp. 141–171, [https://doi.org/10.1016/S0969-5931\(02\)00094-X](https://doi.org/10.1016/S0969-5931(02)00094-X).

Thomas, M. and Morwitz, V. (2005), “Penny wise and pound foolish: the left-digit effect in price cognition”, *Journal of Consumer Research*, Vol. 32 No. 1, pp. 54–64, <https://doi.org/10.1086/429600>.

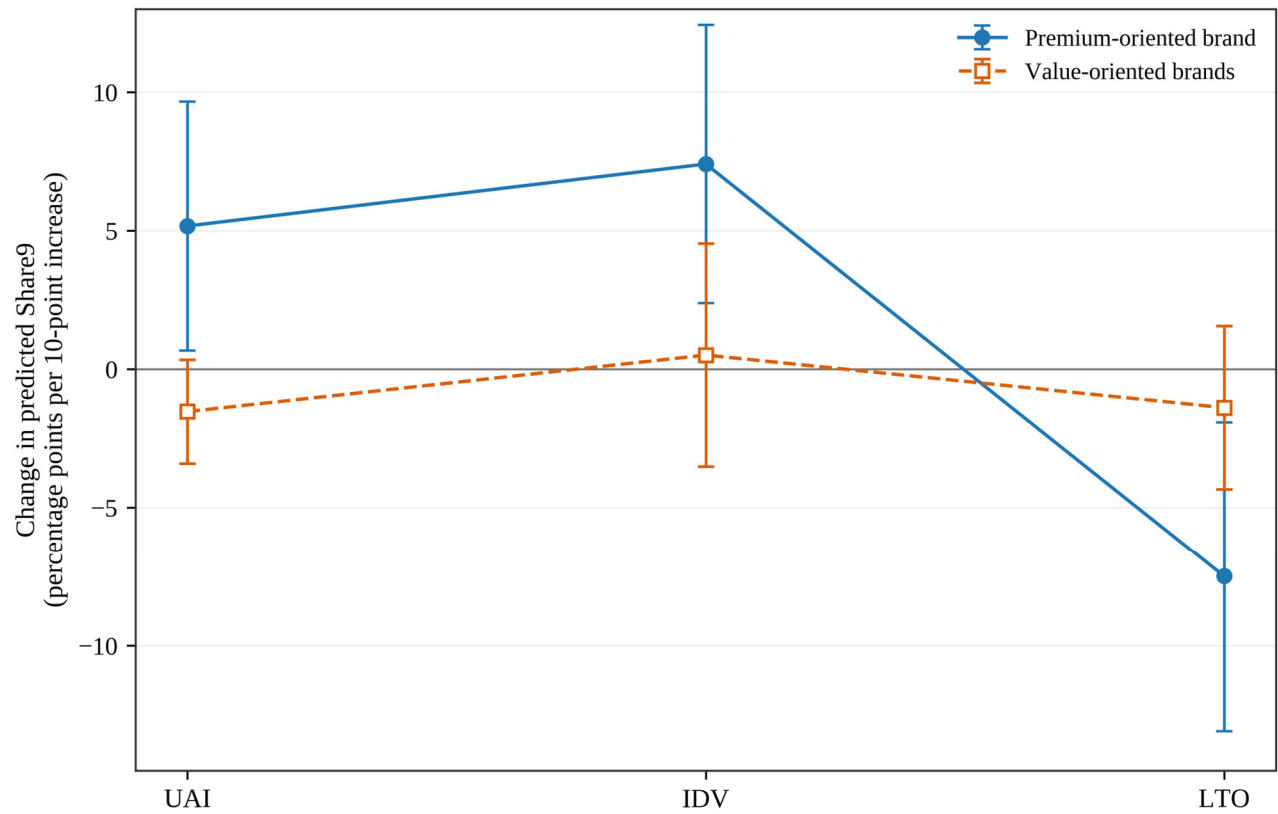
Ventura, A., Troll, E.S., Soliman, M. and Loschelder, D.D. (2025), “Round, just-below, or precise prices? Cultural differences in the prevalence of price endings in E-commerce”, *Frontiers in Behavioral Economics*, Vol. 4, Article 1296207, <https://doi.org/10.3389/frbhe.2025.1296207>.

Westjohn, S.A., Roschk, H. and Magnusson, P. (2017), “Eastern versus Western culture pricing strategy: superstition, lucky numbers, and localization”, *Journal of International Marketing*, Vol. 25 No. 1, pp. 72–90, <https://doi.org/10.1509/jim.16.0022>.

World Bank (n.d.), “GDP per capita (constant 2015 US\$)”, *World Development Indicators*, available at: [World Bank GDP per capita data](#)

Zbaracki, M., M. Ritson, D. Levy, S. Dutta, M. Bergen. 2004. The managerial and customer costs of price adjustment: Direct evidence from industrial markets. *Rev. Econom. Statist.* 86(2) 514–533.

Figure 1. Average Marginal Effects of National Culture on 9-Ending Prevalence by Brand Positioning



Notes: Points report average marginal effects from the price-count-weighted fractional-logit interaction model for a 10-point increase in each cultural dimension; error bars indicate 95% confidence intervals based on country-clustered standard errors.

Source: Authors own work

Table I. Descriptive Statistics

Variable	N	Mean	SD	Minimum	Maximum
Share9	3,744	0.623	0.369	0.000	1.000
Share8	3,744	0.044	0.146	0.000	0.987
Share5	3,744	0.252	0.346	0.000	1.000
Uncertainty avoidance (UAI)	3,744	60.918	23.426	8.000	104.000
Individualism (IDV)	3,744	53.245	22.457	12.000	91.000
Long-term orientation (LTO)	3,744	51.871	21.923	13.098	100.000
Value-oriented brand (=1)	3,744	0.675	0.468	0.000	1.000
Ln GDP per capita	3,744	10.227	0.924	7.265	11.695
CPI inflation	3,744	0.207	0.494	-2.291	6.668
Decimal indicator (=1)	3,744	0.655	0.475	0.000	1.000
Ln relative price level	3,744	0.784	1.114	0.000	12.071
Lucky-8 market (=1)	3,744	0.119	0.324	0.000	1.000

Notes: Unweighted statistics for the 3,744 complete-case country–retailer–month observations in the 61-country main estimation sample. Share variables are proportions. The decimal indicator equals one when at least 10% of observed prices in a country contain a nonzero fractional component.

Source: Authors' own work.

Table II. National Culture, Brand Positioning, and 9-Ending Pricing

Variable	(1) Pooled Robust SE	(2) Interactions Robust SE	(3) Interactions Country-clustered SE
Uncertainty avoidance (UAI)	-0.0056*** (0.0014)	0.0301*** (0.0024)	0.0301** (0.0134)
Individualism (IDV)	0.0050** (0.0024)	0.0431*** (0.0032)	0.0431*** (0.0155)
Long-term orientation (LTO)	-0.0082*** (0.0018)	-0.0437*** (0.0031)	-0.0437** (0.0178)
UAI × Value	—	-0.0376*** (0.0026)	-0.0376*** (0.0138)
IDV × Value	—	-0.0407*** (0.0032)	-0.0407** (0.0159)
LTO × Value	—	0.0370*** (0.0034)	0.0370** (0.0185)
Lucky-8 market (=1)	1.7065*** (0.1344)	1.8192*** (0.1355)	1.8192*** (0.5023)
Ln GDP per capita	-0.7059*** (0.0595)	-0.7075*** (0.0598)	-0.7075*** (0.1985)
CPI inflation	0.0658 (0.0623)	0.0689 (0.0629)	0.0689 (0.0915)
Decimal indicator (=1)	-0.7015*** (0.0672)	-0.6894*** (0.0676)	-0.6894** (0.2684)
Ln relative price level	0.0690 (0.0880)	-0.0049 (0.0850)	-0.0049 (0.1959)
Retailer fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	3,744	3,744	3,744
Countries	61	61	61
Country clusters	—	—	61

Notes: Dependent variable is Share9. Models are price-count-weighted fractional logits with retailer and year fixed effects. The value-positioning main effect is absorbed by retailer fixed effects. Standard errors are in parentheses. * $p < .10$, ** $p < .05$, *** $p < .01$.

Source: Authors' own work.

Table III. Robustness Checks for 9-Ending Pricing

Variable	No Lucky-8	Strict 20 × 8	Complete overlap
Uncertainty avoidance (UAI)	0.0163 (0.0133)	0.0230* (0.0135)	0.0190 (0.0120)
Individualism (IDV)	0.0288* (0.0148)	0.0694*** (0.0257)	0.0716*** (0.0187)
Long-term orientation (LTO)	-0.0204** (0.0102)	-0.0554* (0.0295)	-0.0545** (0.0252)
UAI × Value	-0.0231* (0.0124)	-0.0514*** (0.0148)	-0.0416*** (0.0128)
IDV × Value	-0.0249 (0.0157)	-0.0676*** (0.0238)	-0.0667*** (0.0172)
LTO × Value	0.0128 (0.0132)	0.0582* (0.0315)	0.0549** (0.0263)
Retailer fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	3,299	640	960
Countries	56	20	25
Country clusters	56	20	25

Notes: Dependent variable is Share9. Columns are price-count-weighted interaction fractional logits with retailer and year fixed effects and country-clustered standard errors. The strict panel contains all four retailers in every country-month from October 2012 through May 2013; the complete-overlap sample retains country-months in which all four retailers are observed. The controls from Table II are included but not reported. * $p < .10$, ** $p < .05$, *** $p < .01$.

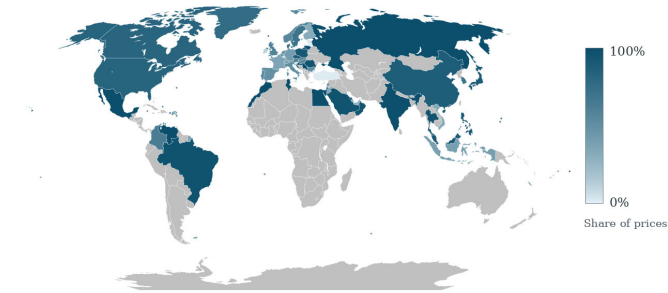
Source: Authors' own work.

National Culture, Brand Positioning, and 9-Ending Pricing Across Markets

Supplementary Material

Supplementary Figure S1. Distribution of Price-ending Patterns across the World

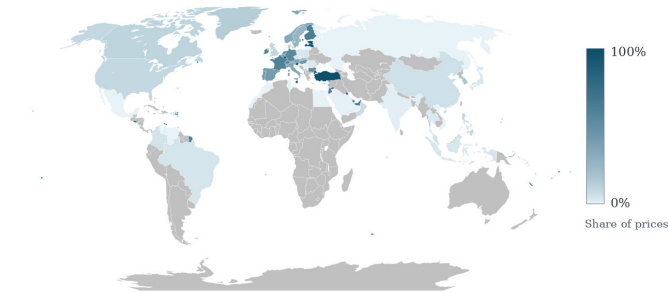
(a) 9-ending prevalence



(b) 8-ending prevalence



(c) 5-ending prevalence



Notes: Shading reports country-level ending prevalence in the 61-country main sample; unshaded countries are outside the sample.
Source: Authors' own work. Base map boundaries: Natural Earth (public domain).

Supplementary Table S1. Country List, Price-Ending Prevalence, and Decimal Indicator

Country	Code	9-ending %	8-ending %	5-ending %	Decimal indicator	Strict 20 × 8
Austria	AT	57.6	1.3	36.9	1	Yes
Bahrain	BH	95.1	0.0	4.8	1	
Belgium	BE	47.8	1.2	41.4	1	Yes
Brazil	BR	96.7	0.0	3.3	0	
Bulgaria	BG	50.1	0.0	49.9	1	
Canada	CA	81.9	1.4	9.6	1	Yes
China	CN	87.7	3.1	5.1	1	
Colombia	CO	63.0	1.8	3.9	0	
Croatia	HR	100.0	0.0	0.0	1	
Czechia	CZ	87.5	4.4	2.9	0	Yes
Denmark	DK	76.0	1.8	13.2	0	
Egypt	EG	99.6	0.0	0.0	0	
El Salvador	SV	13.5	0.0	86.5	1	
Estonia	EE	4.5	0.0	95.5	1	
Finland	FI	31.3	0.7	61.6	1	Yes
France	FR	36.1	0.5	59.2	1	Yes
Germany	DE	41.3	0.7	54.1	1	Yes
Hong Kong	HK	84.5	6.1	4.3	1	Yes
Hungary	HU	52.9	0.8	44.5	0	Yes
India	IN	99.2	0.0	0.8	0	
Indonesia	ID	39.1	6.6	2.6	0	
Ireland	IE	10.0	3.0	60.1	1	
Israel	IL	100.0	0.0	0.0	1	
Italy	IT	50.5	2.1	34.0	1	Yes
Japan	JP	89.5	3.2	2.2	0	Yes
Jordan	JO	34.0	0.0	65.7	1	
Korea (Republic of)	KR	69.7	0.3	16.9	0	
Kuwait	KW	25.5	0.0	74.4	1	
Latvia	LV	0.6	0.0	99.4	1	
Lebanon	LB	57.7	0.0	27.5	0	
Lithuania	LT	100.0	0.0	0.0	1	
Country	Code	9-ending %	8-ending %	5-ending %	Decimal indicator	Strict 20 × 8
Luxembourg	LU	3.5	0.6	93.3	1	
Malaysia	MY	92.1	0.8	4.8	1	Yes

Country	Code	9-ending %	8-ending %	5-ending %	Decimal indicator	Strict 20 × 8
Malta	MT	5.0	0.0	95.0	1	
Mexico	MX	99.8	0.1	0.0	0	
Morocco	MA	99.7	0.0	0.0	0	
Netherlands	NL	46.4	0.9	46.7	1	Yes
Norway	NO	55.4	6.8	32.2	0	Yes
Oman	OM	93.5	0.0	6.3	1	
Philippines	PH	91.1	0.0	8.5	0	
Poland	PL	91.7	1.5	2.7	1	
Portugal	PT	55.0	1.0	39.5	1	Yes
Qatar	QA	30.3	0.0	65.5	0	
Romania	RO	95.1	0.8	1.8	1	
Russian Federation	RU	100.0	0.0	0.0	0	
Saudi Arabia	SA	96.2	0.0	0.2	0	
Serbia	RS	100.0	0.0	0.0	0	
Singapore	SG	87.1	5.9	3.5	1	Yes
Slovakia	SK	61.5	2.1	25.5	1	
Slovenia	SI	3.6	0.0	96.4	1	
Spain	ES	48.6	1.8	40.5	1	
Sweden	SE	69.5	0.8	24.8	0	Yes
Switzerland	CH	39.4	1.0	56.6	1	Yes
Thailand	TH	95.0	0.5	1.9	0	
Tunisia	TN	100.0	0.0	0.0	1	
Turkey	TR	1.3	0.0	98.7	1	
United Arab Emirates	AE	26.7	0.6	64.3	0	Yes
United Kingdom	UK	58.7	4.3	9.1	1	
United States	US	83.0	1.7	8.0	1	Yes
Venezuela (Bolivarian Republic of)	VE	100.0	0.0	0.0	0	
Viet Nam	VN	32.2	40.9	0.0	0	

Notes: Ending percentages use the underlying price-observation counts in the 3,779-cell panel before complete-case exclusion. The decimal indicator applies the 10% rule at country level. Strict 20 × 8 denotes the complete four-retailer panel for October 2012–May 2013.

Source: Authors' own work.

Supplementary Table S2. Average Marginal Effects of Culture by Brand Positioning

Cultural dimension	Premium-oriented brand	Value-oriented brands	Difference (Value – Premium)
Uncertainty avoidance (UAI)	5.16** (2.29)	-1.54 (0.96)	-6.70*** (2.41)
Individualism (IDV)	7.40*** (2.56)	0.50 (2.06)	-6.90** (2.85)
Long-term orientation (LTO)	-7.50*** (2.85)	-1.39 (1.51)	6.11** (3.08)

Notes: Entries are percentage-point changes in predicted Share9 for a 10-point increase in each cultural index, calculated from the country-clustered interaction fractional logit with retailer and year fixed effects. Standard errors are in parentheses. * p < .10, ** p < .05, *** p < .01.

Source: Authors' own work.

Supplementary Table S3. Alternative Inference and Estimation for 9-Ending Pricing

Variable	Pooled frac. logit Clustered SE	Interaction frac. logit Clustered SE	Weighted OLS Robust SE	Weighted OLS Clustered SE
Uncertainty avoidance (UAI)	-0.0056 (0.0043)	0.0301** (0.0134)	0.0053*** (0.0004)	0.0053*** (0.0020)
Individualism (IDV)	0.0050 (0.0096)	0.0431*** (0.0155)	0.0082*** (0.0005)	0.0082*** (0.0024)
Long-term orientation (LTO)	-0.0082 (0.0070)	-0.0437** (0.0178)	-0.0080*** (0.0005)	-0.0080*** (0.0027)
UAI × Value	—	-0.0376*** (0.0138)	-0.0066*** (0.0004)	-0.0066*** (0.0022)
IDV × Value	—	-0.0407** (0.0159)	-0.0078*** (0.0005)	-0.0078*** (0.0027)
LTO × Value	—	0.0370** (0.0185)	0.0063*** (0.0006)	0.0063** (0.0030)
Lucky-8 market (=1)	1.7065*** (0.4686)	1.8192*** (0.5023)	0.2831*** (0.0245)	0.2831*** (0.0987)
Ln GDP per capita	-0.7059*** (0.1987)	-0.7075*** (0.1985)	-0.1246*** (0.0093)	-0.1246*** (0.0331)
CPI inflation	0.0658 (0.0914)	0.0689 (0.0915)	0.0150 (0.0122)	0.0150 (0.0175)
Decimal indicator (=1)	-0.7015*** (0.2628)	-0.6894** (0.2684)	-0.1487*** (0.0127)	-0.1487*** (0.0529)
Ln relative price level	0.0690 (0.2076)	-0.0049 (0.1959)	-0.0003 (0.0144)	-0.0003 (0.0332)
Retailer fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N	3,744	3,744	3,744	3,744
Country clusters	61	61	—	61

Notes: Dependent variable is Share9. All columns use price-count weights and retailer and year fixed effects. The value-positioning main effect is absorbed by retailer fixed effects. Standard errors are in parentheses. * p < .10, ** p < .05, *** p < .01.

Source: Authors' own work.

Supplementary Table S4. Alternative Price-Ending Results

Panel A. 5-Ending Pricing (Fractional-Logit Specifications)

Variable	Pooled Robust SE	Interactions Robust SE	Interactions Clustered SE
Uncertainty avoidance (UAI)	0.0115*** (0.0018)	-0.0268*** (0.0024)	-0.0268* (0.0138)
Individualism (IDV)	-0.0061** (0.0030)	-0.0280*** (0.0032)	-0.0280** (0.0138)
Long-term orientation (LTO)	0.0086*** (0.0020)	0.0203*** (0.0022)	0.0203* (0.0113)
UAI × Value	—	0.0391*** (0.0026)	0.0391*** (0.0131)
IDV × Value	—	0.0225*** (0.0033)	0.0225 (0.0160)
LTO × Value	—	-0.0119*** (0.0029)	-0.0119 (0.0145)
Lucky-8 market (=1)	-2.6956*** (0.1855)	-2.7702*** (0.1860)	-2.7702*** (0.7064)
Ln GDP per capita	0.9637*** (0.0786)	0.9649*** (0.0788)	0.9649*** (0.2611)
CPI inflation	-0.0966 (0.0723)	-0.0971 (0.0724)	-0.0971 (0.1121)
Decimal indicator (=1)	0.8619*** (0.0906)	0.8580*** (0.0906)	0.8580** (0.3701)
Ln relative price level	-0.2520*** (0.0965)	-0.2332** (0.0972)	-0.2332 (0.2402)
Retailer fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	3,744	3,744	3,744
Countries	61	61	61

Notes: Dependent variable is Share5. All specifications use price-count weights and retailer and year fixed effects. The controls from Table II are included. Standard errors are in parentheses. * p < .10, ** p < .05, *** p < .01.

Source: Authors' own work.

Panel B. 8-Ending Pricing (Fractional-Logit Specifications)

Variable	Pooled Robust SE	Interactions Robust SE	Interactions Clustered SE
Uncertainty avoidance (UAI)	-0.0060*** (0.0012)	-0.0354*** (0.0032)	-0.0354** (0.0160)
Individualism (IDV)	-0.0057*** (0.0021)	-0.0199*** (0.0029)	-0.0199 (0.0151)
Long-term orientation (LTO)	-0.0028* (0.0015)	0.0565*** (0.0034)	0.0565*** (0.0180)
UAI × Value	—	0.0370*** (0.0031)	0.0370** (0.0179)
IDV × Value	—	0.0266*** (0.0030)	0.0266* (0.0141)
LTO × Value	—	-0.0696*** (0.0033)	-0.0696*** (0.0178)
Lucky-8 market (=1)	0.8281*** (0.1212)	0.8530*** (0.1204)	0.8530** (0.4071)

Variable	Pooled Robust SE	Interactions Robust SE	Interactions Clustered SE
Ln GDP per capita	0.2415*** (0.0552)	0.0232 (0.0512)	0.0232 (0.2408)
CPI inflation	0.0654 (0.0735)	0.0378 (0.0628)	0.0378 (0.0370)
Decimal indicator (=1)	-0.3337*** (0.0649)	-0.4970*** (0.0603)	-0.4970 (0.3449)
Ln relative price level	0.0944 (0.0631)	0.3112*** (0.0633)	0.3112*** (0.1044)
Retailer fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	3,744	3,744	3,744
Countries	61	61	61

Notes: Dependent variable is Share8. All specifications use price-count weights and retailer and year fixed effects. The controls from Table II are included. Standard errors are in parentheses. * p < .10, ** p < .05, *** p < .01.

Source: Authors' own work.

Panel C. Exploratory Retailer-Specific Lucky-8 Associations with 8-Ending Usage

Retailer	Conditional Lucky-8 association (OLS coefficient)	Weighted Share8 (%) Other markets	Weighted Share8 (%) Lucky-8 markets
Premium-oriented focal brand	0.6585*** (0.0418)	1.58	67.29
Value brand A	-0.0012 (0.0049)	0.01	0.00
Value brand B	-0.0033 (0.0052)	0.10	0.00
Value brand C	-0.0103 (0.0070)	2.62	1.71

Notes: Exploratory price-count-weighted OLS model of Share8 includes Lucky-8 $\times$ retailer interactions, retailer and year fixed effects, UAI, IDV, LTO, ln GDP per capita, CPI inflation, the decimal indicator, and ln relative price. Standard errors are clustered by country. Conditional associations are the Lucky-8 coefficient for each retailer; descriptive percentages use underlying price counts. The fractional-logit version exhibits separation because some value retailers make virtually no use of 8-endings in Lucky-8 markets, so OLS is reported for this exploratory analysis. * $p < .10$, ** $p < .05$, *** $p < .01$.

Source: Authors' own work.

Supplementary Table S5. Specification Sensitivity—Panel A: Weighting

Variable	Price-count weights	Equal cell weights
Uncertainty avoidance (UAI)	0.0301** (0.0134)	0.0196* (0.0107)
Individualism (IDV)	0.0431*** (0.0155)	0.0309** (0.0122)
Long-term orientation (LTO)	-0.0437** (0.0178)	-0.0359*** (0.0127)
UAI × Value	-0.0376*** (0.0138)	-0.0401*** (0.0134)
IDV × Value	-0.0407** (0.0159)	-0.0482*** (0.0153)
LTO × Value	0.0370** (0.0185)	0.0391** (0.0167)
Retailer fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
N	3,744	3,744
Countries	61	61
Country clusters	61	61

Notes: Both columns are interaction fractional logits with retailer and year fixed effects and country-clustered standard errors. The controls from Table II are included but not reported. * $p < .10$, ** $p < .05$, *** $p < .01$.

Source: Authors' own work.

Supplementary Table S5 (continued). Specification Sensitivity—Panel B: Decimal Indicator and Relative Price

Variable	Main	No decimal control	Drop relative price > 100	Winsorized relative price	Relative-price rank
Uncertainty avoidance (UAI)	0.0301** (0.0134)	0.0300** (0.0124)	0.0296** (0.0133)	0.0299** (0.0134)	0.0301** (0.0134)
Individualism (IDV)	0.0431*** (0.0155)	0.0404** (0.0158)	0.0416*** (0.0161)	0.0422*** (0.0158)	0.0431*** (0.0158)
Long-term orientation (LTO)	-0.0437** (0.0178)	-0.0458** (0.0188)	-0.0432** (0.0181)	-0.0436** (0.0180)	-0.0437** (0.0177)
UAI × Value	-0.0376*** (0.0138)	-0.0410*** (0.0128)	-0.0377*** (0.0137)	-0.0375*** (0.0138)	-0.0375*** (0.0138)
IDV × Value	-0.0407** (0.0159)	-0.0427*** (0.0159)	-0.0393** (0.0166)	-0.0396** (0.0163)	-0.0406** (0.0159)
LTO × Value	0.0370** (0.0185)	0.0378** (0.0188)	0.0368* (0.0188)	0.0368** (0.0187)	0.0369** (0.0185)
Retailer fixed effects	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
N	3,744	3,744	3,726	3,744	3,744
Countries	61	61	61	61	61
Country clusters	61	61	61	61	61

Notes: All columns are interaction fractional logits with retailer and year fixed effects and country-clustered standard errors. The main model uses the country-level decimal indicator defined by the 10% rule; the second omits that control. The remaining columns vary the treatment of relative price. The other controls from Table II are included but not reported. * $p < .10$, ** $p < .05$, *** $p < .01$.

Source: Authors' own work.

Supplementary Table S6. Exploratory Retailer-Specific Cultural Slopes

Panel A. Cultural slopes by anonymized retailer

Cultural dimension	Premium	Value A	Value B	Value C
Uncertainty avoidance (UAI)	0.0304** (0.0131)	-0.0326* (0.0177)	-0.0441** (0.0173)	0.0087** (0.0042)
Individualism (IDV)	0.0458*** (0.0151)	-0.0315** (0.0154)	-0.0084 (0.0176)	0.0162 (0.0108)
Long-term orientation (LTO)	-0.0436** (0.0179)	-0.0071 (0.0135)	-0.0009 (0.0141)	-0.0097 (0.0094)

Panel B. Planned average value-brand contrasts

Cultural dimension	Average value-brand slope	Average value – premium
Uncertainty avoidance (UAI)	-0.0227** (0.0096)	-0.0531*** (0.0170)
Individualism (IDV)	-0.0079 (0.0084)	-0.0537*** (0.0165)
Long-term orientation (LTO)	-0.0059 (0.0076)	0.0377* (0.0198)

Notes: Panels derive from price-count-weighted fractional logits with retailer and year fixed effects and country-clustered standard errors. Panel A allows separate cultural slopes for each anonymized retailer; Panel B reports the equally weighted average across the three value-oriented focal brands and its contrast with the premium-oriented focal brand. These estimates are exploratory and assess variation around the average positioning contrast. * $p < .10$, ** $p < .05$, *** $p < .01$.

Source: Authors' own work.