



# Equilibrium demand elasticities across quality segments

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## Abstract

Empirical studies find substantial differences in demand elasticities and associated markups among products of different quality. This paper analyzes the theoretical determinants of such variation. We present a simple model that allows for horizontal and vertical differentiation and accounts for endogenous entry. We find that most economic forces in our model, such as consumers' price sensitivity, the scope for product differentiation, and sunk costs of entry, are likely to induce lower equilibrium demand elasticities for higher quality products. In contrast, other economic forces, such as marginal cost of production and the distribution (across consumers) of the willingness to pay for quality, may induce the opposite pattern. These results provide an organizing framework through which empirical findings may be interpreted, and may also help to predict variation in demand elasticities for markets in which empirical estimates of elasticities are unavailable or infeasible to obtain.

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## 1. Introduction

The importance that price elasticities of demand play in economics would be hard to overemphasize. The relationship among various economic variables in different fields of economics, as well as policymaking in these areas, is primarily driven by the magnitude of these elasticities. For example, price elasticities are a key determinant of the impact of trade restrictions

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on trade volumes, the extent of exchange-rate pass through into export prices, the incidence of a tax increase or a merger, or the effect of wage differentials on labor demand.

Empirical studies estimating demand systems for oligopolistic industries (Bresnahan, 1987; Hausman et al., 1994; Berry et al., 1995; Goldberg, 1995; Nevo, 2001; Petrin, 2002) find substantial variation in estimated price elasticities of demand and associated markups across products. These studies attribute this variation to two key factors. First, consumers self-select into different quality segments within a market according to their price sensitivity. In particular, higher income consumers, who are less sensitive to price, are more likely to purchase high quality products. Therefore, price elasticities for high quality products are likely to be lower. Hausman et al. (1994), for example, use this argument to explain why own-price elasticities for popular-priced beers are somewhat higher than those of premium beers. Second, different segments of the market may vary in market structure and density of products. In particular, products in more densely populated segments face more competition, and therefore higher own-price demand elasticities. Goldberg (1995), for example, finds low price elasticities for sports cars and luxury cars, higher for small (subcompact) cars, and highest for intermediate size cars. She argues that this pattern is driven by “the large number of models included in the intermediate and standard segments.” Berry et al. (1995) find a similar pattern in the automobile market, and use a similar argument to explain it.

These two explanations, price sensitivity and density of products, are not independent of one another. If consumers of premium beers are less price sensitive, markups and profits of premium beer manufacturers will tend to be higher. Higher profits will induce entry and crowding of the product space in this segment, which will increase price elasticities. Similarly, highly dense segments in the automobile market might be such because of entry, which was induced by lower price sensitivity of consumers and higher markups. Therefore, an explanation of the observed differences in demand elasticities across quality segments based on one of these factors alone is not fully satisfactory. Furthermore, other forces might also influence demand elasticities, not only directly but also indirectly, through their effect on entry incentives. For example, high quality products tend to have more attributes along which they can be differentiated from other products. While more differentiation induces weaker competition and lower demand elasticities, the resulting higher markups provide incentives to enter, thus creating an opposing force. More generally, since demand elasticities are not a primitive but are endogenously determined in a market equilibrium, understanding how they vary across quality segments requires a framework that takes into account the relevant forces that determine the equilibrium, and in particular the endogenous determination of the number of competing products and the sorting of consumers. The goal of this paper is to provide such a framework.

We develop a stylized theoretical model of industry equilibrium that predicts variation in equilibrium demand elasticities across quality segments as a function of market primitives, such as price sensitivity of consumers, scope for product differentiation, and marginal costs of production. While including most of the relevant ingredients of markets with horizontal and vertical differentiation, the model is still sufficiently simple to deliver closed-form solutions for the equilibrium values of demand elasticities and markups. As such, it is appealing for organizing the various conceptual determinants of equilibrium demand elasticity differences across quality segments in a single framework.

Given the widespread relevance of demand elasticities in economics, the analysis of their theoretical determinants is not only relevant for understanding observed regularities, but also for predicting differences in elasticities across quality segments when empirical estimates of demand elasticities are not available, which is often the case. Furthermore, since quality varies systematically

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