



Can competition keep the restrooms clean? Price, quality and spatial competition



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ABSTRACT

This article investigates the influence of competition on price and product quality among Austrian camping sites, a market characterized by both horizontal (spatial) and vertical product differentiation. Theoretically, the effect of competition on quality is ambiguous and depends on the degree of cost substitutability between output and quality. Estimating a system of equations shows that intense competition has a positive impact on product quality and a negative effect on prices (conditional on quality). As high quality is associated with high prices, the total effect of competition on prices is rather small.

1. Introduction

This article investigates the impact of the intensity of competition on prices and product quality in a spatially differentiated market. While many retail markets are characterized by both horizontal (spatial) and vertical product differentiation, theoretical and empirical articles accounting for both dimensions of product differentiation are rather scarce. This might be explained by the difficulty of measuring product quality, which can at times only be assessed during or after the consumption of the product (experience good). This is not only a problem for economists analyzing certain markets, but also for consumers who have to base their buying decision on a posted price and on an (at least to some extent) unknown product quality. We know from [Akerlof \(1970\)](#) that with this information asymmetry between buyers and sellers in place, there might be a market for the worst quality products only. To reduce uncertainty and to establish a market for high quality goods there are numerous (independent) organizations assessing product quality in certain markets and publishing their results in respective guides. This includes markets for diverse products such as cars, wine, food in general, restaurants, hotels, or – as analyzed in this article – camping sites.

While the empirical literature on the relationship between prices, quality and competition is rather extensive, most articles focus on (reduced form) price equations while treating quality as exogenous explanatory variables.¹ The literature on quality competition is less comprehensive: Most of these articles analyze the health care market, where prices are often regulated and/or paid by insurances rather than directly by the consumers (see [Gaynor, 2006](#), for an extensive survey of empirical contributions on this industry). Empirical evidence on other industries is rather scarce: [Mazzeo \(2003\)](#), for example, finds that competition reduces delays in the airline industry, and [Matsa \(2011\)](#) provides evidence that competition reduces stockouts in U.S. supermarkets. While both articles find that competition enhances product quality, they do not include the firms' pricing decisions in their analyses. Investigating either prices or quality rather than both variables simultaneously is an obvious limitation in these articles, as firms will choose their optimal combination of price and product quality to maximize profits.

There are only a few empirical articles outside the health industry considering both quality and prices as strategic variables when analyzing the impact of the intensity of competition. The findings of these articles regarding the effect of competition on product quality are

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¹ The empirical literature investigating the price effect of quality differences usually estimate a hedonic price equation, as done (for example) for wine ([Combris et al., 1997](#); [Benfratello et al., 2009](#); [Roma et al., 2013](#); [Pennerstorfer et al., 2017](#)) or hotels ([Andersson, 2010](#)). Empirical contributions explicitly accounting for the intensity of competition include, among others, studies on restaurants ([De Silva et al., 2013](#)) or hospitals ([Mobley, 2003](#); [Mobley et al., 2009](#)).

mixed: [Domberger et al. \(1995\)](#), investigating competitively tendered contracts for cleaning services, provide evidence that competition reduces prices and maintains or even enhances product quality. [Emmons and Prager \(1997\)](#) investigate the impact of competition in the US cable television industry on prices and quality (measured by the number of channels) in local markets, and find that tougher competition reduces prices while leaving quality unaffected. Their results, however, are based on reduced-form price and quality equations only, without estimating interaction effects between these two variables. [Fan \(2013\)](#) analyzes a two-sided market (daily newspapers in the US), where firms set prices for both consumers (subscription prices) and advertisers (advertising rates). Based on a structural model and merger simulations she finds that a merger between two firms (i.e. a reduction in competition) increases subscription prices, reduces advertising rates, but also reduces product quality.

Similar to the empirical findings the theoretical literature investigating the effect of competition on product quality also provides mixed results (see [Section 2](#) below for a thorough discussion). The findings of the theoretical articles indicate that the effect of competition on product quality is closely related to firms' costs of providing high quality products. To emphasize the relationship between firms' production costs and quality provision I propose a spatial competition model characterized by a very general cost function. The results of this model suggest, first, that tougher competition enhances product quality if and only if the degree of production cost substitutability between quantity and quality is high enough (i.e. higher than consumers' marginal utility of quality). If cost substitutability is high enough for competition to increase quality, then, second, product quality is associated with higher prices. Therefore, third, conditional on product quality more competition reduces prices, while the unconditional effect is ambiguous.

This article contributes to the scarce empirical literature on spatial markets with endogenous price and quality choice by testing these predictions for the market for camping sites. In the empirical application I estimate the effect of competition (measured by the number of rivals in the vicinity) on prices and product quality in a system of equations, treating product quality as an endogenous variable in the price equation. Variables based on the nationality of tourists are used to identify the effect of product quality, assuming that the (marginal) valuation of quality differs between consumers across countries. Estimating a system of equations is preferred over a reduced form model because, first, this approach provides evidence on the strength of the interaction between the two choice variables (price and quality) and, second, the theoretical model proposed in this article predicts a price dampening effect of competition conditional on product quality, while the unconditional effect remains ambiguous.

The remainder of the article is organized as follows: [Section 2](#) sets up the model and derives testable hypotheses of the effect of competition on (equilibrium) price and quality. [Section 3](#) provides information on the industry and describes the data sources used in the empirical analysis. Additionally, this section describes the measures of price and product quality and discusses controlling for (endogenous) location choice of firms and identifying the system of equations. The results of the main specifications are presented in [Section 4](#) and results from the sensitivity analysis are reported in [Section 5](#). The concluding [Section 6](#) discusses the results, policy conclusions and directions for future research.

2. Model

To decide on a suitable vacation, tourists have to choose the holiday destination (region) and the type of lodging (e.g. hotel, bed and breakfast, camping site). It is reasonable to argue that consumers choose the destination and decide whether they intend to go on a camping holiday (or prefer a different type of accommodation) before picking a particular camping site. Deciding beforehand whether to

camp or to stay at a different type of accommodation is fundamental, as camping typically requires very specific equipment. After making these decisions tourists can choose among a limited number of firms scattered across a particular destination. This situation can be described appropriately by models of spatial product differentiation, where products differ because of physical travel costs when switching from one supplier (accommodation) to another or due to the disutility when choosing a variety in the geographic space that is less than ideal. In addition to spatial product differentiation camping sites differ with respect to their quality, and products may also differ in other (horizontal) ways.

There are two different strands of literature to model markets with goods differentiated in multiple dimensions: The first one is in the tradition of [Hotelling \(1929\)](#) and extends the 'linear city model' to a two- ([Tabuchi, 1994; Veendorp and Majeed, 1995](#)), three- ([Ansari et al., 1998](#)) or an $m > 1$ -dimensional ([Irmen and Thisse, 1998](#)) geographic and/or product space. All these articles find that the two rivaling firms maximize differentiation in the most important characteristic, but minimize differentiation in all other dimensions.² A similar result is obtained by [Neven and Thisse \(1990\)](#) for a market with both vertical and horizontal product differentiation, namely that firms maximize differentiation in the most important dimension while minimizing differentiation in the other category. The attractive feature of this type of models is that the location decision in (geographic or product) space can be explicitly addressed. All these contributions, however, restrict their analysis to duopolistic markets, impeding to draw conclusions on the relationship between the intensity of competition, product characteristics and prices.

I therefore follow the second strand inspired by [Salop's \(1979\)](#) circular city model. A few theoretical contributions applying this model framework allow for both horizontal (spatial) and vertical product differentiation when analyzing the effects of competition on firm behavior ([Economides, 1993; Gravelle, 1999, and Brekke et al., 2010](#)). To ensure analytical tractability only symmetric equilibria are investigated. The results derived in these models differ: [Gravelle \(1999\)](#) finds that competition does not influence product quality, as opposed to a negative impact derived by [Economides \(1993\)](#). All models, however, predict lower equilibrium prices when competition increases. While these models use very specific cost functions, [Brekke et al. \(2010\)](#) present a more general theoretical model. Due to the general nature of their model they fail to make clear predictions on the impact of competition on both price and product quality, whereas they identify conditions under which competition can reduce prices and enhance product quality. Contrary to the other theoretical contributions [Brekke et al. \(2010\)](#) conclude 'that the scope for spatial competition to stimulate quality provision is larger than previously thought' (p. 478).

Below I will set up the model based on a circular market. The aim of this formal approach is to derive testable hypotheses between the intensity of competition and firms' price and quality choices, and to propose a theory-based guidance to identify the system of equations for the empirical part. Note that the market for camping sites is a particularly well-suited retail market as it fits the assumptions of the theoretical model proposed in this article, but also of the models discussed above: (i) Each firm can choose prices and quality levels, (ii) prices do not vary within seasons and are non-negotiable (i.e. the posted price equals the actual price) (iii) spatial product differentiation

² [Elizalde \(2013\)](#) provides convincing empirical evidence for this theoretical result: When analyzing the Spanish movie theater exhibition market, where products are differentiated by their geographical location and by the set of movies exhibited, he finds a trade-off between the product differentiation in these two dimensions. Additionally, the author finds that firms choose to maximize differentiation in the location dimension if distance is important (i.e. when the local market is large) but minimum spatial differentiation when distance is less important (i.e. when the local market is small), supporting the theoretical result that firms choose maximum differentiation in the dominant characteristic.

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