

Price Elasticity modelling across Customer Segments in Competitive e-commerce markets

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Abstract

In the rapidly evolving landscape of e-commerce, pricing strategies are central to consumer engagement and market competitiveness. This paper examines the doctrinal foundations and contemporary applications of price elasticity modelling across differentiated customer segments in digital marketplaces. By exploring classical economic theories and integrating them with modern consumer behavior analytics, the study highlights how firms assess and respond to varying degrees of price sensitivity among users. Customer segmentation—based on demographics, psychographics, behavior, and technographics—plays a pivotal role in determining elasticity and optimizing pricing decisions. Advanced methodologies such as regression analysis, conjoint analysis, and machine learning are utilized to assign segment-specific elasticity scores, enabling dynamic and personalized pricing strategies. However, these innovations raise important legal and ethical concerns, particularly around price discrimination, data protection, and algorithmic fairness. The paper underscores the importance of aligning commercial practices with legal standards, such as consumer protection laws and antitrust regulations, to maintain fairness in pricing mechanisms. Through a doctrinal lens, the study presents a structured analysis of elasticity as both an economic and regulatory construct, advocating for balanced, transparent, and lawful application of data-driven pricing in competitive e-commerce environments.

Keywords:

Price Elasticity, Customer Segmentation, E-Commerce, Dynamic Pricing, Algorithmic Pricing, Consumer Behavior, Doctrinal Research, Antitrust Law, Personalized Pricing, Data Ethics.

Introduction

The dynamics of pricing in the hyper-competitive, more digitized marketplace tends to be highly dynamic and data-oriented that switch on real-time dynamics rather than the stagnant and cost-plus-based precursor of the pricing. The idea of price is not a figure that acts as an appendage to the initial product anymore but it is a signal both psychological and economic that has the power to control the behavior of consumers, define market competitiveness and overall profitability. When coupled with the understanding of price elasticity of demand (PED), a classical economic construct of measuring responsiveness of consumer demand to a change in price, then some of the most important concepts that informed these pricing strategies include. PED, which is traditionally based in the microeconomic theory has been the framework of analysis when determining how consumers respond when the price of a commodity increase or decrease.¹ Nevertheless, in the era of online shopping, when consumers have never had greater access to information, to product substitutes, and to

free neighborhood offers, the classical definition of elasticity needs an adjustment. The hypothesis that assumes that all the consumers respond similarly upon changing the prices is no longer valid, and it is vital to provide them with the possibility of studying consumer behavior via the concept of the segment-related elasticity due to the variety of different preferences, income, digital behavior, and pricing sensitivities among the members of the online shopping community.²

Consumers now make decisions differently, thanks to digital marketplace. The existence of e-commerce websites like Amazon, Flipkart, Alibaba, among others, offers price transparency, product comparison, product user feedback, and limited-time offers that make consumer behaviour more liquid and volatile. Having this kind of landscape, the retailers will need to move on beyond generic pricing strategy and to move into elasticity modelling that is thoroughly intertwined with customer segmentation. People react to price very differently depending on age, income, shopping, intentions, brand loyalty and behaviour, and even on

the device on which they are doing the shopping. A price adjustment that can inspire a high-income, brand-dedicated customer to continue his or her buying patterns may discourage his or her price-prone customer. Therefore, it is important to realize the heterogeneity of their behaviors in order to not only generate conversions and maximize profits but to maintain a healthy competitive edge within the highly competitive digital markets.³

The study uses a doctrinal approach through which it looks at how elasticity can be modelled and interpreted in different customer segments in e-commerce websites. The normative and theoretical frameworks that form a basis behind the price elasticity as witnessed in the digital age have been analyzed using the doctrinal legal research, normally applied in the interpretation of statutes, case laws and legal principles.⁴ The analysis is the synthesis of economic concepts and legal theories, specifically, the consumer protection and competition law.⁵ Unraveling the market regulation and unfolding the economic theory, in this paper, the researcher attempts to give a comprehensive picture of how to frame pricing decisions, what is the legal framework that limits them, and what businesses can use the knowledge of the elasticity to make a good use of it. This doctrinal inquiry, in the end, is designed to reconcile the distance that lies between classical economic theory and the current day economic state wherein an e-commerce environment can operate in full compliance of the laws as well as ethical in all aspects of the spectrum.⁶

Theoretical Framework of Price Elasticity

The principle of price elasticity of demand (PED) has already been present in economic theory as a way to better understand how the price of a certain product is involved in the demand on it. It is officially described as the rate of change in the quantity demand relative to change in price. This equation assists in measuring the sensitivity of consumers to change in price. When the PED is above 1, demand is said to be elastic (in the sense that consumers react sensitively to changes in price) and when the PED is below 1, one has an inelastic demand in that consumers experience minimal impact on their choices about the quantity demanded due to a change in price.⁷ A PED of 1 implies unitary elasticity, in which revenue has not changed even with a movement of price. These theoretical

differences play a very vital role in economic planning, tax policy, and marketing that it forms a distributional platform in fixing prices in traditional markets. The modern face of e-commerce has however radically transformed the environment in which these classical models exist causing a need, to have a more pertinent and situation-specific theoretical framework of digital commerce.⁸

The consumers in the digital era engage with the markets in different ways that do not comply with the assumptions that govern the classical models of the elasticity. The fact that real-time price comparisons, product alternatives, user reviews, and price-tracking tools are available online gives online shoppers the kind of power they have never had in retail history. Consequently, the elasticity of demand in e-commerce is no longer influenced by price and the product but also by the accessibility of information and behavioral complexity. The new pricing paradigm does not follow the traditional models, which assume rather stagnant and linear nature of responsiveness to the change in price, because the dynamism of the current pricing (including algorithmic pricing, flash sales, personalized suggestions, and promotions that take into consideration the specifics of the person they target) prove the traditional models to be faulty and inadequate.⁹ New variables cause feedback loops in the system: when a platform driven by AI decides to lower the price conditioned by expected consumer drop-off, other consumers perceive this and behavior changes accordingly, in terms of future expectations and demand elasticity. In this way, e-commerce pricing, rather receives theoretical adaptation, integrating the paradigm of behavioral economics, data analytics, and machine learning in the pyramid of elasticity.¹⁰

This is the point where customer segmentation comes in the picture of the elasticity modelling. In contrast to the homogenous marketplace, the e-commerce is not only permissible but actually requires the differentiation among consumers in regard to numerous measurable characteristics that substantially influence their price sensitivity.¹¹ These are price sensitivity where some consumers would actively pursue discounts or are more inclined to move onto another brand when prices varied; brand loyalty, which causes inelasticity even when there is rising price; preferences in types of products

as necessities and luxuries would cause varying levels of elasticity; digital literacy where those seeking products can easily understand pricing structure and detect value; and devices used where people using a device such as mobile can act with more haste and more impulsively than say desktop. These parameters of segmentation bring in an element of complexity which the conventional PED model fails to explain but are essential in the aspect of developing consumer behavior in online markets.¹²

With the knowledge of how the elasticity would differ in such segments, e-commerce companies could effectively plan their pricing models. Personalization then becomes a powerful weapon and makes the firms, have the means to quote dynamic prices, shape targeted promotions, and predict demand with higher accuracy. Theoretically, this is a transition to the modelling of elasticity of prices in terms of discreteness, since it will be possible to have a variety of PED values co-existing in different segments of the same market. In that technical structure, a classical economic framework combines with current technology to create a stronger and more adaptive framework to the prices strategy in hyper competitive internet economies.¹³

Customer Segmentation in E-Commerce Markets

When it comes to e-commerce, customer behavior knowledge has taken the center-stage in strategic pricing and that starts with proper and refined customer segmentation. Online space makes possible the capturing of enormous amounts of information about consumers- their demographic profile, browsing patterns, records of purchasing behaviour- and the ability to use these data to create small but relevant and manageable customer segments. Contrary to the conventional retail environment, whereby pricing strategies were generalized, current e-commerce platforms use such insights to deliver customized experiences, such as differentiated prices strategies depending on price elasticity among other categories. Such segmentation is needed not only to make marketing and pricing decisions more effective but also to increase customer satisfaction and the lifetime value.¹⁴

"Demographic segmentation" remains the most foundational, involving categorization based on factors such as age, gender, income, education level, and geographic location. These features usually relate to the purchasing capacity and brands. As an example, young consumers could be more elastic because of low disposable income and closer familiarity with price comparison mechanisms through the Internet, whereas older or high income people could exhibit lower sensitivity to medium price increase, especially in the case of branded or trusted products. Psychographic segmentation goes further to segment the attitudes, interest and lifestyle of the consumer. This consists of personality, social values, and motivations- factors less observable yet very influential in establishing the aspect of elasticity. As an illustration, a customer with a sense of sustainability can be inelastic (or loyal) with an eco-friendly brand even when there are increases in prices and a dollar shopper may become an easy customer when exposed to alternative and lower prices.¹⁵

"Behavioral segmentation" provides perhaps the most direct insights into elasticity. Based on user behavior, including purchase frequency, the rate of cart abandonment and interest in promotional ads, platforms can determine a price sensitivity of a consumer. High elasticity can be characterized frequently in cart abandoners; they can be on hold to take advantage of vouchers or cut a deal.¹⁶ On the contrary, purchasers who repurchase the same brand without observing slight price change hint of more inelastic speculation. A relatively newer innovation is technographic segmentation; which classifies the customers on a technological basis. The fact that a customer will use mobile or desktop to shop, voice search, or chatbots may indicate whether their purchasing decision is impulse or well thought out. As an example, mobile-first users are more likely to act on an impulse, showing a moderate propensity to elasticity in general and they will be sensitive to price fluctuations but are less inclined to avail of going on a price-comparison run.¹⁷

From a "doctrinal perspective", segmentation is not merely an empirical tool but forms the basis of normative modelling. It enables the development of testable hypotheses on the way consumers behave and these hypotheses can be abstracted and molded into possible rules of pricing. A doctrinally valid

hypothesis would be the one that holds that, “Urban Gen Z mobile shoppers have a greater degree of elasticity among apparel categories because they are exposed to flash sales and price reduction platforms.” This rule can be then applied to a range of data sets and condensed into some pricing protocol that can subsequently be used by an algorithm. The segmentation, in this sense, plays a descriptive role of understanding consumer behavior and a prescriptive role as an effort to guide the platforms to make effective, compliant and fair pricing strategies based on economics and legal principles alike.¹⁸

Strategic and Commercial Applications

In extremely dynamic, price-sensitive e-commerce business segments mainly in markets that deal in upper ranges in consumer electronics, clothes, and fast-moving consumer goods (FMCG), the mathematical price elasticity model is no more a theory but an urgent commercial requirement. The current environment where e-commerce businesses operate presents slender margins, stiff competition, and very knowledgeable consumers. One size fits all

approach to pricing does not work in such markets, which are outdated and counterproductive. More firms are now pursuing the use of elasticity modelling among customer segments in order to make strategic decisions. Such modelling enables business to have an optimal revenue, fare inventory, specialized marketing and sustainable revenue, within the framework of legal and ethical trade.¹⁹

1. Revenue Optimization through Elasticity-Aware Pricing

Among the most proximate advantages of segment-based elasticity modelling, it can be used in dynamic revenue optimisation. Through determining the responses of various types of customers to the variations in the price, companies will be able to set their own pricing strategy in a way that will help to capture their willingness to pay in order to obtain maximum usefulness. A typical example is that highly elastic customers, who are more price-sensitive, receive competitive level of price or discount to convert and to inelastic customers, the benefit is not overpaid and thus cushions the margin.²⁰

Table 1: Sample Elasticity-Based Pricing Strategy

Customer Segment	Elasticity Score	Price Strategy	Rationale
Budget Shoppers	2.1	Deep Discounts	Highly price sensitive
Brand Loyalists	0.7	Premium Pricing	Inelastic, brand-driven demand
Occasional Buyers	1.3	Seasonal Offers	Moderately elastic, opportunistic
Mobile-Only Users	1.6	Time-bound Discounts	Impulsive, responsive to flash deals

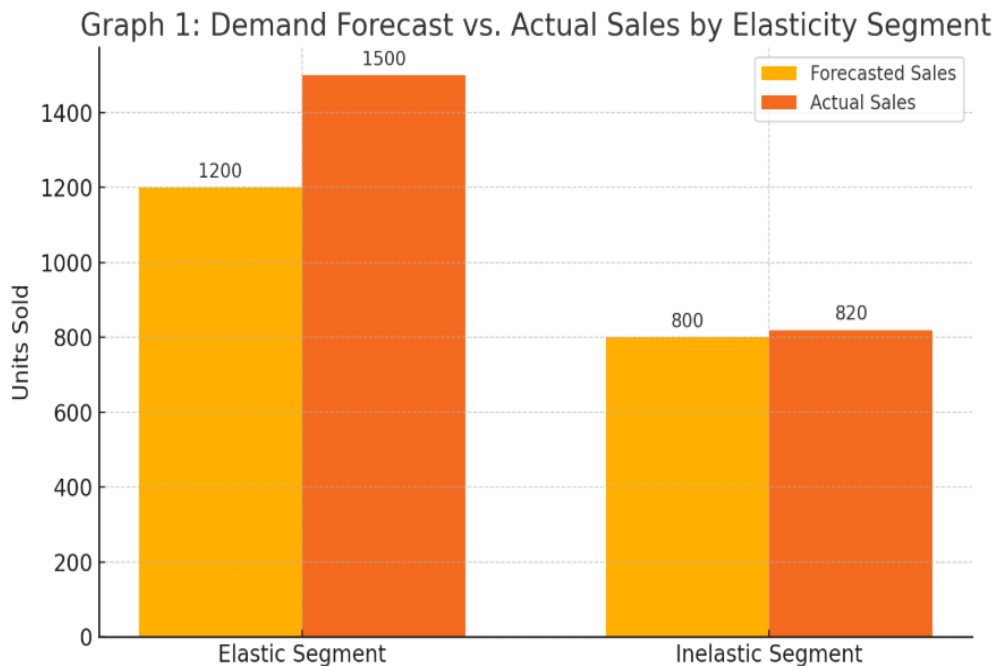
The above table exemplifies how understanding elasticity enables **precision pricing**—minimizing unnecessary discounting while maximizing conversion. This reduces revenue leakage, a common consequence of blanket promotional campaigns.

2. Inventory Management and Demand Forecasting

Elasticity modelling also plays a pivotal role in inventory planning and logistics. Knowing which segments are likely to react to price reductions helps

forecast demand more accurately. For instance, during sales campaigns like Black Friday or festive seasons, predictive models can estimate how much of a specific SKU will be sold at a given price point. This reduces instances of overstocking or stockouts.

Graph 1: "Demand Forecast vs. Actual Sales by Elasticity Segment"



A line graph comparing projected and actual sales for two segments—elastic and inelastic—before and after discounting events.

The graph should show that sales in elastic segments increase significantly with price cuts, validating the predictive value of elasticity modelling for inventory planning.

3. Targeted Promotions and Campaign Design

Another commercial application is in **targeted marketing**, where businesses deploy elasticity intelligence to craft segment-specific promotions. Rather than applying broad-based discounts that erode margins, firms can focus on high-elasticity consumers using personalized offers delivered via

email, app notifications, or dynamic pricing interfaces. For example, a consumer with a history of price comparison or frequent cart abandonment may be flagged as highly elastic. Platforms can automate discount push notifications for such users, increasing conversion probability while maintaining profitability from more inelastic cohorts.

Table 2: Promotional Strategy Based on Elasticity

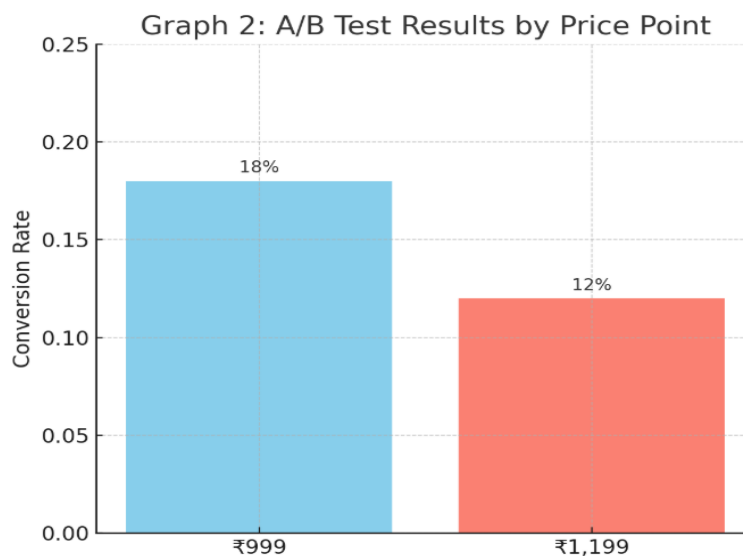
Promotion Type	Target Segment	Trigger Behavior	Medium
20% Flash Sale	Mobile Users	Night-time Browsing	App Notification
Limited-Time Coupon	Cart Abandoners	No Purchase in 48 Hours	Email
Loyalty Points Boost	Repeat Buyers	Brand-Loyal Behavior	Website Banner
Free Shipping Offer	Low-income Shoppers	Price Sensitivity Signals	Checkout Page

These campaigns are informed by a doctrinally grounded principle: that **value should be tailored to perception**, and price should reflect the differentiated experiences consumers receive.

4. Price Experimentation and Continuous Learning

Elasticity modelling also enables **controlled price experimentation** through A/B testing. By offering

different prices to matched groups of users, firms can observe elasticity in real-time and refine their pricing strategies. This adaptive learning process enhances strategic agility in fast-moving markets.

Graph 2: "A/B Test Results: Conversion Rate by Price Point"

A bar chart showing conversion rates for two groups exposed to different prices (e.g., ₹999 vs. ₹1,199) for the same product, with annotations showing segment-wise differences. These insights feed back into elasticity models, improving their predictive accuracy over time. Moreover, doctrinally, this practice aligns with **market-based price discovery**, provided it does not result in unfair discrimination or exclusionary practices.

5. Ensuring Sustainable Growth and Doctrinal Legitimacy

Among the most non-obtrusive but potent contributions elasticity modelling has, it is possible to name the aspect of promoting sustainable and ethical growth. The e-commerce players, especially the new entrants and the mid-size players also succumb into the trap of excessive discounts to increase the volumes. But blind discounting is brand killing, margin reducing and can mis-lead consumer desires in the long run.²¹

The risk is eased by developing elasticity modelling and understanding which segments truly need the incentives driven by prices, and which ones would forget price-based incentives and pay more depending on the brand, service, or exclusivity. Theologically, this is similar to the precedent of the value-based pricing theory, which is an established concept of law and marketing. The idea in this principle is that the cost of goods should not in any way be based on production cost or market-based pricing but based on customer perceived value.²²

Besides, under consumer protection law and antitrust law, practices which lead to a certain differential pricing are legal provided that they are not discriminatory and are data-driven and transparent. The major legal protection is that segmentation should not cause unfair disadvantage or random rejection of customers in similar situations.²³

Strategic elasticity modelling is now no longer a secondary economic process but a fundamental force behind commercial feasibility in competitive e-commerce markets. The fact that it has been deployed productively across revenue management, inventory management, marketing, and long-term planning implies that it is multi-dimensional in its application. Simultaneously, doctrinal conceptions of value-based equity, non-discrimination, and regulatory conformity, provide that such strategies are effective, lawful, and defensible. Used in a sober and methodical manner, elasticity modelling can assist e-commerce businesses to strike the balance between profitability and equity, which is fast becoming a very important dual goal in the shifting digital business environment.²⁴

Conclusion

The dynamically developing world of e-commerce offers new opportunities and challenges equally daunting to all businesses that strive to compete in terms of prices. The most strategic element to this complex lies with the subtle and clear perception of price elasticity among the differentiated customers.

As evidenced in the course of this doctrinal discourse, the modelling of price elasticity, no longer constitutes limitation to classical theory of microeconomics but is also a backbone of the digital marketplace whereby the abundance of data, the real-time feedback to the consumer, and decisions that are made by algorithmic intervention often transform consumer behaviour, today.

Using the segment-specific perspective, companies can be in a better position to determine how various demographics of consumers would react to the price change according to their demographics, purchasing patterns, device usage, and the value they attach to products. This sophisticated insight can then be used to conduct specific types of promotions, perfect inventory levels, and sustainable price processes that work in the interest of the business as well as the customer. Elasticity modelling enables companies to abandon the worn-out practice of arbitrary discounting that has the adverse effects of reducing margins and weakening the brand name and introducing a methodic price/value-based approach to making decisions.

Of equal importance is the justification on the doctrines regarding these practices. With well-

informed, transparent, ethical, and legally valid principles as informants of the elasticity models, a larger picture of consumer rights and fairness in market is strengthened. Dynamic pricing, personalized staleness, and A/B testing are also doctrinally permissible, as long as they do not breach the edict of anti-discrimination standards, obtain informed consent, and do not quarry consumer weaknesses. In this respect, pricing policy based on elasticity does not only mean commercial instruments but instruments of regulatory conformity and morale orientation.

In addition, long-term decision-making requirements like customer retention, brand loyalty and reasonable development are facilitated by elasticity modelling. It assists companies to balance perfectly between immediate maximization of profits and sustained credibility in the market. With the steady increase in customer segments and the growth and evolution of digital commerce, the degree to which price sensitivity can be modelled and therefore reacted to, will greatly characterize the effectiveness of any e-commerce type business.

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