

# Price Strategies in a Big Data World

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## INTRODUCTION

This article presents the results of two empirical studies of price dispersion in homogenous goods markets separated by 10 years. The orthodox microeconomic literature explains that asymmetries of information in markets lead to an equilibrium in which price dispersion is present even when goods are perfectly homogenous. Therefore, with the advent of price comparison websites leading to a serious drop in search costs, firms should price their products at marginal cost. In a closer than ever pure and perfect competitive world, economic profits should disappear. Indeed, new information technologies make it easy to reduce asymmetric information for consumers.

Thanks to the Internet, research costs do not exist anymore. Everyone is able to go on different websites to compare the price of a laptop or a camera. However, empirical evidence shows that the real world is different. For a same item, a price may still vary through the week, or through the year. For instance, it is cheaper to buy a camera on Tuesday than on Friday.

Figure 1 illustrates the minimum price over time of a camera on the price aggregator Pricegrabber.com. The variation is interesting in the sense that it does not seem to follow a clear pattern, not even being steady around the usual equilibrium defined by  $\text{price} = \text{marginal cost}$ .

Theory does not turn up. Why? The answer is that it is not only about the demand side, it is also about the supply side. To be more specific, if search costs are fairly low with the new communication technologies, so are the menu costs. Indeed, firms can change their prices very quickly at a very low cost as well. As a result they can use pricing strategies to re-gain some of their market power.

However, a question arises: with so many firms playing different pricing strategies, an incredible chaos in terms of volatility of prices should be expected. So, how can this chaos help firms benefit from a new market power? Well, the answer was proposed by Salop (1977) in a seminal paper with a concept coined “the noisy monopolist.” The general idea is that noise (in terms of prices) help create a monopolistic power.

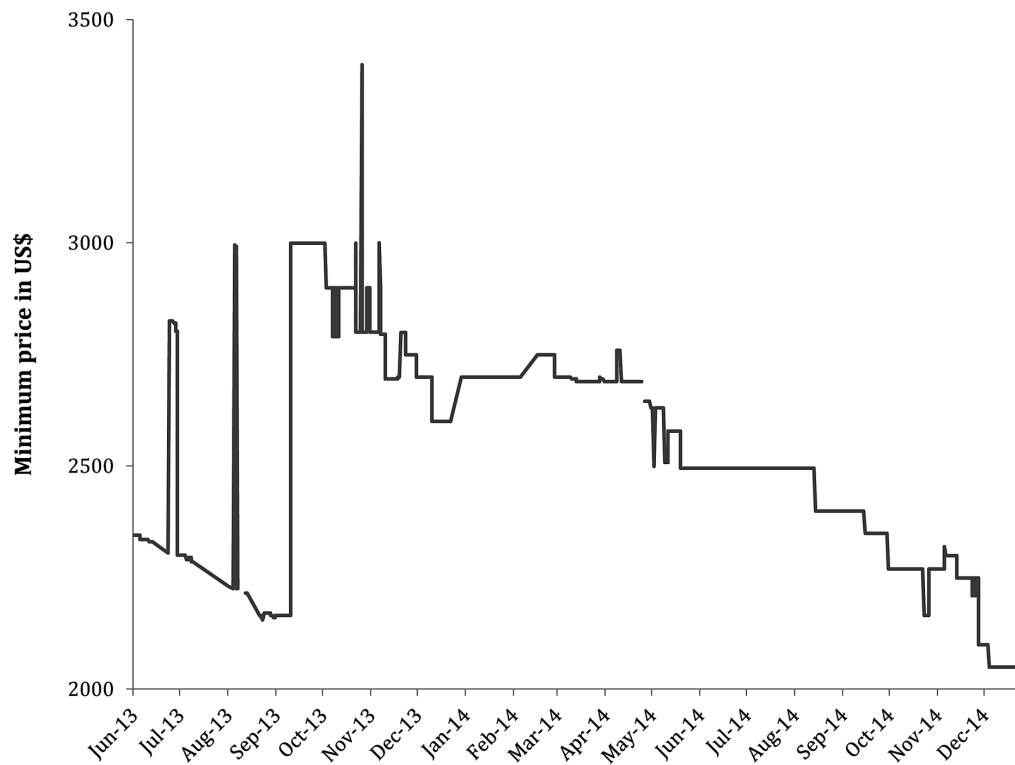
However, although it is a very elegant theoretical result, it is tough to imagine that firms would create noise so that they might have a chance to randomly capture a minimal share of some consumer surplus. Well, in Game Theory, the Folk Theorem for dynamic games would help us find such a scenario. But beyond theory, in the real world, it would be interesting to see whether this strategy could be implemented. To prove it, it would require having access to huge amounts of data as well as great computing power. Well, with the access to big data, it is possible now to evaluate the practicality of the noisy monopolist concept.

In what follows, a comparison between a 2006 study and its replication in 2013-2014-2015 is proposed. The aim of these studies is to capture the new strategic model developed by companies in a high-technological day and age.

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*Figure 1. Minimum price over time of a Canon EOS 5D Mark III Black SLR digital camera body on the website Pricegrabber.com, 1922 observations*

*Source: Authors' computations, 2015*



## BACKGROUND

Information is vital for the fluidity of markets and was first highlighted by Akerlof (1970) in his seminal paper “The market for lemons: quality uncertainty and the market mechanism.”

Following this article, Salop (1977) and Salop and Stiglitz (1977) proposed a theoretical framework that could explain price dispersion based on the cost of searching for the lower price. Varian (1980) proposed a study of “temporal price dispersion”, in which consumers can only be well-informed for short periods of time. The main reason is that firms have an interest to continually change their prices.

While most research was purely theoretical in the past, the existence of the Internet and online gatekeepers has greatly facilitated the collection of data for empirical research. The first articles in this field were concerned with the comparison between online and traditional retail markets (Bakos, 1997).

When it comes to studying specific products, some of the earlier studies by Bailye (1998) and Brynjolfsson and Smith (2000) have found that there is a considerable amount of price dispersion in electronic markets.

According to the theory, this price dispersion could be the result of a drop in menu costs. Menu costs used to be defined as the costs of (re)labeling the products in a shop. With this reduction in menu costs, it can now be used as a firm strategy to create noise on the market. Using the computing power we have nowadays, firms can even automate the process. Algorithms could change the prices depending on demand, the availability of the product, the time of day or month, etc. In fact, Brynjolfsson and Smith (2000) find that online retailers make price changes that are up to 100 times smaller than the

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