2025 Volume 3, Issue 8
Educational Innovation Research
ISSN: 3029-1844(Print)
ISSN: 3029-1852(Online)

How E-commerce Benefits Consumers from an Economic Perspective

Yujia Zhai, Jingyi Dong
University of Waterloo, Waterloo, ON N2L 3G1, Canada

Abstract

A rise of e-commerce has a huge impaction on individuals' consumption behaviors. Many factors may explain its influence, but the relative economic theory is significant to be aware of for a better development in terms of national well-being. We used equilibrium price, Network Effect and the Price Dispersion model to indicate how online stores may benefit consumers through their specific characters such as organized information and comparatively low prices. By comparing models given different variables (variables in each model differed based on its corresponded market) and sketching their relative distribution functions, we observed that when the number of informed consumers increases, more shops would choose to set relatively low prices for their selling goods given there are both online and offline stores in the market. In addition, by applying the price dispersion model, we notice consumers would be better off in general when there is an increased quantity of online stores in the market. We also found online retail market decreases individuals' valuation of offline store products. Thus, online stores benefit consumers by providing various choices and cheap products, which the offline stores would also follow. In this condition, consumers in general would be benefits from the online store in both online and offline purchase channel, respectively.

Keywords

e-commerce; brick and mortar; equilibrium price; network effect; price dispersion model; informed consumers; valuation; retail market

Online publication: September 26, 2025

1. Introduction

Often, today's world is characterized by high-tech and great dependency on networks, as the internet and digital technology develop rapidly. The introduction of new methods of trade (e.g. online shopping) has brought great impact to a variety of industries, shown as the appearances of new-type enterprises, relocation of market shares and transformation of businesses. This report will focus on changes in the retail industry, where the positions of many of the conventional Brick-and-Mortar retail businesses, with Wal-Mart as an example, are increasingly threatened by the novel Pure-click retail businesses such as Amazon, one of the biggest Electronic Commerce businesses in the USA. According to a Digital

Commerce 360 analysis of Commerce Department retail data, Online spending represented 16.0% of total retail sales in the USA for the year of 2020, for which Amazon accounted for more than a third of all ecommerce. This shows great potential of online retailing, which adds more possibilities to the future retail industry.

This report will begin with a brief introduction of the retail market and states some of its key characteristics which are relevant to our research. The next section includes a model from Perloff, Jeffrey M. & Salop, Steven (1985)[1], based on a highly competitive market with differentiated goods which is similar to the situation of a retail market. The equilibrium price derived from this model will help to explain the concept of network effects occurring in the online retail market. Furthermore, the report will mainly discuss how a rise of online stores might possibly benefit consumers in general by applying the Price Dispersion Model. Specific characters of pure-click retail business will be analysed to find their impaction on the model and consumers' utilities. Lastly, a conclusion will be given in the last section.

2. The Retailing Market

Retailing, defined as "the selling of merchandise and certain services to consumers", has always been one of the most common and significant economic activities. To be specific, the distribution process works as the retailer getting the goods (either from the manufacturer, wholesaler, or agents) and selling them to the customers for the actual use. Retailing possesses such a long history that it can be said to have begun the first time one item of value was bartered for another. In the more restricted sense of a specialized full-time commercial activity, retailing began several thousand years ago when peddlers first began hawking their wares and when the first marketplaces were formed. Nowadays in the modern city, the retailing market is considered to be an intensively competitive market with a large number of sellers as well as buyers. The market can be either offline, alternatively called "brick and mortar", or being online and also called "pure click" which is associated with the popular term "New Retailing". In this report, we aim to compare these two types of retailing, and intend to analyze how certain advantages occur in the latter and help to gain more popularity among both sides of the market.

3. Literature Review

The rapid growth of the internet as well as the e-commerce since the 2000s has attracted a number of researches aiming at the development of online markets. Jeffery R. Brown (2002)[2], for instance, did a research on the impact of the internet on the market of life insurance industry. His main findings include general lower quality-adjusted prices of users when more people start to use the internet to search for online insurance products, increased market power due to lower search costs on the internet, which appears to be related to a lower market price on the internet that results in large consumer gains. Another research relevant to this topic we found is from Erik Brynjolfsson • Michael D. Smith (2000)[3], about the comparison of internet and conventional retailers. The report discussed about the less friction existing in the electronically mediated markets of homogeneous products. This results in lower prices in the online market.

Despite being focusing on similar aspects—differences on posted price and price dispersion between online and offline markets in this report, our research angle differs from these previous ones. As the whole retailing market offers supplies of differentiated products which are not financial, the situation, despite having a similar result of research, can be quite different, due to the effects of consumer preferences towards certain goods. Therefore, this report refers to Perloff and Salop (1985) which targets to work out the equilibrium price of a market with differentiated goods[1]. It synthesized the Hotelling (1929) spatial competition model together with the representative consumer model from Chamberlin (1933) and focused on brand attributes. It differed from the former model as competition is not localized but is instead treated as a common phenomenon among all firms[4].

In addition, we studied a paper from Anastasiia Parakhonyak(2017)[5]. It discusses the influences of website search costs, and explains the role of showrooming to help companies to distinguish various kind of consumers. Particularly, its clear explanation about showrooming, such as providing examples and citing statements form other research papers, brings new

thoughts to our research topic.

4. Equilibrium Price and Network Effects

The model used for deriving the equilibrium price in the retail industry where there are differentiated brands in this report is from Perloff and Salop (1985)[1]. The components of this model include n identical producers with marginal cost c <1 respectively, a unit mass of consumers, match value vi for each consumer and pi as the price. The utility for a consumer is shown as v_i-p_i, for which all consumers aim to maximize during consumption. The result has already been worked out, with the equilibrium price equal to c+1/n. This showed that the more firms/ brands in the retail industry, the lower price they tend to set. As witnessed, general price level among online retail products appears to be lower than that of offline. The reason behind this can therefore be explained based on the model, as the n is always larger on the online market, due to the limited shelf space for brick-and-mortar stores. As a result, the lower prices in the online retail market benefit consumers with a higher utility from consumption. Moreover, as there is an increasing number of consumers or users of the online retail store/platform, more sellers are supposed to join the platform in order to benefit from the higher possibility of earning a profit. The two sides of the market boost each other and form a large market, thus create a network effect. This can be formally defined as follows: a product is said to exhibit network effects if each user's utility is increasing in the number of other users of that product or of products compatible with it. In the case of the above modeled online retail market, there exist inter-group network effects for both directions: more buyers benefit sellers with more revenues, meanwhile more sellers benefit buyers with lower prices, accompanied with better quality of products, more innovation and increasing choices as a consequence of the higher level of competition (resulted from more sellers). As two positive inter-group effects are present, an indirect intra-group effect occurs, as more users benefit other users. With buyers and sellers continue to benefit each other and attract a greater number of users of the platform, the online retailing market is fueled and stimulated to grow significantly.

5. Price Dispersion Model

In this section, we will apply the price dispersion model to compare consumers' potential behaviours when there are only offline stores, with there are both online and offline shops in the market. In order to figure out the impaction of online stores on consumers' benefits from a variety of perspectives, our baseline scenario is to remain the rest of the variables in the price dispersion model constant and change one variable once a time based on different characteristics of e-commerce. Given the uncertainty of utility for individuals from different regions with diverse cultural backgrounds, we shall consider the model with certain large groups of human beings in the world. Furthermore, we will plot these distributions based on models we will have built before. These graphs will enable us to obtain a clear understanding of how consumers would be benefited from the development of e-commerce.

The price dispersion model we adopt for the report is:

$$F(p) = 1 - \left(\frac{1-\lambda}{n\lambda}\frac{v-p}{p-c}\right)^{\frac{1}{n-1}}$$

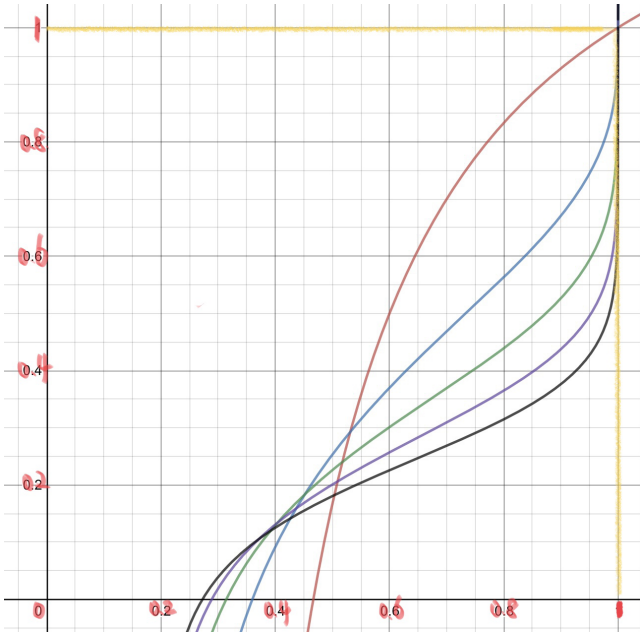


Figure 1. Price Dispersion Model

Firstly, we assume that there are only offline stores in the city. Among all the consumers, half of them did a lot of research and clearly know the product prices for the same good in different shops, while another half will just shop at the store which is located the closet to their house.

Thus, λ = (1-λ) = 50%. In addition, assume their valuation of the good i is 1 and the marginal production cost is 0.2. Hence, we could obtain a price dispersion model, which is

$$F(p) = 1 - \left(\frac{0.5}{0.5n}\frac{1-p}{p-0.2}\right)^{\frac{1}{n-1}}$$

According to this model, we could sketch equilibrium distribution functions when there are 2 shops, 4 shops, 6 shops, 8 shops and 10 shops in the city respectively. In other words, we are going to plug n=2, n=4, n=6, n=8, n=10 once a time into the model to see consumers' earning when there are different number of offline stores in the town.

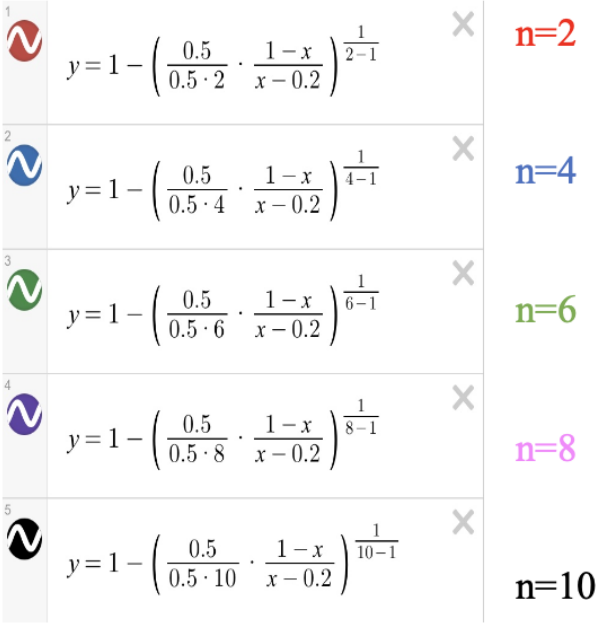


Figure 2. eLine graph of functions

By observing the above picture, we can notice two remarkable features. The first one is as the number of stores in the city increases, the minimum set price of the product decreases. An increased number of competitors might lead some stores to reduce their selling prices in order to be more competitive in the market. On the contrary, another thing to be noticed is when the quantity of offline shops goes up, more firms instead would set higher prices to deal with this situation. It demonstrates when there is an increased number of stores in the city, informed consumers would be better off, while uninformed consumers would be worse off.

5.1. An Increased Number of Informed Consumers (a change of λ)

E-commerce provides consumers an organized platform, where homogenous goods with varied prices from different firms are well listed. To compare the prices of one item given by 100 companies, consumers could easily search it on a random shopping platform and scroll down the searching page. Hence, the quantity of informed consumers, λ, would rise. On the other hand, the number of uninformed consumers, (1-λ), would fall at the same time.

Primarily, we assume λ goes up from 0.5 (when there are only offline shops in the market) to 0.8. Then (1-λ) goes down from 0.5 to (1-0.8 = 0.2). Given other variables in the price dispersion model remain the same, we obtain a distribution function, where:

$$F(p) = 1 - \left(\frac{0.2}{0.8n}\frac{1-p}{p-0.2}\right)^{\frac{1}{n-1}}$$

Similarly, we consider there are 2 shops, 4 shops, 6 shops, 8 shops and 10 shops (the sum of online and offline stores) in the market respectively. With a new λ value, we can get the below picture:

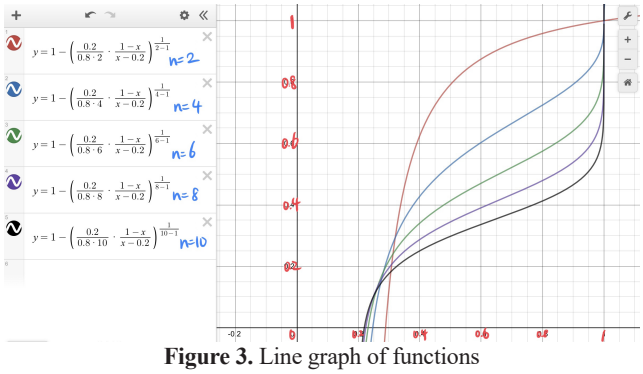


Figure 3. Line graph of functions

From the above plot, we could find that when the number of informed consumers increase by 30 percent, more firms in the market would choose to set a relatively low price. To be more clearly, here are the distribution function sketches when 2 shops in the market but with different λ value:

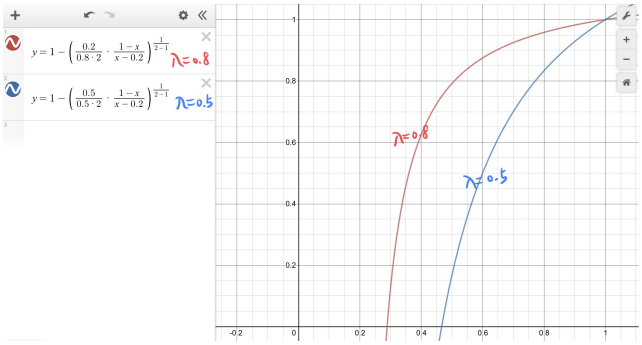
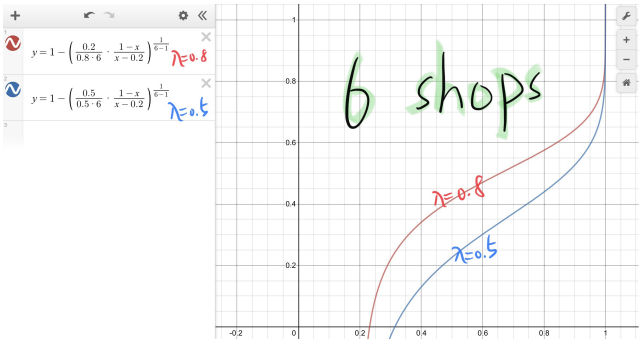
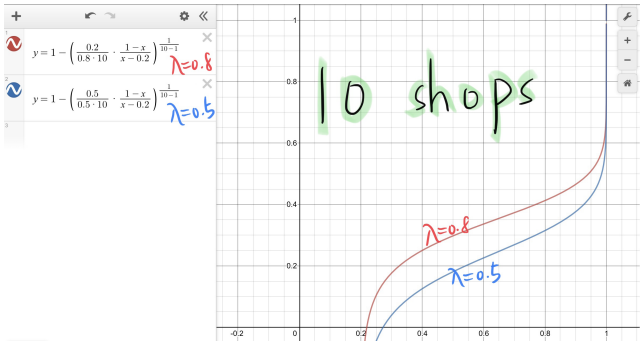


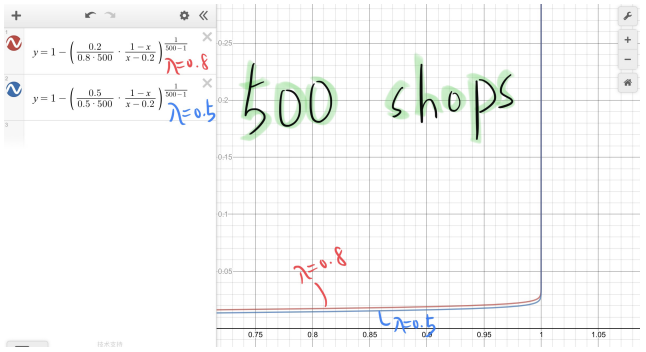
Figure 4. *Line graph of functions*

Based on Figure 5, we notice the red line is clearly on the left side of the blue line. It indicates that more firms now prefer to set relatively lower prices as the group of informed consumers become larger.

To prove this conclusion, there are more distribution function sketching examples. 6 shops, 10 shops, 100 shops and 500 shops are in the market with λ=0.8 and λ=0.5 respectively:







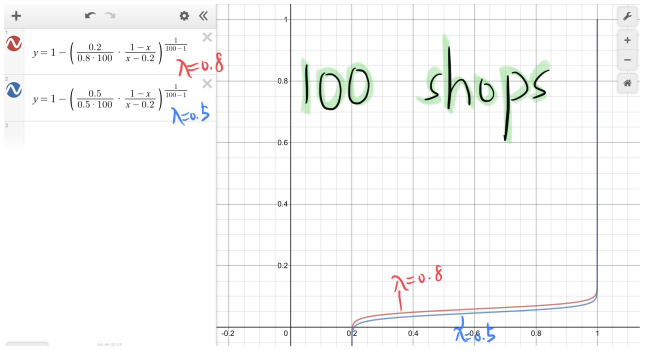


Figure 5. *Line graph of functions*

Thus, we find that no matter the number of firms in the market (from 2 shops to 500 shops), when the number of informed consumers increases by 30 proportion, the red line is always on the left side of the blue line. It means more shops would probably set a lower price for the same product when there are more informed consumers. In this case, consumers would be better off in general since the price goes down when there are shopping websites and online stores in the market.

5.2. A Decreased Valuation of the Good in Offline Stores (a change of v)

When consumers are getting used to access shopping platforms such as Amazon and eBay these days, a term called “showrooming” has been created. It refers to the practice of checking products in offline stores and then buying an identical one online for a cheaper price. Online stores generally do not need to take rent and utilities into consideration as costing, which enables them to provide a relatively low price for products. After checking the quality of products and realizing their high price compared with online stores, consumers would reduce their valuation of the products in offline stores. Hence, for a price dispersion model which predicts consumers’ benefits of purchasing offline when there are both online

and offline stores, the value of v would be smaller than the case where only offline stores exist in the market.

Firstly, we make an assumption where v decreases from 1 to 0.7. Thus, we obtain a price dispersion model:

$$F(p) = 1 - \left(\frac{1-\lambda}{n\lambda}\frac{0.7-p}{p-c}\right)^{\frac{1}{n-1}}$$

To remain other variables constant, we again assume λ=0.5, c=0.2, and plot their probability distribution functions when there are 2, 4, 6, 8, 10 shops in the market.

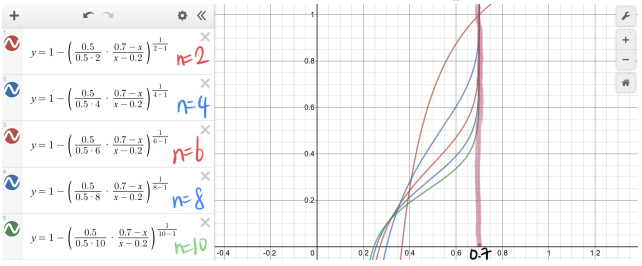


Figure 6. *Line graph of functions*

The picture above illustrates the highest price for shops to set drops from 1 to 0.7. We may also explain this situation by applying specific examples. If the set price of a good were higher than consumers' valuation of it, consumers definitely would not spend money on it. Companies, thus, cannot earn profit unless they choose to reduce its price. The new price need to be equal to or lower than v so that consumers would reconsider about purchasing the product.

Showrooming reduces the valuation of consumers on the offline store goods. Offline retail stores have to reduce their original set price. Therefore, consumers would be better off in general, since offline-store consumers now can spend less money on the same product and online-store consumers are not worse off.

Furthermore, the impacts of showrooming are different based on how network technology has been developed in different countries or regions. For instance, the internet penetration rate in China maintains a growth momentum in recent years. About 950 million citizens use internet to communicate or consume in China (data collected by June, 2020)[6]. Thus, the impact of showrooming would be huge here. We assume v for purchasing offline down to 0.5. We try to make a comparison between China and another country where showrooming has a small influence on the offline stores. By researching, we choose North Korea. The data illustrates there is no data exist in the country, so we simply consider v to be 0.99 for people in North Korea.

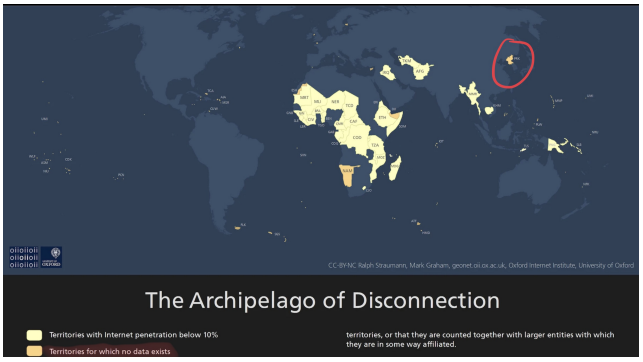


Figure 7. The Archipelago of Disconnection

Thus, we obtain two price dispersion model:

$$F(p) = 1 - \left(\frac{0.5}{0.5n}\frac{0.5-p}{p-0.2}\right)^{\frac{1}{n-1}}$$

$$F(p) = 1 - \left(\frac{0.5}{0.5n}\frac{0.99-p}{p-0.2}\right)^{\frac{1}{n-1}}$$

Applying the model for 2, 10 and 100 offline shops respectively when there are online shopping platforms provided, we could obtain the pictures:

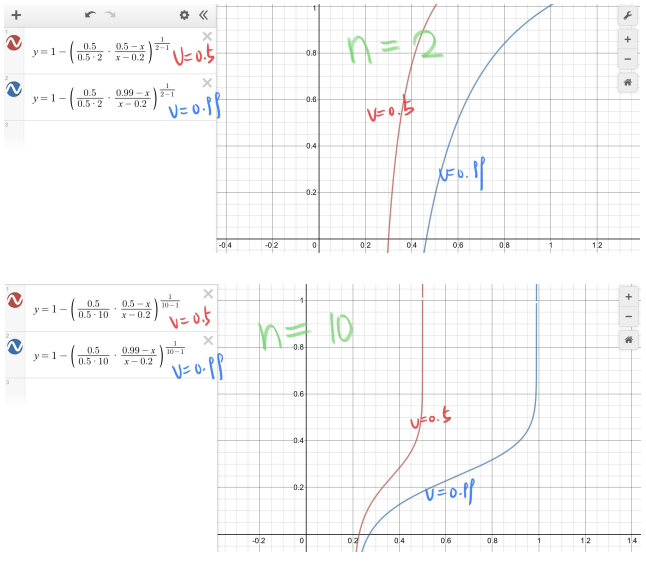


Figure 8. *Line graph of functions*

We could notice that the red line is always on the left side of the blue line. It indicates that larger the showrooming impacts on consumers' behaviors, larger benefit would be received by consumers. Due to the fact that countries with high internet penetration rate are generally influenced more by the showrooming effect, we can conclude that

consumers from regions with a widespread expansion of network benefit more from the rise of online stores.

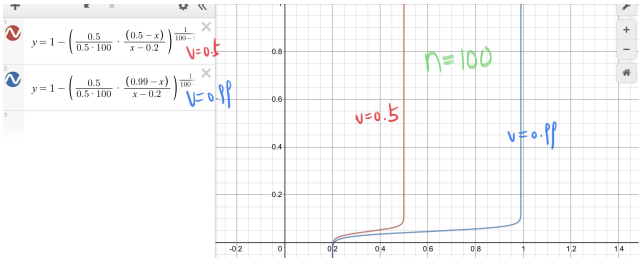


Figure 9. *Line graph of functions*

5.3. Discussion about the number of stores in the model (a change of n)

In the market where both online and offline stores exist, there might be 100 shops that sell homogenous products with different prices at the same time. However, consumers might at most compare prices in 3-5 shops when they try to purchase from offline stores. Thus, it is significant to know that we obtain the Price Dispersion Model from the total expected profit formulation:

$$pi(p) = \lambda [1 - F(p)]^{(n-1)} * (p-c) + [(1-\lambda)/n] *(p-c)$$

because the latter n in the formulation is still 100 in this case, while the former n would be the number of shops consumers indeed could compare when they are shopping offline. To be more specific, the quantity of uninformed consumers to shop at a random store A would be $(1-\lambda)/n$, where n is the total number of stores which provide that kind of good in the market. On the contrary, the number of informed consumers to shop at store A is $\lambda[1-F(p)]^{(n-1)}$, where n here is the number of stores that consumers have compared before they make the final purchasing decision.

Therefore, if there were only offline stores in the market, two n values in the Price dispersion model is quite similar. If there were both types of stores in the market, two n values might be quite different. In order to better observe the differences given two situations, remain the other variables constant, we assume both n equal to 5 for one model. In addition, we assume one n is 5 and another one n is 100 for one model. That is:

$$F(p) = 1 - \left(\frac{0.5}{0.5*5}\frac{1-p}{p-0.2}\right)^{\frac{1}{5-1}}$$

$$F(p) = 1 - \left(\frac{0.5}{0.5*100}\frac{1-p}{p-0.2}\right)^{\frac{1}{5-1}}$$

Sketching both distribution functions, we obtain:

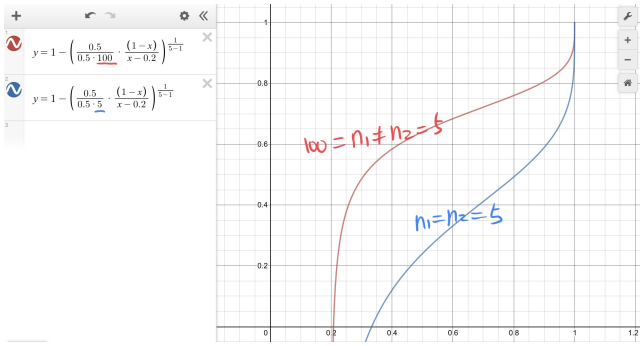


Figure 10. *Line graph of functions*

We can notice that more firms would set relatively low prices when there are both offline and online stores compared with only offline stores in the market, since the red line is on the left side of the blue line based on the above graph. Thus, we can conclude that consumers are better off when there is an increased number of online stores form a change of the variable "n" in the Price Dispersion Model.

6. Conclusion

This report compares the online and offline retailing market in terms of setting price and price dispersion. Using the Perloff & Salop (1985) model, we found that the lower setting price in the online retailing market benefits consumers with greater utility. Therefore, it could be said that more sellers attract more consumers as a direct inter-group network effect. Meanwhile, more consumers joining the market make more sellers willing to join, thus leads to another positive inter-group network effect. The existence of two inter-group network effects results in an indirect intra-group effects. Using the Price Dispersion Model, we found different variables in the model, which are influenced by online stores, lead to new price setting strategies of companies in the market. A rise of online store would increase the quantity of informed consumers, decrease the valuation of offline store goods, and differ the value of n in the model. All of these effects force companies in the market to lower their price respectively, so consumers are better off in general.

Disclosure statement

The author declares no conflict of interest.

References

[1] Perloff J M, Salop S, 1985, Equilibrium with product differentiation. Oxford University Press (OUP): Review of Economic Studies Jan: 3-8, 17-18.

[2] Effler P V, Bogard A K, Domen H Y, et al., 2002, Evaluation of eight rapid screening tests for acute leptospirosis in hawaii. #i{Journal of Clinical Microbiology, 40(4): 1464-1469.

[3] Goto K, Maki H, Kasai C, 2010, The Minimal English Test: a new method to measure English as a Second Language proficiency. Evaluation & Research in Education, 23(2): 91-104.

[4] Rothschild R, 1997, Product differentiation and cartel stability: Chamberlin versus Hotelling. Annals of Regional Science, 31(3): 259-271.

[5] Parakhonyak A, 2016, “Showrooming in a market of tangible goods with Heterogeneous agents”, visited on August, 20, 2025, https://www.tse-fr.eu/fr/seminars/2017-showrooming-market-tangible-goods-heterogeneous-agents.

[6] Straumann R, Graham, Mark. Geonet.oii.ox.ac.UK, Oxford Internet Institute, University of Oxford (CC-BY-NC), *vice.com*, visited on August, 20, 2025, https://www.vice.com/en/article/jp5zgx/this-map-shows-the-countries-with-the-lowest-internet-penetration.