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Eve Goldstein   April 16, 2010

Price Dispersion and Pricing Strategies for Firms on Amazon.com

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Abstract

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By Eve Goldstein

Online markets allow consumers to easily compare products, internet retailers and prices with minimal search costs. Economists have predicted that in this situation there should be perfect competition, with prices for identical goods set at marginal cost. However this has not occurred, instead internet markets have large levels of price dispersion. Amazon is an internet retailer, which facilitates internet sales by other firms. This project studies the market for goods on Amazon, including pricing strategies of firms, factors that drive pricing decisions and the reasons why price dispersion exists on Amazon and in internet markets overall. This paper also discusses methods of differentiation amongst firms, such as reputation, experience, sales, and location on the webpage, in addition to price. On Amazon, firms can be categorized as "Featured" and "Non-featured" merchants based on a set of qualifications, which further differentiates retailers. Using data from Amazon, evidence suggests that there is a relationship between pricing and reputation, experience, and sales (as they are represented on Amazon), and that being a "Featured" merchant on Amazon provides exposure and allows the seller to charge a price premium.

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Introduction

The development of the internet has brought an influx of information to consumers all over the world. Over time, as the internet has become more accessible it has also become a central part of daily life for many and a vital social and economic instrument. As such, an online market for goods and services has been established and is continually expanding. Like in a traditional market, this market provides a place for consumers to purchase and exchange goods and services. Online markets also give consumers access to a much wider variety of products and purchasing options and give retailers another outlet to sell their products. Many economists have predicted that there would be perfect competition amongst retailers in the online market (Chevalier and Goolsbee, 2003).

Consumers have quick access to information about different products and sellers on the internet. Because of the ease and speed with which consumers can search for and find relevant information about products and sellers, they incur extremely low search costs. In some cases these costs include only the time spent seeking out this information. Price comparison websites and shopbots, such as Shopper.com and Google Products, have made it even easier to access information about products and prices by reducing time search costs. Other websites, such as ResellerRatings.com, have made information about online sellers more easily accessible. Due to this dramatic decrease in search costs, retailers would have to price their goods to remain competitive, which would drive prices to marginal cost (Baye and Morgan, 2005). Online sellers, with access to the same information as consumers on the internet, are able to quickly adjust their prices to stay competitive and respond to changes in the markets for different goods, which cannot be done rapidly in traditional markets.

According to economic theory, people are rational and always choose to purchase a product at the lowest possible price in order to maximize total consumption. It follows that

sellers would have to price their product competitively in order to sell their products; prices would be driven down to marginal cost. However, when observing product prices online this is not the case. Online markets do not exhibit perfect competition and homogenous products have varied prices. Contrary to expectations, there is large price dispersion amongst sellers in internet markets (Chevalier and Goolsbee, 2003). This has necessitated the creation of price comparison websites and shopbots.

Amazon.com was one of the first electronic retailers selling products online, beginning in 1995 and initially offering only books (Chevalier and Goolsbee, 2003). It has since grown to be a very popular internet retailer and expanded to sell a variety of goods in addition to books. Amazon currently sells products itself and allows other firms to sell products on its website. In this way, Amazon is an internet retailer, facilitates sales by other internet retailers, and allows consumers to compare prices for products. By simply observing a list of sellers for one product on Amazon, it is possible to see that there is large price dispersion for products in online markets, making Amazon a good candidate to study in order to improve understanding of price dispersion in internet markets and study the other factors that affect online retailers' pricing choices and consumption choices. This project specifically studies the relationship between prices for products on Amazon.com and a series of variables which differentiate sellers.

Literature Review

Research related to this topic (Baye and Morgan, 2005; Baye and Morgan, 2008; Baye et al., 2007; Chevalier and Goolsbie, 2003; Pan et al., 2001) considers issues such as price effects of product reviews, price dispersion in online markets, consumers search, pricing strategies, and online price competition. Some of these papers study other retail websites, such as Barnes and Noble, while others look at price comparison websites, such as Shopper.com or CNet.

This literature discusses issues in brand advertising in order to gain loyalty from customers, as well as price advertising as a way to attract customers. They detail the differences between traditional markets and online markets with respect to advertising and pricing strategies, as well as how retailers differentiate themselves in an online environment which is increasingly difficult on the internet. In addition, it is noted that price dispersion is an unexpected phenomenon in online markets. Many studies predict that price dispersion will disappear as the number of competitors increases (in accordance with economic theory), however based on empirical evidence, papers have reported finding a great deal of price dispersion online (Baye and Morgan, 2008). They also talk about the importance of trust and loyalty to different brands on the internet and in traditional markets, leading people to purchase products at higher prices, though they may be aware that they are not purchasing at the lowest prices (Baye and Morgan, 2008). In addition, papers discuss the way in which consumers perceive quality and the ways that brand loyalty and trust can be built in the online market, and how perceptions of quality are affected by prices (Hitt and Li, 2010).

The literature suggests that there should be perfect competition in online markets (Chevalier and Goolsbee, 2003). Much of this literature also details the ways that the internet has reduced search costs for consumers (Chevalier and Goolsbee, 2003), which provides reasoning for why price dispersion should not exist online. Some of these studies further discuss shopbots and price comparison websites and the ways that they have affected online markets. They find that these websites can reduce search costs in many ways, though they can also reduce the marginal benefit of searching for different retailers in other cases (Jing and Zhang, 2007). Other papers also analyze consumer search patterns to observe consumers' behavior in online markets, in order to make conclusions about how consumers search online.

Theory

Economic theory makes the assumption that all people are rational and make consumption choices that allow them to maximize their utility and budget. When confronted with the option to choose between purchasing a product at one price and purchasing that identical product at a lower price, the consumer is expected to always choose to purchase at the lower price. It is often costly to search for information and compare prices in traditional markets and consumers choose to search for the best deals depending on opportunity cost. The internet gives consumers the ability to easily find information and compare prices to find the best deal (which is made even easier by price comparison websites). The major search cost associated with purchasing on the internet is time and the opportunity cost of that time. This suggests that search costs are very low, particularly when compared with traditional markets, and as such, consumers more frequently choose to seek out the best possible price. It would seem that sellers would have incentive to price their products as low as possible in order to remain competitive, particularly because a consumer can see many prices for a single product on one page and would presumably choose the product that is priced lowest. Therefore it is expected that there would be a perfectly competitive market for goods online. It follows that prices would reach a state of Nash equilibrium, a state of market equilibrium where prices would be forced down to marginal cost (Ellison and Ellison, 2004) and price dispersion in online markets would not exist. This situation is known as Bertrand's paradox would hold, a state where many sellers all charge the marginal cost for a particular product. However, when observing a list of prices for a single product it is clear that this is not occurring in online product markets. Instead there is a large amount of price dispersion. That there is demand for price comparison websites also shows that there is variation in prices on the internet. If the assumptions of economic theory hold, why would a seller choose to set a price that higher than other sellers and why would a consumer choose to make a purchase at this higher price?

Retailers, both in traditional and online markets, have incentive to differentiate themselves in order to attract consumers and avoid Bertrand's paradox (Baye and Morgan, 2005), despite possible differences in prices. Just as there is much information available to consumers about products and pricing, there is also easily accessible information about sellers, particularly in the form of reviews by other consumers. In order to be competitive in the online market (where it would seem that price dispersion and price competition would not exist) retailers must have strategies for differentiation. Price dispersion as well as retailer differentiation give way to price and seller comparison websites and seller, which would otherwise have no purpose.

Retailers can thus differentiate themselves and gain a competitive advantage by providing good service to consumers and receiving positive ratings and feedback as a result of this service. For online markets, this includes giving accurate product descriptions, shipping products quickly, being available for communication, and such, to make the transaction as smooth as possible. This in turn creates competition amongst retailers to provide the best service that they can in order to appeal to consumers. In addition, retailers with superior service could charge prices higher than marginal cost and higher than other retailers, giving them further incentive to differentiate through service. However, when competing firms imitate each other's differentiation strategies, prices are pushed down their initial values and none of the firms are able to gain an advantage over their competitors (Baye and Morgan, 2005).

Amazon.com is a unique case in the online market. Although Amazon itself sells a multitude of products, it also allows online retailers to sell products. Sometimes this includes the same products that Amazon is selling and at lower prices. Usually the lowest price offered for a product is listed on the product's main page and sometimes that price is offered from a retailer other than Amazon. As such Amazon performs some of the same functions of price comparison websites by allowing consumers to search through a list of different retailers selling at different

prices. Instead of being linked to individual retailers' websites, however, the consumer is given the option of purchasing the product from a separate seller through Amazon. It seems that Amazon would have little incentive to allow other retailers to sell the same products that they sell, as they are creating competition for themselves. However, allowing other retailers to sell on its website has helped Amazon to expand into a website which offers a multitude of products and one which appears to be committed to offering consumers the lowest possible prices. Amazon also profits from sales made by other retailers on its website as it charges some retailers to have their products listed and collects commission on all products sold through its website.

Amazon has built a positive reputation with its customers. By selling on Amazon, retailers can benefit from the trust and reliability that Amazon has built with its customers, in addition to the popularity of the website. When purchasing online, consumers are often more likely to go to a website or retailer which they trust, even though their prices might by somewhat higher than another website or seller (Baye and Morgan, 2008). Trust is a significant deciding factor for people making purchases online, and often consumers prefer to purchase from a retailer who has a greater quantity of favorable reviews than from other consumers who have already had transactions with these sellers. This type of information is often expressed in terms of ratings and consumer comments and feedback. Sellers are able to differentiate themselves through service. Looking at ratings and previous customers' reviews of a seller, helps consumers choose which seller has the best service in relation to other sellers. Retailers who have achieved a certain amount of trust with consumers, those who have a good reputation, may be able to sell their products at slightly higher prices than other sellers. As such, retailers have incentive to provide the best service in order to get the best user ratings.

Data

The dataset was collected directly from Amazon.com on Friday, March 5, 2010. It includes data for the top one-hundred bestselling products in electronics at each time interval. This list is provided by Amazon.com and is updated every hour. For each product, data was collected on all sellers offering the product in new condition. Individual data for each product was combined to form an aggregate set of data. Each product in the sample can be identified according to the product's unique Amazon Standard Identification Number (ASIN). In order to collect data for this project, an electronic application was created to automatically extract and compile information from Amazon.com.

When a consumer clicks on the product name, they are taken to the product's main page (see Figure 1, Appendix, page vii). This page includes information about the product, including a product description, links to similar products, customer reviews, etc. There is also a list price, which is usually the lowest price offered by any of the "Featured" sellers. Below this there is a link to a list of other sellers who are offering the product. Clicking this link takes the consumer to another page, where they can see all retailers selling the product listed by price in ascending order (see Figure 2, Appendix, page viii). The consumer can also see the seller's average rating out of five stars, shipping costs, the seller's location, percentage of positive ratings that the sellers has received, the number of ratings that the seller has received, and other such information. Amazon divides this list of sellers for each product into "Featured" and non-featured merchants (under the label "New"). Featured merchants are listed first on the page in order of price (from lowest to highest); non-featured merchants are listed subsequently and also ordered according to price. Because the page is divided and arranged this way, a featured seller offering the product at a higher price than a non-featured seller will be listed above the non-featured seller.

Amazon determines which sellers are listed as "Featured" based on a set of qualifications that must be met by the seller. These qualifications include information about the seller from customer feedback and claims, seller performance, merchandise sales, the amount of time that the sellers has been listed on Amazon.com and the seller's status as a Pro Merchant. In order to be eligible to be a featured merchant, the seller must be a Pro Merchant. To become a Pro Merchant a seller must purchase a Pro Merchant Subscription with Amazon.com for a monthly fee. Eligibility for "Featured Merchant" status is one of the features available when a seller purchases this type of subscription. However, a seller is not required to purchase any subscription to have their products listed on Amazon. Instead they can be an Individual seller, though they still must pay a fee for each sale that they make. Both Pro Merchant and Individual seller accounts require the seller to pay an additional referral fee (or commission), which depends on the category of the product being sold. Purchasing a Pro Merchant account is similar to paying for advertising as it gives the firm an opportunity for more exposure (by being located closer to the top of the page).

On the list of sellers for each product, each seller's average star rating, percent of positive feedback, number of ratings in the past twelve months, and number of overall ratings is listed next to the seller's name. Both percentage of positive feedback and star rating are determined by feedback left for the seller by consumers who have purchased from the seller. After buying a product, the consumer has up to ninety days after ordering to leave a rating and comment. While viewing a list of sellers, a consumer can click on the number of ratings, and they will be taken to the seller's page, where other consumers' comments and ratings are visible, along with the date they were given. Only those who have made a purchase from the seller are permitted to leave feedback and comments, and doing so is optional. In order to leave feedback, the consumer chooses to rate the seller out of five stars, with a rating of five being best and a rating of one being worst. A seller's percentage of positive feedback is calculated based on these ratings, with star ratings of 1 or 2 considered negative feedback, star rating of 3 considered neutral feedback

and star ratings of 4 and 5 considered positive feedback. If a seller has fewer than five total reviews, then neither the seller's star rating nor percentage of positive feedback are not visible to the person viewing the seller listing.

The dataset includes the following variables for each seller listed for every product: price, percentage of positive feedback, star rating (out of five stars), number of ratings that the seller has received in the past twelve months, number of ratings that the seller has received over the time they have been active, whether or not the product is in stock, shipping cost, total price (equal to shipping plus price), whether the seller is listed as featured or not featured, the number of featured sellers for the product, the number of non-featured sellers, the number of pages of sellers and which page the seller is listed on. Those sellers who require a consumer to add the product to their cart on Amazon.com before viewing the price have been eliminated from this sample; this is about 6.1% of all the observations. Duplicate observations for the same product and products for which there are fewer than five total sellers have been eliminated as well (about 1.77% of all the observations). In addition, some of the model specifications focus solely on the first page of sellers, while other specifications include data for all the sellers of each particular product.

Observing a list of sellers and prices for a single product, where each seller is offering the product in new condition, there is a large variation in prices. For example, Figure 2 (appendix, page viii) shows the different prices offered by different sellers for a new Apple iPod Touch at one point in time (on November 9, 2009), and the large amount of price dispersion for the product. This type of price dispersion can be seen for many products on Amazon which are sold by more than one seller. Economic theory seems to suggest that this type of price dispersion should not exist in online markets for an identical product, much less for a product being sold on the same website. Identifying other distinguishing factors about different sellers that might contribute to their decisions on how to price their products could explain this price dispersion.

For example, Figure 4 (appendix, page x) shows the amount of price dispersion for one product, a new Apple iPod Touch on November 9, 2009. Figure 5 (appendix, page x) shows the price distribution for featured merchants and non-featured merchants. Figure 6 (appendix, page xi) shows the relationship between percentage of positive feedback and prices for the same product. These graphs suggest that there are a number of factors that can affect sellers' pricing strategies, particularly the variables that were collected for this study. This project looks for the relationship between variables relating to each separate seller and prices of products in order to identify the reasons that price dispersion exists online and some of the possible factors that might affect the way a seller chooses to price their products.

In analyzing the data, it seems that in 73% of products included in the sample, the minimum price that is listed for a product is by a seller who is featured. This indicates that in most cases, it would benefit the consumer to purchase from a featured seller, rather than a non-featured seller. However, the overall average price for featured sellers is higher than the overall average price for non-featured sellers (see Table 7, appendix, page vi), indicating that featured sellers may be able to charge higher prices; running a t-test shows that there is a significant difference between these means (see Table 7, appendix, page vi). A total of 65% of the sellers in the sample who are listed on the first page of sellers are "Featured Merchants." One of the reasons sellers are chosen to be featured is because they have overall positive ratings. The average percentage of positive feedback for sellers who are featured is higher than for those who are not featured and results from a formal t-test show that these means are significantly different (see Table 7, appendix, page vi). Table 8 (appendix, page vi) shows that featured sellers with an available star rating, have received either four or five stars (out of five). Buying from certain sellers, including Amazon and Target, for example, buyers are not given the option of leaving feedback, therefore these sellers do not have any customer ratings (even though they may be featured). Another factor used to determine which sellers are featured, includes how many

ratings the sellers has received, which is an indication of how many sales they have made. The average number of total ratings that a seller has received over their time selling is significantly greater for featured sellers (see Table 7, appendix, page vi).

Using the data collected for one-hundred unique bestselling electronic products at one point in time (on March 5, 2010), it will be possible to determine if there is a relationship between price and factors related to different sellers, which can affect the way that consumers view these sellers and in turn, who they choose to purchase from (if they choose to purchase at all). Figure 7 (appendix, page xi) shows that there is a large amount of variation in prices for all of the products in the data set; the figure also shows that there is a somewhat normal distribution for prices. Figures 8 and 9 (appendix, page xii) show a comparison of price distribution for featured sellers and non-featured sellers. Figure 10 shows the distribution of percentage of positive feedback and the overall trend in the relationship between price and rating percentage, for featured and non-featured sellers. For featured sellers the concentration of firms with a high percentage of positive feedback is greater than for non-featured sellers.

Hypotheses

This study aims to identify some of the factors that play a role in the pricing decisions made by sellers in the online market and to explain some of the reasons why price dispersion exists in online markets. In particular, it seeks to understand the importance of seller reputation, as defined by consumer ratings. By observing and testing data from Amazon, this work attempts to show the relationship between price and a number of other factors, and how this might relate to online markets as a whole.

Economic theory suggests there should not be price dispersion in online markets, that there is perfect competition for every good in this type of market, and that all things considered, a person would always choose to purchase a product at the lowest possible price. This implies that there should not be price dispersion on Amazon. For each product, firms should be selling products at the same price or close to the same price. Because this is not the case, it follows that there are other elements which affect pricing and consumption decisions. It is predicted that some of the variables that significantly affect both pricing and consumption decisions include: the retailer's location (on the page) and visibility to the consumer, their size, their ratings and customer feedback, and how long they have been active. It is expected that these components affect seller reputation and affect consumers' perceptions of quality and service, in addition to price. The following hypotheses indicate the predicted outcomes of empirical testing for the relationship between price and these factors.

H1. Sellers who have higher consumer ratings will have higher prices.

H2. Price is positively affected by an increase in the number of total ratings that a seller has received over the time that they have been active.

H3. The number of total merchants selling a particular product is negatively related to price. That is, as the number of sellers increases, prices will decrease.

H4. Those sellers who have a product in stock will have comparatively higher prices than sellers who do not have the item in stock.

When observing Amazon by itself, it is predicted that whether or not the seller is categorized as a "Featured Merchant" or as a non-featured seller also plays a role in pricing and

consumption choices. Because of the factors that influence the way that Amazon assigns "Featured Merchant" status, this variable is reflective of reputation, experience and sales.

H5. There will be a positive relationship between price and being a "Featured Merchant," indicating that a consumer will have to pay a price premium to purchase from a featured seller.

Empirical Tests

The empirical models for this project, seek to determine the relationship between price and a series of variables related to each separate seller, in order to observe if these variables could have an effect on sellers' pricing strategies. In each of these models, these variables are studied in relation to total price, which is equal to price plus shipping, as it is likely that consumers consider the cost of shipping to be part of the price of the product. The first set of tests (model (1) to (7)) use data for only the first page of sellers for each product. For these tests, it is assumed that most consumers choose to purchase from a seller on the first page of sellers and most will not visit any other pages of sellers (particularly because the lowest prices are always listed on the first page). Most of the observations in this sample are listed on the first page (about 8.9% of all observations are listed on pages following the first page). Natural logarithm of total price (which is the sum of price and shipping), is used as the dependent variable, instead of total price, in order to account for the large variation and possible skewness of prices amongst the different products included in the sample. As a result, this produces a relationship that is log-linear. Model (1) (shown in Equation 1) is the basic model used for this project, a hedonic price regression relating price to the variables listed on the right side of the equation (see Table 1 for a description of

variables, appendix, page i). Variations of model (1) were tested and produced very similar results (see Table 4 model (2) and model (3), appendix, page iv).

Equation 1 / Model (1)

$$lnTotalPrice = \beta_0 + \beta_1\,sellerPosition + \beta_2\,sellerStars + \beta_3\,nRatingsLifetime$$
$$+ \beta_4\,inStock + \beta_5\,featured + \beta_6\,nTotalSellers + \varepsilon$$

The next model used in this study is a fixed effects model which includes dummy variables for each product, which are used to control for the individual effects of each particular product. As stated previously, this model also uses natural log of total price, rather than total price, to account for price differences that exist among different products and this model is used only for the first page of listed sellers for each product. Equation 2 shows the specifications for this model.

Equation 2 / Model (4)

$$lnTotalPrice = \beta_0 + \beta_1\,sellerPosition + \beta_2\,sellerStars + \beta_3\,nRatingsLifetime$$
$$+ \beta_4\,inStock + \beta_5\,featured + \beta_6\,nTotalSellers + \sum_{i=1}^{n} \alpha_i\,D_i + u_i$$

In addition, other fixed effects model specifications were tested. Model (6), which is shown in Equation 3, includes dummy variables for seller star ratings to show the influence that a seller star rating of 4 or 5 (out of 5 stars) might have on prices, as well as the influence of not having a star rating at all.

Equation 3 / Model (6)

$$lnTotalPrice = \beta_0 + \beta_1 \, sellerPosition + \beta_2 \, sellerStars + \beta_3 \, nRatingsLifetime$$
$$+ \beta_4 \, inStock + \beta_5 \, featured + \beta_6 \, nTotalSellers + \gamma_1 \, sellerStars4$$
$$+ \gamma_2 \, sellerStars5 + \sum_{i=1}^{n} \alpha_i \, D_i + u_i$$

Model (7), which is shown in Equation 4, includes dummy variables for the total number of ratings that the seller has received over the time that they have been selling. This specification looks at the effects of having a very large number of ratings, in contrast to a lower number of ratings. Categories were created for retailers who have between one-hundred and one-thousand total ratings and greater than one-thousand total ratings. Both model (6) and model (7) use data only for the first page of each product's seller listing.

Equation 4 / Model (7)

$$lnTotalPrice = \beta_0 + \beta_1 \, sellerPosition + \beta_2 \, sellerStars + \beta_3 \, nRatingsLifetime$$
$$+ \beta_4 \, inStock + \beta_5 \, featured + \beta_6 \, nTotalSellers + \gamma_1 \, sellerStars4$$
$$+ \gamma_2 \, sellerStars5 + \gamma_3 \, nRatingsBet100\&1000 + \gamma_4 \, nRatingsOver1000$$
$$+ \sum_{i=1}^{n} \alpha_i \, D_i + u_i$$

The following model takes into account whether or not the seller is listed on the first page of the seller listing. The data used for this model includes data observations for all pages of listed sellers for every product. Equation 5 shows the specifications for this basic model. Equation 6 shows the specifications for a fixed effects model (with product effect dummy variables) that includes whether or not the seller is listed on the first page. Other variations of these models were also tested (see Table 6 model (9), model (11), model (12) and model (13) and Robustness Check section for further discussion).

$$lnTotalPrice = \beta_0 + \beta_1\, sellerPosition + \beta_2\, sellerStars + \beta_3\, nRatingsLifetime$$
$$+ \beta_4\, inStock + \beta_5\, page1 + \beta_6\, nTotalSellers + \varepsilon$$

$$lnTotalPrice = \beta_0 + \beta_1\, sellerPosition + \beta_2\, sellerStars + \beta_3\, nRatingsLifetime$$
$$+ \beta_4\, inStock + \beta_5\, page1 + \beta_6\, nTotalSellers + \sum_{i=1}^{n} \alpha_i\, D_i + u_i$$

The regression results for each of the different models specifications are presented in Table 4 (appendix, page iv) and Table 5 (appendix, page v).

Results

By observing the results of all the different model specifications, as well as comparing them, it is possible to see the relationships between prices and the different variables that are included in each specification.

Model (1) shows the relationship between total price and seller position, seller star rating, number of ratings received over the seller's lifetime, whether or not the seller has the product in stock, whether or not the seller is listed as a "Featured Merchant," and the number of total sellers. This specification details only observations listed on the first page of seller listings for each of the products. This model indicates a significant relationship between total price and seller position, seller star rating, and the number of total sellers. It also shows a somewhat significant relationship between total price and whether the seller has the product in stock and whether the seller is featured. There is an insignificant relationship between total price and the number of ratings that the seller has received over a lifetime. Total price has a positive relationship with

seller position which is expected, as seller position denotes location on the page and sellers with lower prices are listed first. Seller star rating has a positive relationship with prices, which is expected. Number of ratings over a lifetime has a positive relationship with prices, as expected. Whether or not the product is in stock has a positive relationship with prices. Whether or not the merchant is featured also has a positive relationship with prices. Number of total sellers has a negative relationship with prices. The r-squared value indicates that this model explains about 30% of the data, which is quite low.

Model (4) is a fixed effects model which details the relationship between total price and seller position, seller star rating, number of ratings received over the seller's lifetime, whether or not the seller has the product in stock, whether or not the seller is listed as a "Featured Merchant," and the number of total sellers. This specification also accounts for differences between products and the effects that they might have on pricing. This model has results that are rather different than the results from model (1). This model indicates a significant relationship between prices and the variables seller position, seller star rating, whether or not the product is in stock, whether or not the seller is featured, and the number of total sellers. The only variable which does not show significant results is the number of ratings that a seller has received over their lifetime. This model shows that there is a positive relationship between prices and seller position, as well as between prices and whether or not the seller is featured. The model shows a negative relationship between prices and seller star rating (number of stars that the seller has received out of five), whether or not the product is in stock, the number of ratings over a lifetime, and number of total listed sellers. However, this model has an r-squared value indicating that it explains about 96% of the variation in the data (which is much higher than in model (1)). Therefore it is likely that this model more accurately describes the relationship between price and the included variables.

Model (6), which is a fixed effects model that looks at the relationship between having a star rating equal to 4 or 5, or whether the star rating is missing shows that there is a somewhat significant relationship between having a star rating of 4 or 5, and that the relationship with price for both of these variables is positive. Model (7) shows that there is a positive and significant relationship between price and having a total ratings count between one-hundred and one-thousand or over one-thousand. Both model (6) and model (7) have very high r-squared values, both accounting for about 96% of the variation in the data, respectively. These models also include the largest number of observations of all the models.

With regards to what page the seller is listed on, particularly whether or not the seller is listed on the first page of sellers for a product, model (8) and model (10) show that this has an insignificant relationship with prices. Model (8) shows that there is a negative relationship between prices and being listed on page one. This model has a rather low r-squared value, indicating that it covers only 40% of the variation in the data. Model (10) shows that there is a positive relationship between prices and being listed on page one. This model has an r-squared value indicating that it explains 96% of the variation in the data. In model (11), which does not include seller position, being listed on page one has a negative and significant relationship with price. This implies that sellers listed on page one have lower prices, which is the expected relationship for these variables since sellers are arranged in order of ascending prices.

The relationship between seller position and total price is positive and significant across each of the different models that were tested. Since the list of sellers for every page is divided into two sections, "Featured Merchants" and non-featured sellers, then arranged in order of ascending prices, it is expected that this variable would have a positive relationship with prices. The result for this test reinforces the significance of the way that the list of sellers is arranged. Both model (11) and model (13) also test for the relationship between price and whether or not

the seller is listed on the first page, which is used as another indicator for seller position. Model (11) shows that there is a negative and significant relationship between price and being listed on the first page. This result is expected as sellers are arranged according to ascending prices, therefore sellers with higher prices are more likely to be listed after page one. A seller who is listed on the first page of sellers has a comparatively lower price than those who are listed on any of the pages following. Since prices are listed in ascending order in the two categories of sellers (featured and non-featured), it is expected that there would be a negative general trend between price and being listed on page one or after. In model (13), there is a positive and significant relationship between price and being listed on page one. This is rather unexpected because seller lists are arranged in order of ascending prices.

The relationship between star rating and price differs across the different models, though the relationship is significant in each of them. In model (1), star rating appears to have a positive relationship with price, which indicates that as seller star rating increases, price increases. This implies that there is a price premium for purchasing from a seller with a higher star rating and is one of the expected outcomes between rating and price. However, the relationship between star rating and price in model (4) is negative indicating that as star rating increases, total price decreases. While this is not the expected outcome, it can be explained by the possibility that price affects star rating, and a consumer is more likely to give the seller a higher star rating if they have a lower price. A person might be more likely to purchase from a seller with a lower price and leave that person positive feedback. Furthermore, star rating may also be related to the size of the firm. A larger firm is able to sell a greater quantity at lower prices than a smaller seller. A firm that is larger and making a greater quantity of sales (in terms of its total sales for all products), will receive a greater quantity of ratings, and a larger quantity of positive ratings (which may be given for a favorable price).

The results from model (6) show that there is a positive and significant relationship between a seller having a star rating of 4 or 5, which are positive seller ratings, and higher prices. This is the predicted relationship between star rating and prices and, again, implies that there is a price premium for purchasing from a seller with a higher star rating. A seller with higher star rating, and a better reputation, should be able to charge higher prices and still remain competitive. Some sellers do not have a star rating or positive feedback rating. This is the case for sellers who have just started selling products and for particular sellers (such as Amazon and Target) which do not give consumers the option to leave feedback. Sellers without a star rating, including those that may have recently started selling, have an incentive to price their products lower in order to attract more buyers, and in this way build some sort of reputation. On the other hand, sellers who have higher prices might be less likely to attract buyers, and therefore fewer people leave feedback or people might be more likely to leave negative feedback if prices for the product are comparatively higher.

Prices and total number of ratings that a seller has received over their lifetime have a positive and insignificant relationship in model (1). This positive relationship indicates that as the number of ratings that a seller receives increases, price increases as well, which is as predicted. Higher ratings indicate that more people are purchasing from that seller, which might indicate that the seller is popular and thus can charge a higher price. On the other hand, this might indicate that the retailer is larger and has a greater quantity of products to sell; therefore there are more consumers who leave feedback for that retailer. In model (4), the relationship is also insignificant, though there is a negative relationship between price and number of ratings, implying that as number of ratings increases, price decreases, which presents the possibility that as a seller becomes more popular and makes many sales, they are able to sell at lower prices. This could also, instead, be reflective of the size of the retailer, in that a larger seller can charge lower prices, thereby attracting more buyers, and accumulating a greater amount of total ratings.

In model (5), there is a negative and significant relationship between price and number of ratings received. According to this model, sellers with fewer seller ratings have higher prices than sellers with a greater quantity of ratings. The coefficient for this variable across all the models is nearly equal to zero however, indicating that the total number of ratings that a seller has received has a very small effect on prices, if any.

The fixed effects method used for model (7) includes variables used to group sellers by the number of ratings that they have received. These four groups divide the sellers into those who have between one-hundred and one-thousand ratings and sellers who have over one-thousand ratings. This model shows that there is a significant and positive relationship between price and having a total number of ratings greater than one-hundred. Therefore, as the number or ratings increases, price increases as well. This result is expected, as number of total ratings that a seller has is an indicator of the number of sales that a seller has made. A large number total of ratings shows that many people are purchasing from that seller, which could be representative of reputation or could be explained by the size of the retailer. A larger retailer is more likely to have more ratings and sales as they sell more products and a greater quantity of goods.

Price has a positive and somewhat significant relationship with whether or not the product is in stock. In model (1), there is a positive relationship, indicating that if a product is in stock, it has a higher price. It is expected that if a seller has their product in stock, they would be able to charge a higher price, compared to sellers who do not have the product in stock. This relationship might imply that sellers with lower prices do not have the product in stock because their prices are lower than other sellers, and a result they have sold their entire inventory. In model (4), however, the relationship between having a product in stock and price is negative, indicating that if the seller has the product in stock, they have a comparatively lower price than

sellers who do not have the product in stock. This is not the predicted relationship for these variables.

A seller's status as a "Featured Merchant" or a non-featured merchant has a positive and significant relationship with price, which is the case in every model, except model (5). These results indicate that a seller who is featured, will sell their product at a higher price. Therefore, there is a price premium for purchasing from a featured seller. Since sellers are chosen by Amazon to be "Featured Merchants" based on a number of criteria, including merchandise sales and customer feedback, being featured is indicative that a seller has a positive reputation. Model (5), however, does not account for the seller's position on the page, which leads to a negative and insignificant relationship between price and being featured. This model shows that if a seller is featured they will have a comparatively lower price and implies that, disregarding seller position, featured sellers will have lower prices than non-featured sellers.

The number of total sellers for each product has a significant relationship with price in every model. In all these models, this relationship is negative, implying that as the total number of sellers increases, price decreases. This fits with the prediction that as more sellers enter the market for a certain product, prices are driven downwards due to an increase in competition. The results of model (4), however, show that there is a positive relationship, indicating that as the total number of sellers increases, price increases as well. This does not fit with prior predictions, as it is expected that a greater number of sellers in the market for a particular product would become more competitive, therefore driving prices downward as sellers continue to enter the market.

Based on the results of empirical tests, model (6) and model (7) are preferred, as they seem to explain the data the best (according to their r-squared values both models each account for about 96% of the variation in the data) and include the largest number of total observations. In addition, these models also include product dummy variables and groups for seller star ratings

and total number of ratings, which helps to more accurately analyze the importance of these variables with relation to prices.

Discussion and Conclusion

Though economists expected that online markets would have perfect competition and that the "law of one price" would hold in a market of identical goods, this situation does not occur. Firms who sell their products online must price their goods competitively; however other factors seem to play a role in their pricing decisions. Observing the results of empirical testing on data from Amazon shows that there is an important relationship between price and each firm's size, reputation and sales, as well as the length of time that the firm has been selling in the online products market. In some ways, the online market functions similarly to a traditional market, where being listed at the beginning of the seller listing is similar to having a shop in a good location and having high consumer ratings is an indication that the firm maintains has fair prices, good service, and maintains a clean and well-kept store. Firms operating online make different pricing decisions depending on how much they sell, as well as their size and how customers rate them and prices of other sellers. The number of sales that a firm makes and the quantity of positive feedback that they receive could also be a reflection of lower prices.

Firms that sell on Amazon are divided into "Featured Merchants" and non-featured merchants categories, based on their sales, customer feedback ratings and how long they have been selling on Amazon. As consumers often choose to buy from Amazon because they already trust this website, they might also be more likely to purchase from a seller who is featured, as this implies that the seller is reliable. A seller on Amazon might have incentive to make pricing decisions in an effort to become a "Featured Merchant," as this will indicate to a consumer that

they are more reliable and trustworthy. Being featured also means that the seller will have a better position on the list of sellers for a product, that they will be listed closer to the top of the page. This is important because, the lowest prices are listed closest to the top of the page and, often consumers, will only view the seller listings that appear on the first page and closest to the top of the page. In other words, location is very important. Therefore, it is in the seller's best interest to make pricing decisions in order to become a featured seller. The empirical results of this study show that, overall, a featured seller will have a higher price than a non-featured seller, indicating that featured sellers can charge a price premium.

Another significant factor that affects pricing choices is a firm's rating. On Amazon this is displayed as a star rating (out of five, with five being best) and rating percentage (which is the percent of positive feedback that the seller has received). Sellers with star ratings of four or five have higher prices than sellers with lower ratings. A high seller rating can be indicative of good customer service and seller reliability, and can also reflect the seller's prices (customers may give sellers with lower prices better ratings). Sellers who have not received any seller ratings seem to have lower prices. Since it is possible that a seller's rating reflects the customer's satisfaction with the seller's prices (lower prices lead to higher ratings), it is possible that this would help to drive prices down, as sellers may want to price in order to receive positive ratings. Consumers would presumably be more willing to purchase from a seller if they know that others have purchased from them previously and that they have received positive ratings, even if they have slightly higher prices than other sellers. Therefore, firms who have higher seller ratings may choose to price differently than those who have lower ratings, and could potentially charge higher prices. The total number of ratings that the seller has received plays an important role in pricing. Having a large number of ratings reflects the retailer's size and amount of sales, and higher quantity of ratings also implies a better reputation. A retailer who is larger and has a positive

reputation would be able to charge lower prices than other sellers, due to the quantity of sales that they are making.

When purchasing products online, consumers must consider price as well as a variety of other significant factors. Economic theory predicts that prices will play an integral role in purchasing decisions, however the large amount of price dispersion online indicates that price is not the only factor driving their decisions. The opportunity of cost of the time that a person must spend searching for the best deal plays an important role, and is largely reduced due to price comparison websites and Amazon (which is an online retailer and allows consumers to purchase the same good from many retailers and compare their prices). Consumers choose to purchase at Amazon because they have trust in the website. Sellers can gain trust from consumers by listing their products on Amazon, instead of selling individually. Because of the importance of trust and loyalty in making purchasing decisions, sellers who list their products on Amazon may be able to charge a higher price than they would otherwise. A seller who is in the "Featured Merchants" category would presumably attract more buyers because of their position on the seller listing page and because this categorization implies that the seller has a large number of sales, experience and a positive reputation.

Firms must price their products in order to remain competitive, however, they must also take into account other components that buyers might consider when making purchasing decisions. Consumers may choose to purchase from a seller with a higher price if that seller has a better reputation. In an online market, sellers are able to adjust their prices in order to compete with other sellers and in accordance with factors such as reputation and experience in selling. Sellers who are featured are able to perhaps price their products slightly higher than other sellers, because of the importance of experience and reputation, which helps to attract consumers and gain their trust. The significance of these components, as seen in the empirical results for this

study, indicates that, when making pricing decisions, firms perhaps take into consideration their competitor's prices as well as other factors, including sales, size and reputation for both themselves and their competitors. This suggests that one of the reasons for price dispersion in online markets is that customers value a seller's reputation and experience, and, as such, pricing strategies for firms selling their products online must include these factors and their potential implications for greater sales.

References

Barron, John M., Beck A. Taylor, and John R. Umbeck (2004): "Number of Sellers, Average Prices, and Price Dispersion," *International Journal of Industrial Organization*, Elsevier, 22(8-9), pages 1041-1066.

Baye, Michael R. and John Morgan (2001): "Information Gatekeepers on the Internet and the Competitiveness of Homogenous Product Markets," *American Economic Review* 91(3), pages 454-474.

Baye, Michael R. and John Morgan (2005): "Red Queen Pricing Effects in E-Retail Markets," No. 2005-07, Working Papers, Indiana University, Kelley School of Business, Department of Business Economics and Public Policy.

Baye, Michael R. and John Morgan (2008): "Brand and Price Advertising in Online Markets," Mimeo, Indiana University, Kelley School of Business, Department of Business Economics and Public Policy.

Baye, Michael R., John Morgan, and Patrick Scholten (2004): "Temporal Price Dispersion: Evidence from an Online Consumer Electronics Market," Working Papers 2004-04, Indiana University, Kelley School of Business, Department of Business Economics and Public Policy.

Baye, Michael R., J. Rupert J. Gatti, Paul Kattuman, and John Morgan (2007): "A Dashboard for Online Pricing", *California Management Review* 50 (1), pages 202-216.

Bolton, Gary E., Elena Katok, and Axel Ockenfels (2003): "How Effective are Electronic Reputation Mechanisms? An Experimental Investigation," Working Paper Series in Economics No. 3, University of Cologne, Department of Economics.

Brynjolfsson, Erik and Michael D. Smith (2000): "Frictionless Commerce? A Comparison of Internet and Conventional Retailers," *Management Science* 46(4), pages 563-585.

Brynjolfsson, Erik and Michael D. Smith (2001): "Consumer Decision-Making at an Internet Shopbot: Brand Still Matters," *Journal of Industrial Economics*, Blackwell Publishing, vol. 49(4), pages 541-558.

Chen, Bin, Nan Hu, Ling Liu, and Vallabh Sambamurthy (2008), "Are Online Reviews Just Noise? The Truth, the Whole Truth, or Only the Partial Truth?," from http://ssrn.com.

Chevalier, Judith and Austan Goolsbee (2003): "Measuring Prices and Price Competition Online: Amazon and Barnes and Noble," *Quantitative Marketing and Economics* 1(2), pages 203-222.

De los Santos, Babur I., (2008): "Consumer Search on the Internet," Working Papers No. 2008-06, Indiana University, Kelley School of Business, Department of Business Economics and Public Policy.

Ellison, Glenn and Sara Fisher Ellison (2004): "Search, Obfuscation, and Price Elasticities on the Internet," MIT Department of Economics Working Paper No. 04-27.

Haynes, Michelle and Steve Thompson, "Price, Price Dispersion and Number of Sellers at a Low Entry Cost Shopbot," *International Journal of Industrial Organization*, 2008, vol. 26, issue 2, pages 459-472.

Hitt, Loren M. and Xinzin Li (2010): "Price Effects in Online Product Reviews: An Analytical Model and Empirical Analysis," from http://ssrn.com.

Jing, Bing and Jennifer Zhang (2007): "The Impacts of Shopbots on Online Consumer Search," Working Papers 07-34, from http://www.NETinst.org.

Pan, Xing, Brian Ratchford, and Venkatesh Shankar (2001): "Why Aren't the Prices of the Same Item the same at Me.com and You.com?: Drivers of Price Dispersion Among E-Tailers," University of Maryland Department of Marketing.

Thiel, Stuart E. (2005): "A New Model of Persistent Retail Price Dispersion," from http://ssrn.com.

Appendix

Variable	Description
totalPrice	The total price of the product, equal to price plus shipping.
price	The price of the product.
shipping	Cost of shipping for the product.
sellerPosition	The position of the seller in comparison to other sellers on the page; the location of the seller on the page.
page1	Dummy variable equal to 1 if the seller is listed on the first page of sellers, equal to 0 otherwise.
pageN	The page number where the seller is listed.
sellerStars	The star rating for each seller ranging from 1 to 5, with 5 indicating the best.
ratingPercentage	The percentage of positive feedback that the seller has received, with percentages closer to 100% indicating more positive reviews.
n12MonthRatings	The number of ratings that the seller has received from customers in the past 12 months.
nLifetimeRatings	The number of ratings that the seller has received from customers over the entire time that they have been selling on Amazon.
inStock	Dummy variable equal to 1 if the seller has the product in stock and 0 if the seller does not have the product in stock.
featured	Dummy variable equal to 1 if the seller is a "Featured Merchant" and 0 if the seller is not.
nFeatured	The number of featured sellers for each product.
nNonFeatured	The number of non-featured sellers for each product.
nTotalSellers	The total number of sellers for each product, offering the product in new condition.
lnTotalPrice	Natural logarithm of total price.
nRatingsUnder5	Dummy variable equal to 1 if the number of ratings a seller has received over their lifetime is less than or equal to five, equal to 0 otherwise.
nRatingsBet5&100	Dummy variable equal to 1 if the number or ratings a seller has received over their lifetime is between five and one hundred, equal to 0 otherwise.
nRatingsBet100&1000	Dummy variable equal to 1 if the number of ratings a seller has received over their lifetime is between 100 and 1000, equal to 0 otherwise.
nRatingsOver1000	Dummy variable equal to 1 if the number of ratings a seller has received over their lifetime is over 1000, equal to 0 otherwise.
sellerStars4	Dummy variable equal to 1 if the seller star rating is equal to four, variable is equal to 0 otherwise.
sellerStars5	Dummy variable equal to 1 if the seller star rating is equal to five, variable is equal to 0 otherwise.
sellerStarsMissing	Dummy variable equal to 1 if the seller star rating is missing, variable is equal to 0 otherwise.

Table 2: Summary statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
totalPrice	3840	184.58	189.49	2.53	1676.21
lnTotalPrice	3840	4.82	0.94	0.93	7.42
price	3840	177.85	188.67	0.01	1664.52
shipping	4089	6.61	6.54	0	136
sellerPosition	4089	20.68	18.37	1	128
page1	4089	0.91	0.28	0	1
pageN	4089	1.12	0.43	1	5
sellerStars	3463	4.59	0.52	1	5
ratingPercentage	3463	94.81	6.69	0	100
n12MonthRatings	4089	11056.9	21164.93	0	352549
nLifetimeRatings	4089	38059.4	90018.49	0	727739
inStock	4089	0.92	0.28	0	1
addToCart	4089	0.06	0.24	0	1
featured	3725	0.65	0.48	0	1
*nFeatured**	3725	20.36	8.03	2	36
*nNonFeatured**	3725	11.81	7.74	0	25
nTotalSellers	4089	40.36	24.60	6	128
nRatingsUnder5	4089	0.20	0.40	0	1
nRatingsBet5&100	4089	0.08	0.28	0	1
nRatingsBet100&1000	4089	0.13	0.34	0	1
nRatingsOver1000	4089	0.59	0.49	0	1
sellerStars4	4089	0.33	0.47	0	1
sellerStars5	4089	0.51	0.50	0	1
sellerStarsMissing	4089	0.15	0.36	0	1

* Note: The summary statistics for these variables includes observations for sellers listed on the first page of sellers only.

Table 3: Correlations

1. Data for first Page of Sellers

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1) totalPrice	-																	
2) lnTotalPr.	.80	-																
3) price	.99	.80	-															
4) shipping	.14	.12	.11	-														
5) sellerPos.	-.03	.01	-.04	.20	-													
6) sellerStars	.04	.06	.05	-.15	-.05	-												
7) ratingPer.	.01	-.01	.01	-.07	-.06	.64	-											
8) n12MoRa.	.00	-.04	.00	-.09	-.36	.05	.04	-										
9) nLifeRati.	.00	-.00	.00	-.04	-.31	.04	.03	.88	-									
10) inStock	.04	.04	.05	-.13	-.19	.21	.10	.10	.07	-								
11) featured	.03	-.03	.03	-.07	-.64	-.04	.08	.37	.30	.08	-							
12) nFeatur.	-.17	-.20	-.17	.11	.39	-.08	.01	-.03	-.04	-.14	.14	-						
13) nNonFea.	-.18	-.03	-.18	.05	.37	.00	-.03	-.15	-.11	.00	-.28	.14	-					
14) nTotSell.	-.23	-.15	-.23	.10	.50	-.05	-.01	-.12	-.10	-.09	-.09	.76	.75	-				
15) nRateBet100&1000	-.02	.02	-.02	.06	.23	-.02	-.03	-.24	-.20	-.10	-.35	-.05	.07	.01	-			
16) nRateOver1000	.04	-.04	.04	-.05	-.44	-.01	.09	.38	.31	-.01	.69	.13	-.23	-.06	-.65	-		
17) sellStars4	-.04	-.07	-.05	.17	.04	-.92	-.39	-.04	-.03	-.23	.08	.11	-.02	.06	.04	.05	-	
18) sellStars5	.04	.07	.05	-.16	-.05	.97	.48	.04	.04	.23	-.06	-.10	.02	-.06	-.03	-.04	-.99	-

2. Data for all pages of sellers

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1) totalPrice	-																
2) lnTotalPrice	.80	-															
3) price	.99	.80	-														
4) shipping	.13	.11	.10	-													
5) sellerPos.	-.06	-.02	-.06	.15	-												
6) sellerStars	.03	.04	.04	-.15	-.06	-											
7) ratingPer.	.00	-.02	.00	-.06	-.09	.64	-										
8) n12MoRa.	.01	-.02	.01	-.10	-.30	.05	.04	-									
9) nLifeRati.	.00	-.00	.00	-.04	-.26	.04	.03	.88	-								
10) inStock	.04	.03	.04	-.13	-.16	.23	.10	.09	.07	-							
11) page1	.03	.01	.03	-.03	-.71	.03	.07	.11	.09	.05	-						
12) pageN	-.05	-.03	-.05	.04	.78	-.03	-.06	-.11	-.09	-.05	-.88	-					
13) nTotalSellers	-.20	-.16	-.21	.08	.65	-.03	-.03	-.14	-.12	-.05	-.47	.53	-				
14) nRateBet100&1000	-.02	.06	-.02	.06	.19	-.01	-.05	-.24	-.20	-.09	-.04	.06	.08	-			
15) nrateOver1000	.04	-.03	.04	-.05	-.36	-.01	.10	.38	.31	-.02	.10	-.12	-.18	-.64	-		
16) sellStars4	-.04	-.06	-.04	.16	.04	-.91	-.34	-.03	-.03	-.25	-.01	.02	.03	.03	.07	-	
17) sellStars5	.04	.05	.04	-.16	-.05	.96	.46	.04	.03	.24	.02	-.03	-.03	-.02	-.04	-.99	-

Table 4: Log-linear regression models, data includes only the first page of sellers for each product

	Dependent Variable: Log of Total Price						
Variable	**Model (1)**	**Model (2)**	**Model (3)**	**Model (4)**	**Model (5)**	**Model (6)**	**Model (7)**
sellerPosition	0.014 5.95 ***	0.0142 5.85 ***	0.0223 8.80 ***	0.0139 22.34 ***		0.0138 25.14 ***	0.0139 26.44 ***
sellerStars	0.0869 2.51 **		0.0831 2.47 **	-0.0312 -4.83 ***	-0.0410 -5.58 **		
ratingPercentage		-0.0010 -0.47					
nRatingsLifetime	0.0000 0.32	0.0000 0.41	0.0000 0.39	-0.0000 -0.33	-0.0000 -4.80 ***	0.0000 0.52	
inStock	0.1256 2.17 **	0.1595 2.83 ***	0.0839 1.47	-0.0930 -8.15 ***	-0.1346 -10.74***	-0.0769 -6.77 ***	-0.0638 -5.60 ***
featured	0.1008 1.98 **	0.0918 1.81 *	0.3329 5.81 ***	0.2085 15.12 ***	-0.0096 -0.90	0.1792 14.31 ***	0.1154 8.63 ***
nTotalSellers	-0.0187 -9.56 ***	-0.0187 -9.55 ***		-0.0391 -56.15***	-0.0345 -51.29***	-0.0434 -12.10***	-0.0435 -12.82***
nFeatured			-0.0382 -14.28***				
nNonFeatured			-0.0044 -1.95 *				
sellerStars4						0.0925 8.22 ***	0.0013 0.08
sellerStars5						0.0524 4.73 ***	-0.0361 -2.46 **
nRatingsBet100&1000							0.0739 4.85 ***
nRatingsOver1000							0.1490 10.26 ***
Product Dummies				yes	yes	yes	yes
Constant	4.5901 25.73	5.0644 23.56	4.5960 26.36	6.9648 155.12	7.2914 172.85	6.9783 38.81	6.9938 41.09
Number of Observations	2987	2987	2987	2987	2987	3478	3478
Log Likelihood	-4085.11	-4088.22	-4046.69	907.67	595.19	981.20	1054.41
R-squared	0.04	0.04	0.06	0.97	0.96	0.96	0.96
Adj. R-squared	0.04	0.03	0.06	0.96	0.96	0.96	0.96
F-statistic	19.15	17.89	36.71	3082.45	2205.18	2710.72	2463.80

Legend: b/t

*significant at the 10% level (critical value is equal to 1.64)
** significant at the 5% level (critical value is equal to 1.96)
*** significant at the 1% level (critical value is equal to 2.58)

Robust standard errors.

Table 5: Log-linear regression models, data includes all pages of sellers

	Dependent Variable: Log of Total Price					
Variable	**Model (8)**	**Model (9)**	**Model (10)**	**Model (11)**	**Model (12)**	**Model (13)**
sellerPosition	0.0082 5.77 ***	0.0081 5.72 ***	0.0065 13.16 ***		0.0076 17.14 ***	0.0095 22.46 ***
page1	-0.0273 -0.36	-0.0236 -0.31	0.0067 0.27	-0.2186 -9.69 ***	0.0088 0.43	0.0789 3.64 ***
sellerStars	0.0623 1.95 *		-0.0391 -5.71 ***	-0.0399 -5.60 ***		
ratingPercentage		-0.0031 -1.96 **				
nRatingsLifetime	0.0000 0.19	0.0000 0.24	0.0000 1.83 *	-0.0000 -5.28 ***	0.0000 2.62 ***	
inStock	0.1127 2.08 **	0.1439 2.76 ***	-0.0985 -8.58 ***	-0.1366 -11.35 ***	-0.0796 -7.08 ***	-0.0658 -5.80 ***
nTotalSellers	-0.0102 -12.58 ***	-0.0101 -12.59 ***	-0.0272 -45.90 ***	-0.0252 -55.56 ***	-0.0291 -27.13 ***	-0.0294 -26.32 ***
sellerStars4					0.1162 11.22 ***	0.0048 0.35
sellerStars5					0.0642 6.33 ***	-0.0374 -2.85 ***
nRatingsBet100&1000						0.0682 4.90 ***
nRatingsOver1000						0.1702 13.75 ***
Product Dummies			yes	yes	yes	yes
Constant	4.6810 26.68	5.2313 29.06	7.1611 147.92	7.4416 169.19	7.0203 55.81	6.9219 51.80
Number of Observations	3257	3257	3257	3257	3840	3840
Log Likelihood	-4417.28	-4418.32	682.90	511.31	817.17	947.82
R-squared	0.04	0.04	0.96	0.95	0.96	0.96
Adj. R-squared	0.04	0.04	0.96	0.95	0.95	0.96
F-statistic	27.44	27.92	3400.10	2382.32	2630.97	2363.16

Legend: b/t

*significant at the 10% level (critical value is equal to 1.64)
** significant at the 5% level (critical value is equal to 1.96)
*** significant at the 1% level (critical value is equal to 2.58)

Robust standard errors.

Table 6: Analysis of average prices for sellers at each star rating, price includes shipping

Seller Star Rating	Average Price	Count
< 3	206.85	22
4	176.22	1368
5	191.43	2073
Missing *	180.21	626
Total	184.58	4089

* Missing rating indicates that the seller is not eligible to receive star ratings or the seller has not received any ratings yet. Certain retailers, including Amazon and Target, do not get customer feedback.

Table 7: Analysis of differences between non-featured and featured merchants and t-tests, price includes shipping, data from first page of sellers only

	Non-featured Merchants	Featured Merchants	Total	t-stat
Count	1305	2420	3725	-
Average Price	180.71	189.32	186.11	-1.26
Standard Deviation	157.28	213.15	194.26	
95% Confidence Interval	[172.13, 189.28]	[180.37, 198.26]	[179.65, 192.57]	
Average # of Total Ratings	2024.95	61726.27	40810.78	-19.53
Standard Deviation	15625.97	109825.7	93444.42	
95% Confidence Interval	[1176.37, 2873.53]	[57348.41, 66104.13]	[37808.99, 43812.56]	
Average Rating Percentage	94.15	95.31	94.95	-5.11
Standard Deviation	9.95	2.59	5.95	
95% Confidence Interval	[93.53, 94.77]	[95.20, 95.42]	[94.74, 95.16]	

Table 8: Analysis of star ratings for featured sellers versus non-featured sellers, data from first page of sellers only

Row Labels	Count	% of Sample
Non-featured Merchants Star Rating	1305	35.03
< 3	16	0.43
4	349	9.37
5	620	16.64
Missing *	320	8.59
Featured Merchants Star Rating	2420	64.97
4	904	24.27
5	1302	34.95
Missing *	214	5.74
Total	3725	-

* Missing rating indicates that the seller is not eligible to receive star ratings or the seller has not received any ratings yet. Certain retailers, including Amazon and Target, do not get customer feedback.

Figure 1: Sample of the main page for a product on Amazon

Figure 2: Sample of a list of sellers for a product on Amazon.com, the list is divided into "Featured Merchants" and non-featured merchants (under "New")

**Figure 3:** Screen capture of Amazon's "Bestsellers in Electronics" list

**Figure 4:** Histogram of price dispersion for the Apple iPod Touch on November 9, 2009 (Number of Observations=16)
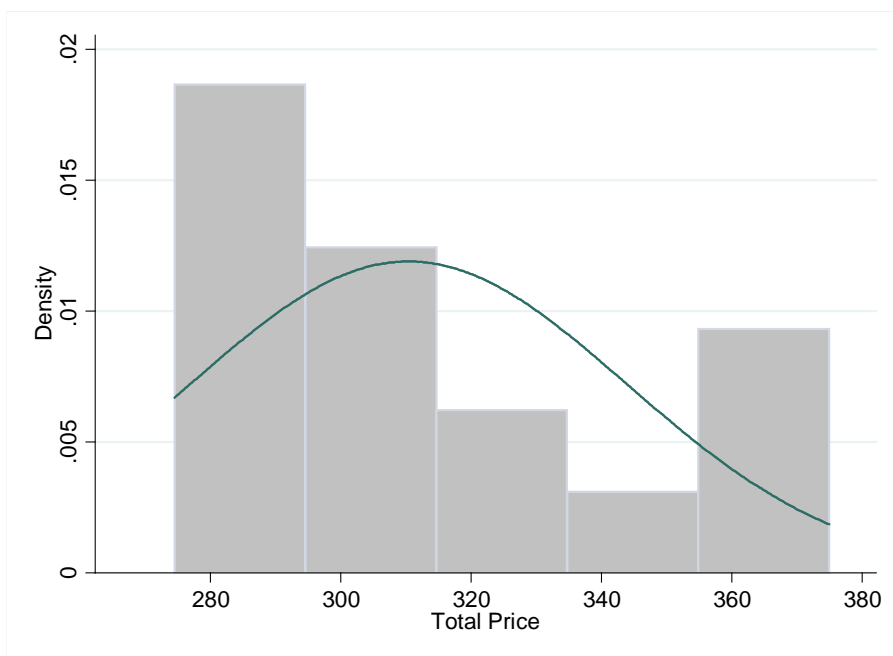
Figure 5: Data distribution for featured sellers versus non-featured merchants, for Apple iPod Touch on November 9, 2009
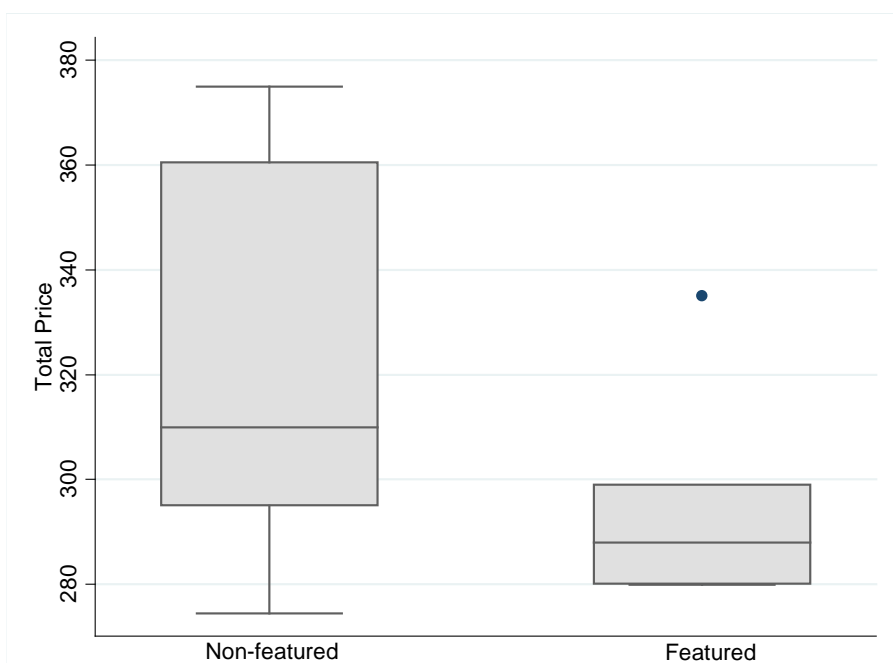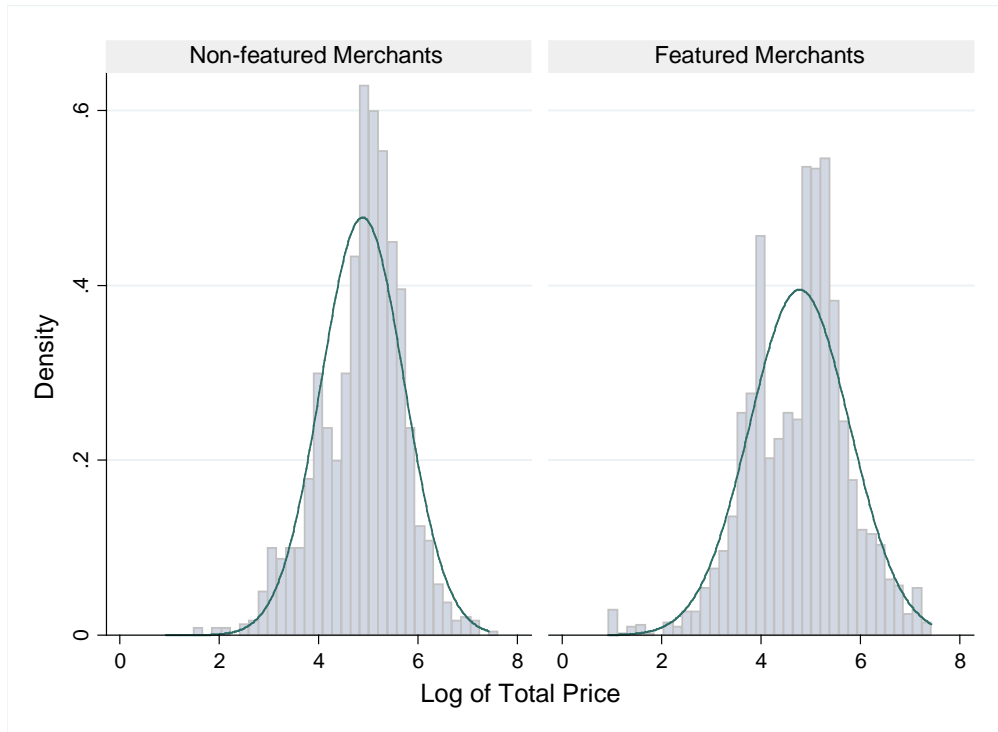
Figure 6: Scatterplot showing the relationship between price and percentage of positive feedback, for Apple iPod touch on November 9, 2009
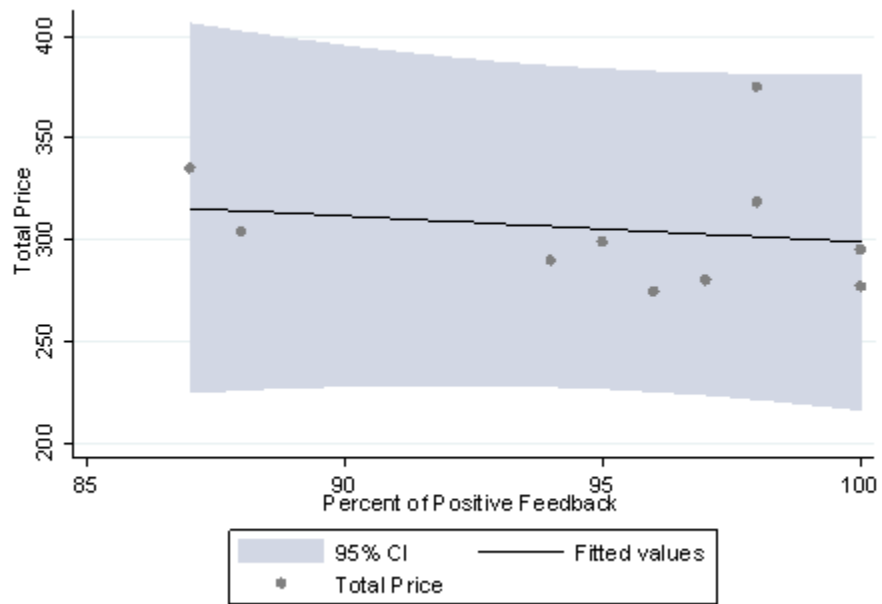
Figure 7: Histogram showing price distribution for aggregate data set, for March 5, 2010
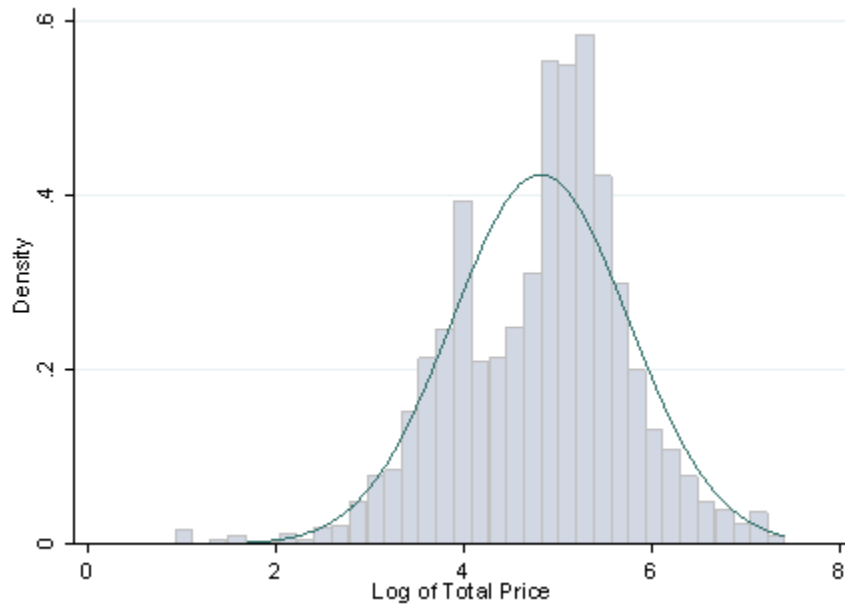
Figure 8: Histogram showing price distribution for featured versus non-featured merchants, for aggregate data set on March 5, 2010

Figure 9: Graph showing distribution of price for featured versus non-featured merchants, for aggregate data set on March 5, 2010
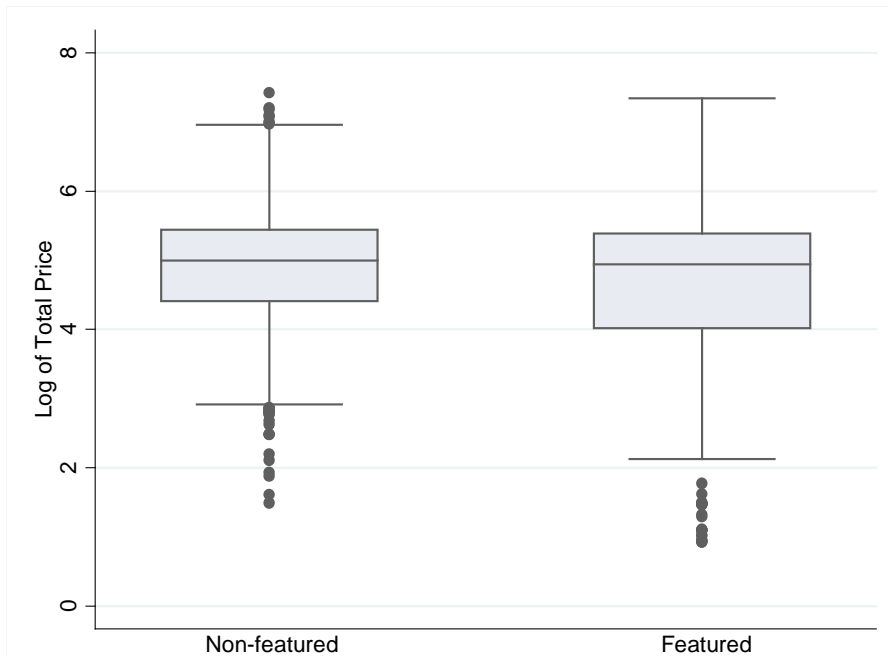
Figure 10: Price distribution for featured versus non-featured merchants, for aggregate data set on March 5, 2010
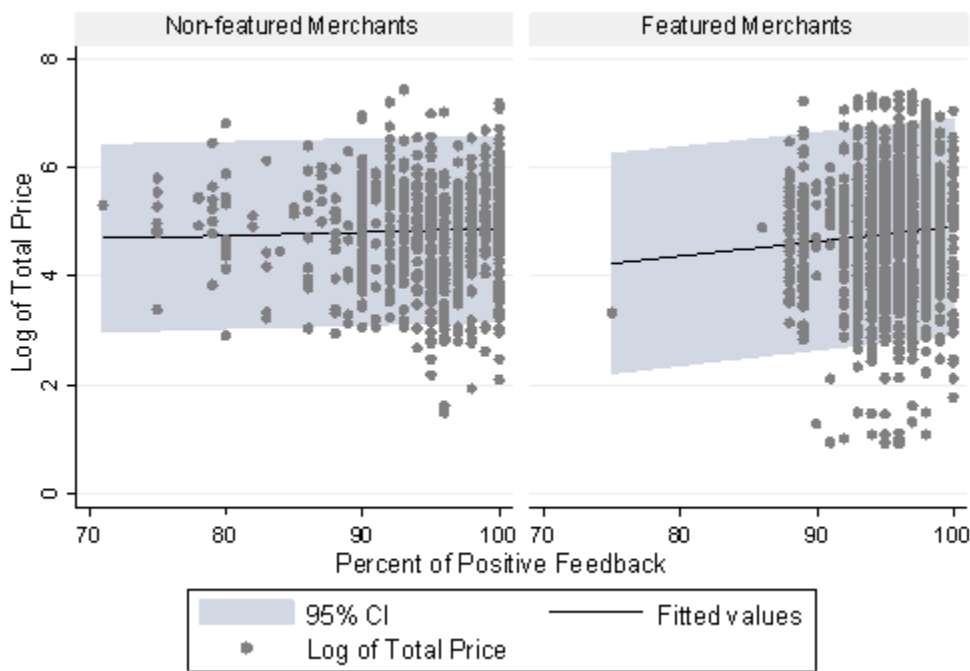

Figure 11: Distribution of star ratings for featured versus non-featured merchants, for aggregate data set on March 5, 2010