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EXCESSIVE PRICE COMPETITION AS A FACTOR OF BRAND VALUE EROSION

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НАДМІРНА ЦІНОВА КОНКУРЕНЦІЯ ЯК ФАКТОР РУЙНУВАННЯ ЦІННОСТІ БРЕНДІВ

Aggressive price promos in today's markets have become a common tool of competition, which has a destructive effect on the long-term profitability and equity of brands. One of the main methodological challenges in assessing these consequences is the lack of observable classic (psychological) brand health metrics in standard transactional data (real sales and price data).

Correspondingly, the article aims at studying the impact of intense price competition on key indicators of brand health and developing an analytical approach for their indirect measurement based on real market data. To achieve the goal, a comprehensive log-linear demand model has been developed, which allows us to assess the value of the brand and its dynamic price sensitivity. As a proxy indicator of the brand strength, the index of "base velocity" was introduced, i.e. sales per 1% of distribution under relatively neutral market conditions. To evaluate the intensity of price competition, the metrics of "instantaneous interference" and "strategic interference" have been developed. Both indices measure synchronization of price discounts among competitors. The empirical test was carried out based on the weekly data of the Ukrainian whiskey market for 2018—2021.

Thanks to the parameterization of coefficients, it has been estimated that price sensitivity evolves under the influence of tactical decisions of the firm and general market price dynamics. Econometric modelling confirmed the presence of two mechanisms of brand erosion. Firstly, the effect of brand value degradation has been revealed: own promotional pressure and general market promotional noise statistically significantly devalue the base velocity. Secondly, the growth of price sensitivity has been proven: interference of price promos with competitors puts consumers in the waiting mode for discounts, which sharply increases the elasticity of demand. The study has also confirmed the existence of "brand resistance" effect when high base velocity acts as a kind of immunity, which partially dampens the negative effects of price wars, but leading brands still remain extremely vulnerable to mutual price attacks.

Based on the study results, the existence of a destructive "spiral of brand degradation" has been identified. Excessive promotions reduce base velocity and weaken brand resistance, which in turn generates an increase in buyers' price sensitivity. This forces companies to resort to even deeper discounts to at least keep prior sales, triggering a new round of brand value erosion.

Агресивні цінові акції на сучасних ринках стали поширеним інструментом конкуренції, що деструктивно впливає на довгострокову прибутковість та капітал бренду. Однією з головних методологічних проблем в оцінці цих наслідків є неспостережуваність класичних (психологічних) метрик здоров'я бренду у стандартних транзакційних даних (реальних даних про продажі та ціни).

Відповідно, метою статті є дослідження впливу інтенсивної цінової конкуренції на ключові показники здоров'я бренду та розробка аналітичного підходу для їх непрямого вимірювання на основі реальних ринкових даних. Для досягнення мети розроблено комплексну логлінійну модель попиту, яка дозволяє оцінювати цінність бренду та його динамічну цінову чутливість. Як проксі індикатор сили бренду введено показник "базової оборотності" — обсяг продажів на 1% дистрибуції за нейтральних ринкових умов. Для оцінки інтенсивності цінової конкуренції розроблено, зокрема, метрики "миттєвого перетину" та індекс стратегічної інтерференції, що фіксує синхронізацію акцій між конкурентами. Емпіричну перевірку здійснено на потижневих даних українського ринку віскі за 2018—2021 роки.

Завдяки параметризації коефіцієнтів доведено, що цінова чутливість еволюціонує під впливом тактичних рішень фірми та загальної ринкової цінової динаміки. Економетричне моделювання підтвердило дію двох механізмів руйнування бренду. По-перше, виявлено ефект розмиття цінності: власний акційний тиск і загальноринковий промо шум статистично значущо девальвують базову оборотність. По-друге, доведено зростання цінової чутливості: інтерференція акцій з конкурентами переводить споживачів у режим очікування знижок, що різко підвищує еластичність попиту. Дослідження також підтвердило наявність "опірності брендів", коли висока базова оборотність діє як імунітет, що частково гасить наслідки цінових війн, проте бренди-лідери є надзвичайно вразливими до взаємних цінових атак.

На основі отриманих результатів ідентифіковано існування деструктивної "спіралі деградації бренду". Надмірні промо акції зменшують базову оборотність і послаблюють опірність бренду, що генерує зростання цінової чутливості покупців. Це змушує компанії вдаватися до ще глибших знижок для утримання продажів, запускаючи новий виток руйнування капіталу.

Key words: price competition, pricing strategies, brand, pricing, consumer behaviour, competitiveness, brand value, market dynamics.

Ключові слова: цінова конкуренція, цінові стратегії, бренд, ціноутворення, поведінка споживача, конкурентоспроможність, цінність бренду, ринкова динаміка.

STATEMENT OF THE PROBLEM

In highly competitive consumer markets, aggressive price competition and frequent price promotions have become widespread tactical tools, yet they are increasingly recognized as destructive forces that erode long-term profitability and brand equity. While it is conceptually understood that intense pricing battles alter buyer behaviour by making consumers highly price-sensitive and "promo-dependent", measuring this deterioration in real-time presents a major operational challenge for businesses.

One of the core methodological challenges lies in the fact that traditional psychological metrics of brand health are generally unobservable in standard (actual) transactional data, typically requiring consumer surveys. Consequently, there is a significant analytical gap in the existing literature regarding the comprehensive integration of indirect brand health measurements into dynamic demand models. Therefore, there is a need to develop a data-driven framework capable of quantifying exactly how cumulative promotional pressure and the overlapping pricing strategies of competitors mathematically erode the intrinsic value and inflate price elasticities of brands over time.

ANALYSIS OF RECENT PUBLICATIONS

As research shows, excessive price competition and frequent promotions are destructive phenomena that erode long-term profitability and brand equity [1; 2]. Deep or too frequent discounts worsen the brand image and reduce the internal reference prices of consumers [2; 3]. Intense price competition fundamentally changes the

behaviour of buyers, significantly increasing their long-term price sensitivity (elasticity), forming a segment of "promo-dependent" buyers and reducing brand differentiation [3; 4].

One of the main methodological challenges in assessing these effects is the unobservability of psychological brand health metrics in standard (real) transactional data [5]. Since such indicators are usually measured in consumer surveys, in their absence, various researchers offer indirect methods [6]. For example, one of the reliable indicators can be the "price premium" of a national brand compared to the chain's private labels [2; 6]. An alternative is also to use a static base sales index, which is extracted from econometric models of demand to estimate the basic brand advantage over other brands [7].

As for empirical analysis, vector autoregression (VAR) and vector error correction models (VECM) are traditionally used to estimate dynamic consequences of dumping on real market data [6; 8]. Such models make it possible to separate short-term promotional shocks from their long-term and structural impact on the evolution of brand market shares [3].

However, there is a significant methodological gap in the available literature regarding the comprehensive integration of indirect measures of brand health and the dynamics of the evolution of price sensitivity (elasticity) into such models for quantifying the erosion of intrinsic brand value.

GOAL AND OBJECTIVES OF THE STUDY

In line with the identified research gaps, the goal of our study is to investigate the impact of intensive price competition on key brand health and value indicators. Correspondingly, the objectives of our study are (1) to formulate a theoretical framework for estimating the impact of excessive price competition on brand health and price sensitivity (elasticity), (2) to develop an approach to indirect measurement of the brand health when direct data are not available, and (3) to estimate the abovementioned effects on real market data.

RESULTS OF THE STUDY

In accordance with the objectives, our study consists of two main parts: developing a theoretical framework and conducting an empirical test of the framework.

Definition of key target indicators. The main indicators of brand health in our study are (1) value of the brand for the consumer (the higher, the more stable the brand is) and (2) price sensitivity of the brand demand (the lower its absolute value, the more loyal consumers are, the bigger price increase they are ready to tolerate). Taking into account such a set of indicators, the first research question arises: how to assess the brand value in the absence of direct historical data on this indicator?

As part of our approach, we propose to evaluate the relevant indicator indirectly based on the actual time series on prices, sales and distribution of brands. Such a proxy indicator that would reflect attractiveness of products to consumers "ceteris paribus" is, in our opinion, a "base velocity". Technically, we define this indicator as the volume of sales generated by 1% of the distribution of the product under the conditions of relatively neutral market environment (no abnormal discounts, seasonality, etc.). To estimate and calculate the base velocity ($BaseVel_i$), we use a log-linear model of brand demand where the dependent variable is the volume of sales per a unit of distribution:

$$\ln\left(\frac{Vol_{it}}{Distr_{it}}\right) = Const_i + a_1 \cdot \ln(Price_{it}) +$$

$$+a_2 \cdot \ln(Price_{compt}) + a_3 \cdot VolMkt_t + Error_{it} \quad (1).$$

Where:

Vol_{it} — actual sales of a product or market share,

$Distr_{it}$ — weighted distribution of the product,

$Const_i$ — fixed effect of brand strength,

Price — price indices of the target product and competitors, respectively. To correctly estimate the base velocity, we subtracted the average value of the price series from the price. In this case, the equation constant reflects the value of the dependent variable, provided that the price is on the brand-average level. Prices of competitors were centred using the same logic.

$VolMkt_t$ — dynamics of the total market volume, which allows one to control for the trend of the category and seasonal fluctuations in demand.

According to this logic, the base velocity is calculated as an exponent of the model constant, which reflects the volume of sales per one unit of distribution, cleaned of the influence of prices, seasonality, category dynamics, and other factors that can be potentially included in the model:

$$BaseVel_i = \exp(Const_i) \quad (2).$$

As for the second target indicator of brand health — price sensitivity of demand (own and cross-price elasticity) — according to our objectives, it should be modelled variable over time, and not static, as it is the case in many classic models. To estimate the dynamic elasticity, we need an appropriate specification of the demand model for individual brands. Moreover, since we plan to measure the impact of the price competition intensity on price sensitivity of demand, the latter needs to be parameterized using some measures of such a competition.

Measuring intensity of price competition. In our study, we suggest that a comprehensive measurement of the competition intensity is not only about the depth or frequency of discounts provided by firms, it is to a great extent also about interference of their pricing strategies. From a practical perspective, price interference occurs when the strategies of two or more market players overlap in time and form the effect of synergy or resonance. Since in our further analysis, we plan to quantify the impact of this phenomenon on price sensitivity and consumer loyalty to individual brands, we need to introduce quantitative metrics of interference of pricing strategies.

As the first metric, we introduce the concept of "instantaneous interference" — an indicator that reflects the strength of a direct tactical clash or the imposition of price promotions of two firms or brands (A and B) in a specific period (for example, a week):

$$Overlap_{ABt} = Disc_{At} \cdot Disc_{Bt} \quad (3).$$

By definition, this indicator differs from zero only during periods when both brands reduce the price at the same time. The greater the discounts offered by players, the greater the resonance. We can assume that the greater the resonance, the smaller the effect of the promotion for each individual player, because large simultaneous discounts transfer the competition purely to the price dimension, reducing the impact of loyalty or brand strength.

Since the instantaneous interference is a more tactical (short-term) indicator, we propose a similar more strategic indicator that would measure longer price interferences among brands. We define the strategic interference index as a link in the pricing of brands over a certain period of time. Mathematically, we propose to measure this indicator through the Pearson correlation coefficient between the discount dynamics of two firms A and B at a certain time interval L:

$$Sync_{ABL} = \frac{\sum_{t=1}^{L}(Disc_{At} - Mean_A)\cdot(Disc_{Bt} - Mean_B)}{\sqrt{\sum_{t=1}^{L}(Disc_{At} - Mean_A)^2 \cdot \sum_{t=1}^{L}(Disc_{Bt} - Mean_B)^2}} \quad (4).$$

This metric reflects the degree of similarity of pricing trajectories of the two firms. If we are talking about the market as a whole and the aggregate metric of the price promo pressure of all brands in general, it can be expressed as follows:

$$TotalPres_t = \sum_{i=1}^{N}(Disc_{it} \cdot Share_{it}) \quad (5).$$

Where Shareit is the market share of product i in time period t.

Based on the described metrics, three main types of interference in brand pricing can be distinguished:

— Mutual reinforcement, a high level of discount synchronization ($Sync_{AB} \rightarrow +1$), price promotions are held by firms at the same time.

— Antiphase ($Sync_{AB} \rightarrow -1$). Such interference is manifested in completely opposite movement of discounts between two players.

— SyncAB ≈ 0. Lack of interference in the pricing strategies of the respective players (orthogonality). Under such conditions, we can talk of the relative autonomy of the firm strategies.

By itself, the analysis of interferences among different firms allows us to understand specifics of dynamic price interactions in the market: which players act together or copy each other's steps, which try to avoid price interference with other players, etc.

Demand model. The equation of demand proposed by us incorporates both the company's own price history, the actions of competitors, and the interference of price strategies. We propose to express the actual volume of sales of the product in the period t as follows:

$$Vol_{it} = BaseVelDyn_{it} \cdot Distr_{it} \cdot \left(\frac{P_{it}}{STR_{it}}\right)^{E_{ownt}} \cdot \left(\frac{P_{compt}}{STR_{compt}}\right)^{E_{crosst}} \cdot \exp\left(-Cannib \cdot Overlap_{it}\right) \cdot (VolMkt_t)^{\beta_{mkti}} \quad (6).$$

Where:

$BaseVelDyn_{it}$ is a time-varying base velocity that is proportional to the strength (value) of the brand/product,

$Distr_{it}$ — product availability (distribution level),

P_{it} / STR_{it} — the ratio of the current actual price to the base (regular) price,

E_{ownt} — dynamic intrinsic price elasticity (< 0),

E_{crosst} — dynamic cross-price elasticity with competitors (> 0),

P_{compt} / STR_{compt} — the ratio of the actual price of competitors to the base price of competitors,

$Overlap_{it}$ — instantaneous interference index (weighted index of tactical overlap of discounts). The Cannib coefficient reflects the strength of cannibalization of demand when holding simultaneous discounts.

$VolMkt_t$ — general dynamics of the market, which captures brand-specific sales effects from changes in market demand, as well as seasonal factors.

In classical behavioural economics, addiction to discounts is usually described through the concept of a reference price, against which the consumer compares the actual price of a product in the market in a certain period of time. Within our approach, we do not directly introduce the concept of the reference price, but we argue that its change is implicitly reflected in the dynamic indicator of base velocity and the impact of price interferences. Explicit inclusion of the reference price in the model would then lead to double counting. In our approach, the indicators reflecting consumer attitudes to a particular brand evolve under the influence of excessive price competition via two main mechanisms:

— Brand value erosion and

— Increased price sensitivity of demand.

Brand value erosion. Base velocity of a brand (BaseVel) reflecting brand strength is not constant in our model. It can decline under the pressure of two factors: its own abuse of price promotions and the general market "promotional noise". If a brand uses discounts too often or makes them very deep, its base price is perceived as "unfairly high" by the consumer. At the same time, if other brands start making deep and frequent discounts, even if the brand does not do this, it can be perceived overpriced on the background of what competitors do. Mathematically, this can be expressed as follows:

$$BaseVelDyn_{it} = BaseVel_{i0} \cdot (1 - Decay_{own} \cdot OwnPres_{it-1} - Decay_{mkt} \cdot TotalPres_{t-1}) \quad (7).$$

Where:

$OwnPres_{it-1}$ — cumulative promotional pressure of a brand in previous periods (the total depth of its own discounts for previous periods) — is a powerful factor eroding brand value.

$TotalPres_{t-1}$ — cumulative promotional pressure in the market: eroding the value of brands, when the consumer believes that there are permanent discounts on the market at any time.

$Decay_{own}$ and $Decay_{mkt}$ are the coefficients of influence of the factors described (the strength of brand value erosion); it can be assumed that brand's own excessive discounts erode the brand more, although the situation may be the opposite for weaker brands.

From the economic perspective of the described equation, the following can be stated: in order to restore sales volumes to the previous level with a decrease in

BaseVelDyn, the company is forced to provide additional discounts.

Increased price sensitivity of demand. This mechanism works as follows: When brands synchronize their strategies ($Sync_{AB} \rightarrow 1$), their promotion periods coincide, which means that consumers get used to comparing them rather based on price. However, price sensitivity of demand for a product or brand (as well as cross-price sensitivity) can also degrade (grow) due to the mechanism of reduced brand value described above which negatively affects consumer willingness to pay a higher price for it.

In terms of economic indicators, we can then talk about growth of both the brand's own price sensitivity and cross-price elasticity with competitors resulting from both mechanisms. Mathematically, we suggest multiplicative functions of dynamic price elasticities (own and cross):

$$|E_{ownt}| = |E_{own0}| \cdot \exp\left(Sens_{own} \cdot Sync_{AB} - \right.$$
$$\left. -Resist_{own} \cdot \ln\left(BaseVelDyn_t\right)\right) \quad (8),$$

$$E_{crosst} = E_{cross0} \cdot \exp\left(Sens_{cross} \cdot Sync_{AB} - \right.$$
$$\left. -Resist_{cross} \cdot \ln\left(BaseVelDyn_t\right)\right) \quad (9).$$

Where:

$Sens_{own}$ and $Sens_{cross}$ are sensitivities of own and cross-price elasticity to interferences in pricing of a brand and its competitors. We expect that the more interference is present, the greater the price sensitivity is.

$Resist_{own}$ and $Resist_{cross}$ are "resistance coefficients" reflecting our hypothesis that weaker brands will have higher own and cross-price sensitivities.

Empirical evaluation of brand value erosion and negative impact on sales. We conducted an empirical test of our approach on weekly time series data on prices, distribution and sales of brands in the Ukrainian whiskey market in 2018—2021. Data source: Audit of retail distribution in the category of alcoholic beverages conducted by "Kvadrans-M" LLC in 2018-2021. Based on these data, econometric modelling of the equations described in the theoretical part of our study was carried out.

Empirical simulations convincingly confirm the hypothesis of brand strength erosion due to excessive promotional activity: for all players, the coefficients Decayown have expected signs and are statistically significant with the absolute values of the coefficients ranging from -0.13 to -0.4. This result means that the cumulative volume of discounts for past periods (OwnPres) works as a toxic factor that reduces dynamic base velocity (strength) of brands.

The coefficients of impact of market promotional activity (TotalPress) were also significant for the vast majority of brands. Based on this finding, we may conclude that even if a firm itself refrains from excessive promotional pressure, but the market as a whole is oversaturated with promotional activities, the base velocity of the brand suffers due to general commoditization of the market.

In Figure 1, we combine these two metrics for different brands. As can be seen, brands 1, 3 and 10 are disproportionately more vulnerable to market promotional noise — its negative impact on the strength of these brands is bigger even compared to the impact of their own excessive promotional activity. The rest of the brands (except for brand 8) are more vulnerable to their own excessive promotional noise.

It is also worth paying attention to the absolute values of the negative impact of excessive promotional activity of the brands themselves and the market as a whole: the stronger this influence is, the more the brand is dependent on price competition in the market. For example, the strength of Brand 5 is less sustainable and can be noticeably diminished in case of irrational actions of the brand itself or beginning of a price war in the market.

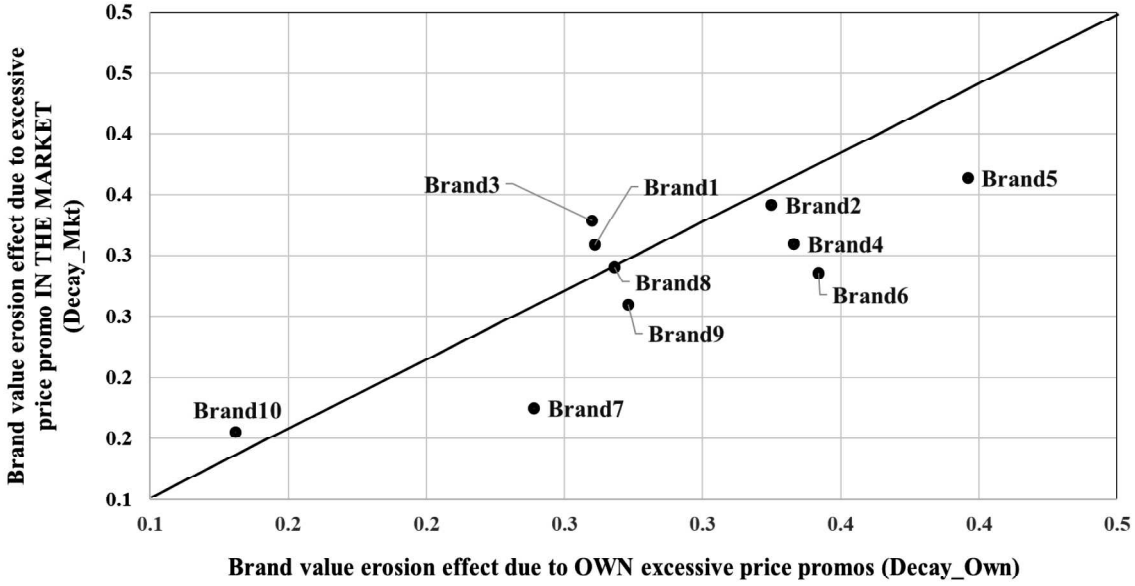

Figure 1. The effect of brand strength erosion due to excessive promotional activity by brands and market as a whole (TOP10 brands)

Source: Simulations and calculations by the author.

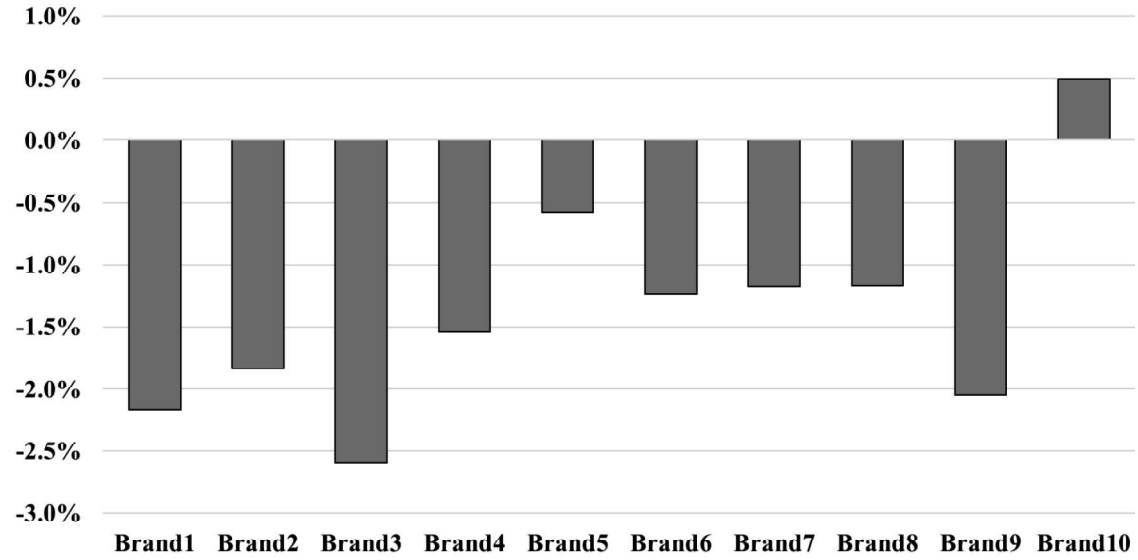

Figure 2. Change in base velocity (strength) of TOP 10 brands on the market in 2021 compared to 2018, %

Source: Simulations and calculations by the author.

Figure 2 shows how the estimated base velocity for TOP 10 whiskey brands changed in 2021 compared to 2018 (the period of our analysis). It is clear that by its nature, this indicator cannot change suddenly and quickly but nine out of ten brands under consideration have experienced a decline in their own value.

In our study, we also confirmed the hypothesis that pricing interference of various market players directly negatively affects their sales. This conclusion can be drawn from the fact that the impact coefficients of price promo synchronization on demand (Cannib coefficients in equation 6) are significant for all brands. Therefore, the more a brand synchronizes its price discounts with the activity of competitors, the more it loses and the less effect it achieves from the promotions.

Empirical evaluation of price sensitivity erosion and brand resistance. Our empirical model confirmed the two most important hypotheses: about the erosion of price sensitivity and presence of brand resistance.

Erosion of price sensitivity. The sensitivity coefficient (Sensown) to price interference in the market (Sync) turned out to be statistically significant for all brands and has an average value of about -0.4. Moreover, price interference also has a statistically significant effect on cross-price elasticity. The conclusion from this is that the greater the price resonance, the easier it is for consumers to switch

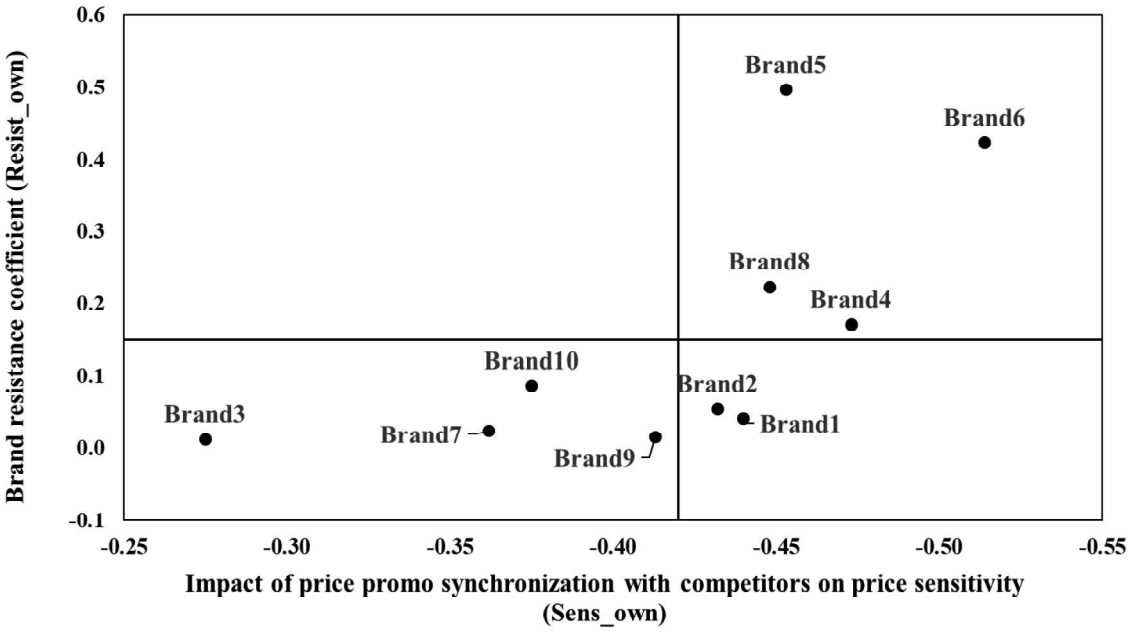

Figure 3. Blurring of price sensitivity due to synchronization of price promos with competitors (pricing interference) and brand resistance (decrease in price sensitivity due to brand strength) of TOP10 products

Source: Simulations and calculations by the author.

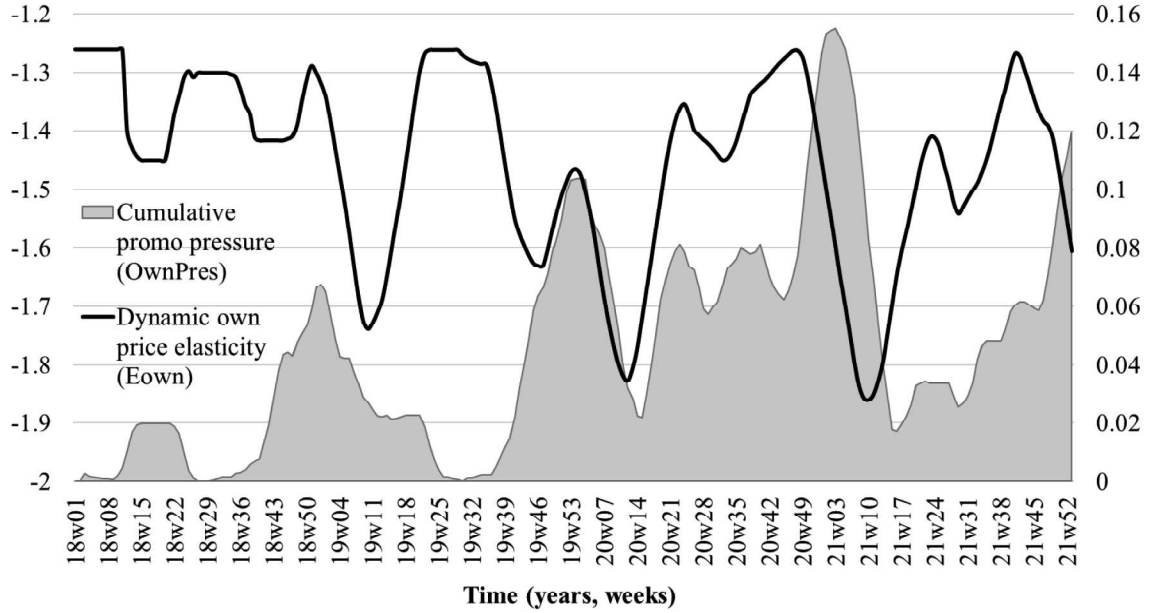

Figure 4. "Spiral of brand degradation" (Brand1): Excessive promotional activity increases the size and volatility of price elasticity

Source: Simulations and calculations by the author.

among different products, the price is becoming even more important factor of brand choice.

Brand resistance. According to our theoretical model, the higher the brand strength is, the more loyal consumer are and the less sensitive they are to the price. In our empirical model, the resistance coefficient (Resistown) in the equation of own dynamic price elasticity (equation 8) turned out to be significant for the vast majority of brands. Similarly, in equation 9, the impact coefficient of brand strength on cross-price elasticity is significant for all brands. We therefore mathematically confirm the hypothesis that higher base velocity (strength) of a brand acts as a protection that partially reduces the negative effects of aggravation of general price competition.

In Figure 3, as an example, we combined two sets of estimated coefficients: the impact of price interference on own price elasticity and the strength of brand resistance. As can be seen from the figure, brands 1 and 2 (the leaders of the category) are next to each other: they are characterized by a rather strong blurring of price sensitivity in case of synchronization of pricing with competitors and a relatively low level of resistance. Such a seemingly non-obvious result may indicate that both leaders are each other's main competitors. Since both brands are strong and popular, each is very vulnerable to the other's aggressive pricing strategy.

The price sensitivity of brands 3, 7, 9, 10 is comparatively more resistant to price interference with competitors, however, their brand strength does not provide them with adequate protection (resistance is relatively low). At the same time, relatively strong vulnerability of brands 4, 5, 6, 8 to price interference is compensated by the powerful protection provided by their brand strength.

Spiral of brand degradation. Combination of equations 7, 8 and 9, in turn, allowed us to mathematically prove the existence of a "spiral of brand degradation". The mechanism works like this: excessive promotional activity of the brand today makes consumers more sensitive to the price tomorrow, which forces the company to resort to an even more aggressive pricing strategy to maintain sales. In this way, the spiral of brand degradation advances to the next circle.

Figure 4 demonstrates described effect on the example of Brand 1. The graph clearly shows how, with the increase in its own promotional pressure, the price sensitivity of brand demand grows and becomes more volatile, which will obviously have negative consequences for the brand in the longer run.

It is worth adding that in case of big market players, the effect of their price or promotional activity can significantly affect respective indicators in the market as a whole (for example, TotalPress). In turn, this can negatively affect other players making them hostages of the decisions of a big player. The final outcome -fading out of price turbulence or the market sliding into a price war — depends primarily on the current market situation, actions of big players, reactions to such actions by medium and small firms, as well as the processes of learning and actions of consumers.

CONCLUSIONS

One of the main contributions of this study is an attempt to solve the methodological problem of measuring brand health solely on the basis of real transactional data. Having introduced the concept of "basic velocity" and mathematical indicators of strategic price interference, the study formalizes the mechanisms of the destructive impact of price competition on the value of brands.

Instead of simply stating the negative consequences of aggressive promotions, the paper proves that price elasticity of demand is not a static characteristic. It acts as a dynamic parameter that evolves and systematically degrades under the influence of tactical price decisions of market players. The "spiral of brand degradation" conceptualized in the article clearly summarizes this

process: the tactical benefit of deep discounts triggers an irreversible structural erosion of brand value and a general commoditization of the market.

At the same time, it is obvious that the dynamics of prices and sales is influenced by a number of additional macroeconomic and operational factors: inflationary pressures, changes in the structure of production and logistics costs, etc. Within the framework of our model, the impact of these general market trends is partially captured by including a variable of general market dynamics, which absorbs fluctuations in demand and macroeconomic impacts on the category as a whole. Nevertheless, separating the individual impact of specific cost shocks or local supply chain disruptions on individual brands' pricing remains outside the current model. Further integration of cost data and the expansion of econometric tools to account for these alternative factors forms a promising direction for future research.

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