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Strategic segmentation of markets due to cultural consumer behaviour & advertising

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ABSTRACT

The first appearance of an outlet store took place more than a century ago. This entrepreneurial activity evolved nowadays into a worldwide phenomenon. Some manufacturers even created specific product lines to sell at these stores for low prices. However, it is seen that some manufacturers have none outlets at all in some countries. The outlet phenomenon is not universal for all. This problem is more related to how consumers are different than how companies are different themselves.

Our paper takes a deep step on the discrimination due to consumer behaviour. It demonstrates that there are some other consumer characteristics that the manufacturer should take into account when considering the option of opening an outlet in a certain country. The model comprises two different scenarios. The first scenario examines the hypothesis in a developed country, while the second one examines the hypothesis in a developing country. The analysis of this model demonstrates that manufacturer's decision to open an outlet store is not linked to differences in consumer cultural background, however, there are differences when including advertising to the study. Advertising costs are higher in developing countries, because of the difficulty in reaching the right audience and the generally higher risk aversion of consumers towards switching stores. Therefore, it is demonstrated that the appearance of outlet stores in developing countries is not the most advantageous choice for the manufacturers.

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1. Introduction

The first appearance of an outlet store took place more than a century ago, when a shoe manufacturer in the United States started to offer an excess of some damaged or irregular products to employees at low prices. After that, he also started to sell to non-employees. These price-discount stores were mostly located on the grounds of the factory where the goods were indeed produced. The first outlet store outside the factory facility was opened by a men's clothing manufacturer at the end of the 1930s.

After some decades, the first big manufacturer-outlet mall opened in the 1980s, (Klaffke, 2003). It was distantly located in order to avoid direct competition with already recognized retail stores. During the 1980s and 1990s, these outlet malls, where the primary tenants were the manufacturers, had experienced a high increase in sales. Some of the reasons for this growth were the increase in awareness and desirability of designer labels and an increase of the product quality and value appreciation by customers, (Coughlan & Soberman, 2004). Besides, the recognition of outlet stores as a feasible alternative channel also drove the sales increase.

The original main role of these outlets was to liquidate the excess of stock of some production lines. However, manufacturers are currently selling more than this excess of defective production through this channel, some companies even create specific product lines to trade at these stores. Therefore, some of the main questions regarding the relative success of outlet stores is in which conditions it becomes more profitable, why some brands have many outlet stores and some have none? Why can some companies better forecast the upcoming demand? In which types of goods and countries are they dominant?

This acquaintance is more related to how consumers are different than how companies are different. This heterogeneity between the consumer behaviours generates a necessity to discriminate between the different types of consumer. In Iyer (1998) the discrimination between how consumers are different is related along two dimensions: price sensitivity and the perception of their cost of time. In addition, Ngwe (2014) separates consumers by a diversity of characteristics. He concludes that those who went to the primary or outlet market were demographically identical (income, zip codes, etc.). Nevertheless, they differ in two important variables, which are broadly the same as in previous studies: their willingness to travel and the degree in which they care about the quality and the price associated with this quality. Ngwe (2014) found a practically perfect inverse correlation between these two characteristics.

Hence, the more likely a consumer is to pay a higher price, the less likely is she willing to travel a long distance to an outlet mall. Or in other words, consumers that are price-sensitive go shopping to outlet stores and vice versa; consumers that are time-sensitive go shopping to the primary retailers, (Coughlan & Soberman, 1999). Notably, these price-sensitive consumers go to outlet stores not only to buy damaged products, but also for brand-new items created in less-fashionable design that manufacturers still produce only for their outlets. Even after they stopped producing them for the primary retail stores. Furthermore, by producing lower-quality designs for the outlet stores and selling them at cheaper prices, the manufacturers evade cannibalization of their latest more-fashionable designs at the retail stores. The distance between the two markets actuates as a buffer to separate the two different types of consumers and theoretically maximize the overall profit.

Nonetheless, it is seen that the outlet phenomenon is not universal; there are some categories where the manufacturers find it more profitable to distribute just through the primary market. Coughlan & Soberman (2005) found that when the range of service sensitivity across consumers is high relative to the range of price sensitivity, the manufacturers would prefer a single channel distribution. This service sensitivity is related to the two dimensions in which the manufacturer is competing, price and service. As in the primary markets the stores provide service to their consumers, the price charged by the manufacturers has a significant influence on these service levels. If there are outlet stores, there is an upward pressure on the prices and on the service levels of the primary retailers, as the clients that stay in the primary market are service sensitive. Therefore, it increases the level of service competition. Without the appearance of outlet stores, two downward pressure effects alter the price and service levels. Thus, when buyers with a high cost of time are also highly service-sensitive, manufacturers might find it more productive just to distribute via the primary market.

This paper takes a deep step on the discrimination due to consumer behaviour influenced by cultural background and demonstrates that there are other characteristics related to the consumer that the manufacturer should take into account in order to open an outlet in a certain country. E.g. a single channel would be more profitable than a dual channel, even if the range of price sensitivity across consumers is larger. This is because of the cultural and economic aspects of the consumer background, such as higher risk aversion in developing countries. This discrimination could be possible, for example, due to the progressive fragmentation of consumer audiences by the launching of more specialized advertising campaigns. Firms are now able to identify patterns of behaviour through large groups of customers and extract the characteristics of their target consumers for a specific product. However, the cost of reaching customers in mass is being increased due to that fact, (Solomon et al, 2012).

In brief, the principal research questions for this paper are: Why in some countries outlets are extremely popular, for endorsed industries, but not in others? Is manufacturers' choice of distribution influenced by cultural consumer behaviour? Could advertising influence the manufacturers' decision in this case? A theoretical model is created on the following pages in order to take a further look at the channel discrimination and assess those questions.

2. Literature Review

The literature related to this topic can be linked to the economic fields of industrial organization and marketing, as these fields examine the segmentation of the markets, price competition, and advertising.

From the perspective of the industrial organization, starting with the model of sales by Varian (1980), there has been developed an extensive and significant literature that deals with segmented market competition. Naransimhan (1988) studies the equilibrium pricing strategies of homogenous brands involved in a pricing game, where some consumers exhibit brand loyalty. Subsequent work has been done from the classic articles by Butters (1977) and Grossman and Shapiro (1984), where they add advertising to heterogeneous consumers who try to find the products that better fit their necessities. This allows, as well, to study the effects of a change in the targeted advertising technology on different consumer segments.

Initial considerations on advertising are offered by Marshal (1919). As he explains, advertising has a constructive role by transmitting information to consumers. Also, he highlights that some kinds of advertising can be socially inefficient. Chamberlin (1933) embraces the integration of advertising into an economic theory. Firms sell differentiated products within a particular industry. Each of the firms affront a downward-sloping demand curve and hence hold some monopoly power, while at the same time they can advertise and use other promotional activities differentiate their products from each other. Chamberlin debates that advertising affects demand, because it conveys information to consumers, with respect to the existence of the sellers and, the price and quality of its product. Besides, it affects consumers' tastes on products.

The formal foundation of the information view, used in this paper, is leaded by Ozga (1960) and Stigler (1961). They argue that advertising is an important source of information for buyers that leads to a decrease of price dispersion. However, as more potential consumers become informed, more advertising effort is being misused, because a greater percentage of the population is already familiar with the product advertised. Conversely, Nelson (1974) maintains that if customers are receptive to advertising, whether deliberately or not, then this leads to a positive association between advertising and consumer utility, since the most proficient firms achieve the most from advertising.

There are some papers that analyze strategic informative advertising in models where consumers buy new products in a spatial market. Creating the model when the consumer will only buy the product when they watch the informative advertisement and establishing the condition that the buyers need to receive at least one ad to be aware that this product exists. This has been studied in the models of Fudenberg and Tirole (1984), Ireland (1993) and Bester and Petrakis (1995).

Those studies differ from the literature on persuasive advertising of Dixit and Norman (1978), where demands rise by shifting buyer preferences via advertising. However, Roy and Scheurs (1998) endows firms with the ability to target information to explicit consumers by direct marketing strategies, still, only pure local monopoly emerges in the equilibrium as firms target to mutually exclusive customer segments. Galeotti and Moraga-Gonzalez (2007) show that when the consumer cost greatly fluctuates, firms can obtain positive profits in a symmetric pure equilibrium. Therefore, a joined strategy of marginal market segmentation and targeted advertising can lead firms to generate positive rents.

From the marketing perspective, early empirical literature takes into account the heterogeneity of consumers in terms of the retail service's valuation, leading to multiple channel distribution in Bucklin (1966). While, the model of this research is almost entirely focused on homogenous/symmetric distribution channels for simplification. Distinctly, Iyer (1998) analyzes how manufacturers coordinate the distribution channels when retailers compete with price and non-price factors. Looking into when it is optimal to induce retail differentiation, this paper identifies the type of channel menu-based contracts that encourage symmetry or differentiation among retailers. This paper demonstrates when it is more likely that a manufacturer stimulates greater price or greater service competition between retailers, taking into account the heterogeneity between the consumers in their locations and their willingness to pay for retail services. The paper also illustrates that depending on this correlation, the competing retailers will concentrate on the more service-sensitive customers at the expense of ignoring the price-sensitive consumers in the market or vice versa.

The main paper as a reference for this study is Coughlan and Soberman (2005). The authors investigate the attractiveness of some types of outlet stores, and the absence of others. Their model uses segmented distribution with manufacturers and retailers. This segmentation is related to the degree of consumer's heterogeneity along two dimensions: price and service sensitivity. It is the balance between price and service competition that determines when single or dual distribution by outlets is more profitable. They conclude that when consumer's price sensitivity is the main source of heterogeneity in the market, dual distribution with outlet stores increases the profits of manufacturers and retailers. However, when service sensitivity is the principal cause of heterogeneity, dual distribution with outlets leads to lower profits for both, manufacturers and retailers. Therefore, single distribution is the optimal strategy for both in this case. Even though common perception suggests that outlet stores can be harmful to retailers, they show that retailers can have more profits in the optimal circumstances when manufacturers run outlet stores.

3. The Model

The model takes as reference Coughland and Soberman (2005)'s example. Nevertheless, it includes advertising and differences in risk aversion in order to show some specific consumer behaviour that can be linked to culture from developing or developed countries. Further, focusing on the consumer behaviour, in their paper they differentiate the consumer into price or service takers for the markets' segmentation. However, culture for developed and developing countries may be interesting for firms to measure and analyze, in order to identify the criteria which influence the shopping behaviour of their customers. Thus, for the manufacturer, it is important to take into account the cultural factors inherent to each market, with the intention to adapt its product to those characteristics and market conditions.

The subcultures of the buyers (social classes, etc.) are often considered by the brands for the segmentation of a market so as to adapt a product to the values or the specific needs of this segment. De Mooij (2003, 2011) evidences that consumers in developing countries discount the impact of the price-quality relationship, since they tend to exhibit higher levels of brand loyalty than consumers in developed countries. This is because of higher levels of consumer risk-aversion arising from the spotty quality of products and deficiency of necessary information about existing substitutes in the developing world. Consequently, we could assume, the manufacturers should advertise their products in order to be revealed in the market for the price sensitive consumers. Nevertheless, the effectiveness would depend on the intrinsic characteristics of the consumers. Since there are differences regarding their culture and country of origin, it is acknowledged there are also differences in the advertising costs associated to this. We presume it will not be always profitable for the manufacturer to open in parallel an outlet store.

This model comprises two different scenarios, the first one is in a developed country and the second in a developing country. Inside each of the scenarios, two manufacturers compete in a spatial market where the consumers are differentiated by their manufacturer preference and their sensitivity to advertising, price and service. This sensitivity to the different variables of interest will vary between consumers in developed or developing countries. Two main market structures can be possible: both manufacturers distributing only via primary markets by retailers shops, and both manufacturers distribute via outlet stores whereas they also allocate via primary market by retailers. In the previous paper, the authors focus the analysis in symmetric structures, as they want to recognize the relative effectiveness of division of markets via distribution strategies, when cross-segment heterogeneity in service sensitivity is significantly different from heterogeneity in price sensitivity. Alternatively, this paper, still taking a look at the structures, includes advertising and cultural differences of the consumer regarding the country where they live.

3.1. Market

As explained before, we will have two different scenarios. In each of them, there will be two different markets, with and without outlets. Therefore, there will be four different situations to look at, in order to evaluate the results.

The market consists of consumers who are uniformly distributed by their inclination for the manufacturer's goods. Manufacturers supply products to each of the markets through selected retailers or through outlets that are located at a substantial distance from the primary market. From the consumers' point of view, the distance to the outlet mall is significantly larger than the distance between primary retailers or the distance between outlets, as they are in the same big shopping mall. Making the assumption that the outlet mall is equidistant from all consumers, it is designated that the shop that is at the left-end of the market belongs to manufacturer 1 and the one located at the right-end belongs to manufacturer 2. The products offered by the two manufacturers may be physically comparable but, it is presumed, that branded advertising creates the perceptions the brands and the products are psychologically different for the buyer.

It is assumed that there are two types of consumers in each of the two scenarios (i=a, b) in this market and both are uniformly spread along the linear market. The two sectors are different in the way that they have different values for their cost of time. The Altos buyers have a high cost of time when they travel, their time is more valuable than the product prices, whereas the Bajos have a lower cost of time and prices for them are more crucial than time. The number of total consumers is divided on the market with one segment γ of Altos consumers and a segment of $1-\gamma$ of Bajos consumers. Altos are less price sensitive and also value more the service given by the store staff than Bajos, therefore they can pay more for the brand that best match their needs. Nevertheless, there will be differences as well regarding the Bajos consumer demand in each of the two scenarios, due to the higher risk aversion of the consumers in developing countries. Therefore, this can be showed by the higher service preference of the Bajos consumers in developing countries ($\theta_{bajos,developing}$).

The manufacturer fabricates a single product at a constant marginal cost of c. Each consumer buys no more than one unit of product and places a value Vi on the product. This ideal point is identified by the value for its preferred brand. A consumer who is located at a distance x from Manufacturer i or Retailer i, obtains a surplus from buying the preferred product associated with her location and the pricing and service provided to them:

$$CS_{i,1} = Vi + \theta_i s_1 - xt_i - p_1^{h;l(outlet)} - TC_{j,outlet}$$

$$CS_{i,2} = Vi + \theta_i s_2 - xt_i - p_2^{h;l(outlet)} - TC_{j,outlet}$$

Consumer surplus (CS_i) is shaped by the above equations, where V_i is the willingness to pay for i's product, s_j is the level of service provided at the selected retailer of manufacturer i's products, θ_i is the marginal valuation of service by type i consumers ($\theta_a > \theta_{b,developing} >$

$\theta_{b,developed}$), t_i is the travel cost incurred by a type i consumer (ta>tb) as they do not consume a product that completely matches their taste, $p_j^{h;l(outlet)}$ is the price of the product, higher at the primary market and lower at the outlet stores and, finally, TCi is the valuation of the cost of time incurred, by a type i consumer, when deciding whether to take a long drive to the outlet store.

To simplify, $\theta_{b,developed} = 0$ and $\theta_a > \theta_{b,developing} > 0$ is normalized, henceforth we assume $\theta_a = \theta$ in the developed country scenario and $\theta_a > \theta_b > 0$ in the developing country scenario for the rest of discussion. This normalization reflects the grade of service heterogeneity in the markets. In addition, we further clarify the main difference between t_i & TCi. It is acknowledged that travel cost t_i is used to show the lower price sensitivity of Altos (ta>tb), whereas the assumption of TCa>TCb identifies the dislike of Altos for the long drive to the outlet malls and allows manufacturers to efficiently divide the market between the consumers.

Lastly, it is assumed that in the retailers primary market there is greater brand recognition and the stores can be geographically separated from each other. However, in the secondary market (outlets) there is more competition between manufacturers as the stores are close to each other in the outlet mall. There is also less brand recognition and more homogeneity in terms of quality. It is seen that all outlets are the same, besides, the quality is "lower" than in the primary market, (Porter, 1997). The consumers are more price sensitive at the outlet stores. Therefore, the manufacturers have to show, somehow, their products to the consumers as well as compete in prices. Thus, adding advertising for the manufacturers indicates that if they open an outlet, they should advertise their products in order to be disclosed. Consequently, the manufacturers should advertise in order to get the consumers to purchase their products, but depending on the characteristics of the consumers this will not be always profitable.

3.2. Consumers

Consumers will choose the manufacturer and purchase at a location that offers the highest surplus to them. It is assumed that the surplus offered by the product is sufficient for all consumers to buy. When the manufacturers have not opened outlet stores, the clients will buy comparing the surplus offered from any of the two manufacturers' goods in the primary market. In the configuration where the outlets are open, consumers will choose between the four options comparing the surplus of each one.

When consumers buy in the primary market, the demand for each manufacturer is derived by identifying the indifferent consumer in each sector. Given prices and service levels set by the retailer for each manufacturer, all customers on the left part will buy at Retailer 1, whereas the customers on the right part will go to the Retailer 2. The range of distribution of consumers on the market is [0, 1], the indifferent consumer is located at the market's point x* where the surplus obtained by purchasing from any of the products is equal to:

$$x^*{}_i = \frac{t_i + \theta_i(s_1 - s_2) - p_1 + p_2}{2t_i}$$

In absence of outlet malls, demand from the low segment (Bajos) is $(1-\gamma)x_b^*$ and$(1-\gamma)(1-x_b^*)$, while demand for the high segment (Altos) is γx_a^* and $\gamma(1-x_a^*)$; for retailer 1 and 2 respectively.

When the outlet stores are open, the manufacturers have to advertise their products. Depending on the scenario, the advertising cost can differ between developed vs developing countries. Reaching a given Bajos' consumer in a developing country is more expensive, as they are more risk averse to the change of store, (De Mooij, 2003, 2011). They know their trusted but more expensive retailer brand, however, they don't know they still have their trusted brand but in a cheaper price at the outlet store if they don't receive the advertising. However, it is assumed that the advertising is sufficiently costly such as not all consumers are informed. The advertising costs are $C(\lambda_i) = z\frac{\lambda_j^2}{2}$ with $z_{developing} > z_{developed} > \frac{t_i}{2}$. Manufacturer i has $\lambda_i\lambda_j$ of fully informed consumers, $\lambda_i(1-\lambda_j)$ of partially informed consumers and $(1-\lambda_i)(1-\lambda_j)$ of uninformed consumers who do not purchase any product as they do not receive any ad. The probability of being informed or not is independent of the location of the buyer. This fractioning takes place inside the Bajos segment, as they are the ones who receive the ad and are willing to travel to the outlet mall to purchase, leaving the Altos in the primary market. Therefore:

In scenario 1 with developed countries, the indifferent consumer is as follows:

$$x^*{}_a = \frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}$$

$$x^*{}_{b,uninformed} = \frac{t_b - p_1 + p_2}{2t_b}$$

$$x^*{}_{b,informed} = \frac{t_b - p_{1,outlet} + p_{2,outlet}}{2t_b}$$

In scenario 2 with developing countries, the indifferent consumer is as follows:

$$x^*{}_a = \frac{t_a + \theta_a(s_1 - s_2) - p_1 + p_2}{2t_a}$$

$$x^*{}_{b,uninformed} = \frac{t_b - p_1 + p_2 + \theta_b(s_1 - s_2)}{2t_b}$$

$$x^*{}_{b,informed} = \frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}$$

Once the more price sensitive consumer goes to the outlet mall, she makes a choice between the manufacturers taking into consideration if she received the advertising ad from one of the manufacturers or from both. Obviously, the consumer makes the decision when she recognizes that the surplus is higher than the one that she would get going to the primary market. The total demands for the manufacturers, in this case, take the following structure:

$$Q_{m1,outlet} = (1-\gamma)[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 x_b^*]$$

$$Q_{m2,outlet} = (1-\gamma)[\lambda_2(1-\lambda_1) + \lambda_2\lambda_1(1-x_b^*)]$$

3.3. Retailers

The primary retailers are individually owned; they establish service levels and then retail prices in order to maximize their profits. Retailer j has to pay a wholesale price of wj per unit for the manufacturer's products, after that he sells the goods to the consumers at price pj. The cost of retail service is assumed to be quadratic.

When there are not outlet malls, retailers attract all consumers. Therefore, the profits in this situation are:

$$\pi_{r1} = (p_1 - w_1)[\gamma x_a + (1-\gamma)x_b] - s_1^2$$

$$\pi_{r2} = (p_2 - w_2)[\gamma(1 - x_a) + (1-\gamma)(1 - x_b)] - s_2^2$$

Where x_a and x_b are defined as $x^*{}_i$ without outlet stores. When both manufacturers open outlet stores, the primary retailers just get the Altos demand of customers and the totally uninformed demand of Bajos (they don't receive any ad from the manufacturers). This is given by:

$$\pi'_{r1} = (p_1 - w_1)\left[(\gamma x_a^*) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\, x^*{}_b\right)\right] - s_1^2 \quad \text{and}$$

$$\pi'_{r2} = (p_2 - w_2)\left[\gamma(1 - x_a^*) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)(1 - x^*{}_b)\right)\right] - s_2^2$$

3.4. Manufacturers

It is assumed that manufacturers are symmetric; they produce a product at a unitary marginal cost of c and sell it to the retailer at the wholesale price. Manufacturers are Stackelberg[1] leaders and retailers are followers. When manufacturers open outlet stores, their cost of supplying is just the marginal cost. However, when manufacturers do not have outlet stores, the profit of each manufacturer depends on the fraction of consumers that the retailer obtains in the following way:

$$\pi_{m1} = (w_1 - c)[\gamma x_a + (1-\gamma)x_b] \quad \text{and} \quad \pi_{m2} = (w_2 - c)[\gamma(1 - x_a) + (1-\gamma)(1 - x_b)]$$

On the other hand, when manufacturers open outlet stores, they receive benefit from both markets, primary and secondary. The profit from the retailers is increased in this situation, as the price competition decreases due to the fact that only the Altos segment and a small Bajos segment of consumers stays in the primary market, and they are more service sensitive than price sensitive. The profits of the manufacturers take the following configuration:

$$\pi_{m1}' = (w_1 - c)\left[(\gamma x_a^*) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\, x^*{}_b\right)\right] + \pi'_{1,outlet} \quad \text{and}$$

$$\pi_{m2}' = (w_2 - c)\left[\gamma(1 - x_a^*) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)(1 - x^*{}_b)\right)\right] + \pi'_{2,outlet}$$

with:

$$\pi'_{1,outlet} = \left(p_{1,outlet} - c\right)(1-\gamma)[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 x_b^*] - z\frac{\lambda_1^2}{2}$$

$$\pi'_{2,outlet} = \left(p_{2,outlet} - c\right)(1-\gamma)[\lambda_2(1-\lambda_1) + \lambda_2\lambda_1(1 - x_b^*)] - z\frac{\lambda_2^2}{2}$$

Where it is assumed that manufacturers procure stock at marginal cost and sell it at a price that is lower than the price in the primary market. When they open an outlet store, they have to advertise their products, but not all the consumers are informed. Besides, they have to pay for the advertising.

The analysis is focused on identifying the manufacturers' different profits under the two market structures, and their decision based on the crucial variables of advertising, price and service. Besides, the main contribution of this paper is the study of the two different scenarios of

[1] Stackelberg Model, Market structure and equilibrium (1934).

developed and developing countries, with the second market structure adding advertising in order to take into account the elasticities at the equilibrium that influence the decision of the players.

The game is solved under the concept of subgame perfect Nash equilibrium[2] and it has four or five stages depending on which of the markets is being studied.

- 1st The manufacturers set also outlet store's prices simultaneously with advertising intensity (Informative Advertising).
- 2nd Manufacturers set wholesale prices (Stackelberg leader).
- 3rd Primary retailers set service levels given the wholesale prices in the prior stage.
- 4th Primary retailers set retail prices given the service level, the wholesale prices and the advertising in the previous stages.
- 5th Consumers make choice of what buy and where to go (Linear Hotelling Model with Informative Advertising).

4. Analysis & Discussion

In this section the equilibrium prices, service levels, advertising levels and equilibrium profits are derived. It is taken into consideration the two established scenarios, on the developed and developing countries, and within the two options with or without outlet stores. It also considers the question of in which situation the manufacturers are better or worse off, as they will be the ones making the final decision to open or not an outlet store in those countries. Table 1 presents a brief description of the main variables used in the analysis for perusal.

Table 1: Brief description of the variables

Variables	Symbol	Description
Segment of Altos consumers	γ	Percentage of the population that are less price sensitive and also value more the service given at primary retailers.
Marginal valuation of service	θ	Valuation of the consumers on service in the retailers' store. It can be also explained by risk aversion of consumers for low-quality products.
Service levels	s	The quantity of service given at the primary retailers' store.
Retailers price	p	The price of products sold at the primary retailers' store.
Wholesale price	w	The price manufacturers establish for selling their products to the retailers.
Outlet price	p_o	The price of products sold at the outlet malls by the manufacturers.
Profits	π	The amount of revenue gained by manufacturers or retailers after all the costs.

[2] First used by Cournot on Recherches sur les Principes Mathematiques de la Theorie des Richesses (1938).

Level of advertising	λ	The quantity of advertising ads in the market.
Advertising cost	z	The cost of the ads for the manufacturer.
Transport costs	t	The travel cost incurred by a consumer.

4.1. Equilibrium outcomes

Retail prices, wholesale prices, service level, advertising level, outlet prices and profits of both manufacturers and retailers, are fully derived on the Appendix A & B for both scenarios. As the final equations are relatively long, to simplify the presentation, we have normalized them following the model's conditions stated in the previous section: regarding $t_a = 2 > t_b = 1$ & $z_{developing} = 4 > z_{developed} = 3 > \frac{t_i}{2}$ .Those equilibrium equations are reported in Table 2.

In order to compare both scenarios, Table 2 contains the equilibrium results when $\theta_a > \theta_{b,developing} > \theta_{b,developed} \neq 0$. In this way, we can approach the comparison by looking at the fluctuation on the valuation of service or buyers' risk aversion as mentioned earlier. However, as the outcomes are still highly complex, in order to differentiate what is driving the results, we have derived an extra outcome for developing countries. In this extra outcome, the advertising costs are the same with the developed ones ($z_{developing} = z_{developed} = 3$). This is done with the purpose to isolate the advertising influence on the different variables and better see what drives the difference in the results. Besides, the parameter of the fraction γ of Altos consumers in each of the markets is also taken into account. In the following paragraphs, each of the markets is examined in an individual approach in order to extract different results and appropriate deductions.

Firstly, we delved into the Single Channel situation. In this scenario manufacturers just distribute via primary retailers. Outlets are not open, therefore there is no advertising either. The equations are the same for both developing and developed countries, just the valuation of service and the fraction of Altos differing. With the intention to explain better the results, we focused the analysis on the valuation of service.

Starting with the prices, retail prices and service levels are both higher in the developing countries. This is because the average risk aversion of consumers is higher, as $\theta_a > \theta_{b,developing} > \theta_{b,developed}$, therefore higher levels of service in the retailers' store lead to higher prices in developing countries. However, wholesale prices stay the same in both situations, as they are not influenced by consumer's risk aversion. An intuition behind this prices differentiation can be found in Sobel (1984) and Pesendorfer (2002), who studied the pricing behaviour of the retailers' product, where the reason retailers change retail prices is independent of differences in wholesale prices. The insight behind this model is that consumers differ in their disposition to wait for price promotions. Low-value buyers are more willing to wait for those promotions, however, high-value buyers do not wait as their cost of time is higher. The result of this model predicts that prices will generally be at a high level with sporadic promotions. We can implement this result as an intuition behind our model, where retailers' prices change for developing countries, but wholesale prices do not. This is because, in developing countries, retailers do not have to offer as many promotion prices as in the developed ones, as a result of the higher valuation of the service by the Bajos consumers.

Table 2[3]: Equilibrium outcomes of the different scenarios and market structures with $t_a = 2 > t_b = 1$ & $z_{developing} = 4 > z_{developed} = 3 > \frac{t_i}{2}$ and with $z_{developing} = z_{developed} = 3 > \frac{t_i}{2}$

	All Countries	Developed Countries	Developing Countries	
	Single Channel	**Dual Channel**	**Dual Channel** *(z=3)*	**Dual Channel** *(z=4)*
Retail Prices	$\frac{180-(4\gamma^2-8\gamma+4)\theta_b^2-((4\gamma-4\gamma^2)\theta_a-6\gamma^3+18\gamma^2-12\gamma)\theta_b-\gamma^2\theta_a^2-(3\gamma^3-6\gamma^2)\theta_a-90\gamma}{9\gamma^2-36\gamma+36}$	$\frac{-4\gamma^3+\sqrt{22\gamma}(56\gamma^2+280\gamma-336)-2064\gamma}{\sqrt{22\gamma}(4\gamma^2+20\gamma-24)-2\gamma^3}$	$\frac{-4\gamma^3+\sqrt{22\gamma}(56\gamma^2+280\gamma-336)-2064\gamma}{\sqrt{22\gamma}(4\gamma^2+20\gamma-24)-2\gamma^3}$	$\frac{-4\gamma^3+\sqrt{30\gamma}(56\gamma^2+392\gamma-448)-2736\gamma}{\sqrt{30\gamma}(4\gamma^2+28\gamma-32)-2\gamma^3}$
Wholesale Prices	$\frac{6}{2-\gamma}$	$\frac{\sqrt{22\gamma}(12\gamma^2+60\gamma-72)-516\gamma}{\sqrt{22\gamma}(4\gamma^2+20\gamma-24)-2\gamma^3}$	$\frac{\sqrt{22\gamma}(12\gamma^2+60\gamma-72)-516\gamma}{\sqrt{22\gamma}(4\gamma^2+20\gamma-24)-2\gamma^3}$	$\frac{\sqrt{30\gamma}(12\gamma^2+84\gamma-96)-684\gamma}{\sqrt{30\gamma}(4\gamma^2+28\gamma-32)-2\gamma^3}$
Service Levels	$\frac{36-(4\gamma^2-8\gamma+4)\theta_b^2-(4\gamma-4\gamma^2)\theta_a\theta_b-\gamma^2\theta_a^2-18\gamma}{(-6\gamma^2+18\gamma-12)\theta_b+(3\gamma^2-6\gamma)\theta_a}$	$\frac{\sqrt{22\gamma}\left((30\gamma^4+36\gamma^3-294\gamma^2+348\gamma-120)\theta_b+(44\gamma^2-16\gamma)\theta_a\right)}{\sqrt{22\gamma}(12\gamma^3+12\gamma^2-312\gamma+288)-6\gamma^4}$	$\frac{\sqrt{22\gamma}\left((30\gamma^4+36\gamma^3-294\gamma^2+348\gamma-120)\theta_b+(44\gamma^2-16\gamma)\theta_a\right)}{\sqrt{22\gamma}(12\gamma^3+12\gamma^2-312\gamma+288)-6\gamma^4}$	$\frac{\sqrt{30\gamma}\left((30\gamma^4+76\gamma^3-418\gamma^2+472\gamma-160)\theta_b+(54\gamma^2-20\gamma)\theta_a\right)}{\sqrt{30\gamma}(12\gamma^3+24\gamma^2-516\gamma+480)-6\gamma^4}$
Advertising		$\frac{3\gamma+\sqrt{22\gamma}-2}{8-2\gamma}$	$\frac{3\gamma+\sqrt{22\gamma}-2}{8-2\gamma}$	$\frac{3\gamma+\sqrt{30\gamma}-2}{10-2\gamma}$
Outlets Price		$\frac{\gamma\sqrt{24-26\gamma}}{2-2\gamma}$	$\frac{\gamma\sqrt{24-26\gamma}}{2-2\gamma}$	$\frac{\gamma\sqrt{32-34\gamma}}{2-2\gamma}$
Manufacturer Profit	$\frac{6}{4-2\gamma}$	$\frac{-2\sqrt{22}\gamma^{3/2}(\sqrt{22\gamma}(12\gamma^2+60\gamma-72)-516\gamma)}{(4\gamma-16)(-2\gamma^3+\sqrt{22\gamma}(4\gamma^2+20\gamma-24)+1)}$	$\frac{-2\sqrt{22}\gamma^{3/2}(\sqrt{22\gamma}(12\gamma^2+60\gamma-72)-516\gamma)}{(4\gamma-16)(-2\gamma^3+\sqrt{22\gamma}(4\gamma^2+20\gamma-24)+1)}$	$\frac{-2\sqrt{30}\gamma^{3/2}(\sqrt{30\gamma}(12\gamma^2+84\gamma-96)-684\gamma)}{(4\gamma-20)(-2\gamma^3+\sqrt{30\gamma}(4\gamma^2+28\gamma-32)+1)}$
Retailer Profit	$\frac{(12\gamma^4-24\gamma^3+12\gamma^2)\theta_a^2+(6\gamma^4-24\gamma^3+30\gamma^2-12\gamma)\theta_a-(8\gamma^4-32\gamma^3+48\gamma^2-32\gamma+8)\theta_b^4+((-16\gamma^4+48\gamma^3-48\gamma^2+16\gamma)\theta_a-4\gamma^4+20\gamma^3-36\gamma^2+28\gamma-8)\theta_b^3}{(12\gamma^4-72\gamma^3+156\gamma^2-144\gamma+48)\theta_b^2+(3\gamma^4-12\gamma^3+12\gamma^2)\theta_a^2}$	$\frac{(348\gamma-120)\theta_b+(44\gamma^2-16\gamma)\theta_a+(1-\gamma)(\sqrt{22\gamma}(56\gamma^2+280\gamma-336)-4\gamma^3-2064\gamma)}{\sqrt{22\gamma}(12\gamma^3+12\gamma^2)-6\gamma^4}$	$\frac{(348\gamma-120)\theta_b+(44\gamma^2-16\gamma)\theta_a+(1-\gamma)(\sqrt{22\gamma}(56\gamma^2+280\gamma-336)-4\gamma^3-2064\gamma)}{\sqrt{22\gamma}(12\gamma^3+12\gamma^2)-6\gamma^4}$	$\frac{(472\gamma-160)\theta_b+(54\gamma^2-20\gamma)\theta_a+(1-\gamma)(\sqrt{30\gamma}(56\gamma^2+392\gamma-448)-4\gamma^3-2736\gamma)}{\sqrt{30\gamma}(12\gamma^3+24\gamma^2)-6\gamma^4}$

[3] $\boldsymbol{\theta_b}$ Represented in this tables is subject to the conditions $\theta_a > \theta_{b,developing} > \theta_{b,developed} \neq 0$ depending if it is in the Developed Country column ($\theta_{b,developed} = \theta_b$) or developing country column ($\theta_{b,developing} = \theta_b$).

Nevertheless, this does not influence wholesale prices for the manufacturers, as they do not need to promote their prices to the retailers. On the retailers' perspective, consumers in developing countries have a higher valuation of their time and therefore the have a higher "average" retail price.

Service in the retailers' stores is higher as the average level of risk aversion on bad quality products increases. This is due to the fact that the risk aversion is higher in developing countries, entailing the situation where the valuation of service is also higher for those countries. Regarding profits, manufacturer's profit is not affected. As manufacturers don't have to deal with consumers firsthand, their prices do not differ. Retailer's profit is also higher in developing countries as prices increased due to higher service levels.

In conclusion, in Single Channel distribution, retailers have higher profits in developing countries, as retail prices and service level increase. However, profits stay the same for manufacturers, since wholesale prices are not affected.

Secondly, regarding the dual channel distribution, we have two different situations to explore, taking into account when the advertising costs are the same in the two countries ($z_{developing} = z_{developed}$), and when they are different. We can already see some alterations at first sight. Without the advertising influence on the variables, we can see that both equilibriums are exactly the same for developed and developing countries. The different prices, advertising levels and manufacturer profits stay the same as they are not influenced by risk aversion, but they are by advertising costs.

We can use the same intuition as in Single Channel distribution, following the example of Sobel (1984) and Pesendorfer (2002). In this case, retailers' prices stay the same in both scenarios, they don't differ, and there is no promotions. The reason behind this is that a big part of the Bajos demand goes to the outlet stores. Consequently, the retailers would take more into consideration the Alto's price valuation, as the big bulk of consumers that they receive are Altos. They know they will not lose the small part of Bajos demand because of the prices, as they are uninformed about the alternatives. Altos have the same valuation of time - risk aversion- in the two scenarios of this model, thus retail prices are equal in both countries. Moreover, we can assume that Retailers' do not need to give as much promotions, as their main consumers are the Altos and, hence, they stick to a higher price, just encouraging consumers with better service.

Nevertheless, the service levels and the retailer's profits differ due to the different valuation of service. Both are higher in developing countries, as service in the retailers' store is greater, which also increases indirectly their profits. This is because retailers are not significantly affected in this case by the big amount of Bajos risk aversion. Outlet stores are open and most of the demand of the Bajos consumers is directed to this market. Besides, even though the uninformed part of the demand of Bajos is still buying in the retailers market, in the developing markets the valuation of service from the Bajos perspective is higher. This has as a result that both service levels and retailer profits in developing countries are bigger because, they do not need to do any promotions to Altos consumers. Both parts of the demand (Altos and uninformed Bajos), with the higher risk aversion in a developing country, create an upward pressure on service levels for retailers in the dual channel situation.

In conclusion, in Dual Channel distribution with an equal cost of advertising, retailers have higher profits in developing countries, as the service levels also increase, they do not need to promote sporadic discounts of their products and they can stick to a higher price. However, in this case, the retailers' price is stable as there are no promotions. Profits for manufacturers stay the same, as wholesale prices and outlet prices are stable.

Thirdly, taking into account that previous results were with the withdrawal of advertising, now advertising cost for developing countries is included. Comparing the market situation when $z_{developing} = 4 > z_{developed} = 3$, gives us the effect of advertising level and its costs. First of all, it is seen that the increase in advertising cost increases the quantity of all the variables. Nonetheless, it is still difficult to compare until we normalize the fraction of Altos, i.e. $\gamma = {}^{1}/_{2}$. Once done that, we found a mixed situation. Looking at the prices, all prices are higher for the developing market. It is seen that higher advertising costs affect manufacturers wholesale prices indirectly, which also affects retailers price. Implying that manufacturers need more income to confront the higher cost, so they increase both wholesale and outlet prices.

It is shown the direct relationship between the outlet prices and advertising cost, as if the costs increase, prices increase as well. Besides, advertising levels are higher when advertising is cheaper, and this is what happens for the developed country scenario. This matches with the theory of informative advertising in industrial organization, as when advertising becomes cheaper there are higher levels of advertising, (Belleflamme & Peitz, 2015). In addition, these authors also showed that an increase in advertising costs lead to an increase in manufacturers' prices, since are directly related. We can also see that in out model.

Nevertheless, service levels are higher for developed countries. We assume this is because advertising levels in developing countries are lower, therefore, less Bajos go to the outlet stores and more go the primary retailers. This leads to a downward pressure on service levels in developing countries, as average service valuation is lower. We presume advertising is very effective in developed countries and most of the Bajos consumers buy at the outlet stores, leading to a higher service level.

In conclusion, in Dual Channel distribution with different advertising cost, service and advertising levels are higher for developed countries, whereas prices are higher for the developing markets. Therefore, it is necessary to further look at what is driving the change in those variables. We deep dive into this change resulting from advertising in the next section.

Furthermore, comparing the situations in the same scenario in Table 2, dual and single channel, it is shown that retail prices and service levels given at the primary retailers are higher in the case of outlet stores. This is because most of the Bajos demand is redirected to the outlet stores. When both Altos and Bajos are served at the primary retailers, there is a balance between the price and the service levels to deal with the whole demand. However, as Bajos have a lower service level and most of them leave the primary markets, this concludes in an increasing pressure on both variables. The same situation is presented in both scenarios.

In any case, the cost of advertising z ($z_{developing} > z_{developed}$) has to be higher for the developing countries due to problems observed in De Mooij (2003, 2011), such as higher brand loyalty, inadequate or low-efficient infrastructures, or simply higher cost of production.

The main issue is that reaching a given Bajos' consumer in a developing country is more expensive. Adding to this, there are also differences on risk aversion ($\theta_a > \theta_{b,developing} > \theta_{b,developed}$).

We need to further look at the manufacturer profits, as they will be the ones who take the final decision to open, or not, an outlet store in each market. Therefore, we need to compare the manufacturer situation and decision in each of the scenarios depending on our key variables of culture background and advertising.

4.2. Manufacturer decision

At the end, manufacturers are the ones that take the decision, in order to be better off in the market. When manufacturers have a symmetric distribution channel, they have a revenue motivation to sell through outlet stores as well as retailers. Nevertheless, this decision takes into account parameters that they can directly or indirectly influence.

4.2.1. Advertising influence

The influence of advertising is very important in the manufacturers' decision. Because it is linked, in this case, to how the increase in the manufacturers' profits can overcome the costs of their advertising. By means of that, the manufacturers will compare in which situation they will be better off, with or without outlet stores.

Advertising has been an important economic variable, first introduced by Marshall (1919), who offered very insightful characteristics, and then winning momentum with Chamberlin (1933) and its incorporation of selling costs into economic theory. Over the last century, the advertising's economic analysis has advanced at a really fast and incredible pace. One of the principal views of advertising, the one that is used in this research, is the informative view. Initialized in the 1960s under the leadership of the Chicago School, this view examines how markets are categorized by imperfect consumer information, as search costs can stop a consumer from finding a products' presence, price and quality. When a firm advertises, its demand curve becomes more elastic, hence, advertising can increase importantly the competitive effects.

In theory, advertising enhances demand on a competitive setting. However, in a monopoly setting, informative advertising does not affect the elasticity of demand ($^{\partial\eta_1}/_{\partial\lambda} = 0$). In this case, we are always considering the competition. Therefore, at symmetric prices and advertising intensities, more informative advertising increases the price elasticity of demand. The elasticity effects of advertising on the model of this study are analyzed in the Appendix A.b.2 & B.b.2 on the dual channels equilibriums.

$$\eta_1 = \frac{p_{outlet}\lambda_1}{2t_b - t_b\lambda_1}$$

$$\frac{\partial\eta_1}{\partial\lambda} = \frac{p_{outlet}t_b\lambda_1}{(2t_b - t_b\lambda_1)^2} - \frac{p_{outlet}}{2t_b - t_b\lambda_1} > 0$$

The elasticity is positive, as advertising increases the elasticity of demand, proven also in theory with Bagwell (2007). However, we still don't know if our demand is elastic or not. Values between 0 and 1 indicate that demand is inelastic. This happens when the percentage change in demand is less than the percent change in price. When price elasticity of demand equals 1, demand is unit elastic. The percent change in demand is the same as the percent change in price. Finally, if the value is greater than 1, demand is perfectly elastic, (Anderson et al, 1997). The demand is affected to a larger grade by changes in price. Therefore, to have a final conclusion, the elasticity is normalized taking into account the market assumptions of the last section and giving an equal proportion of Altos and Bajos $\gamma = 1/2$, giving us for developed and developing countries:

$$Developing\ \eta_1 = \frac{p_{outlet}\lambda_1}{2t_b - t_b\lambda_1} = 0{,}44 > 0$$

$$Developed\ \eta_1 = \frac{p_{outlet}\lambda_1}{2t_b - t_b\lambda_1} = 0{,}41 > 0$$

This implies that demands are inelastic, but advertising increases their price elasticity. The manufacturers' product is considered to be inelastic since a big change in price leads to a slight change in the quantity demanded, i.e. there will be a small decrease in the quantity demanded if there is an increase in prices. However, we still need to take into account that this number is merely an assumption, as the normalization has the minimum requirements to meet all the conditions. In any case, this positive influence in the elasticity of demand can help us to establish that, indeed, in this scenarios advertising increases the share of knowledge of the outlets for consumers. Therefore it can increase the competition between them, increasing the elasticity of demand.

In price, informative advertising has contradictory effects in theory. Bagwell (2007) concludes that the complete relationship cannot be reasoned on only theoretical grounds. We cannot compare situations with and without advertising. When manufacturers advertise, they also open outlet stores and all influence the prices. Besides, the advertising, in this case, is for the outlet stores not for the products that the manufacturers sell to the retailers. Therefore, the effects on retailers' price are completely indirect. Besides, there are many considerations that influence the pricing decision. Nevertheless, we can compare the two situations when manufacturers advertise in the developing countries with two different costs.

As we compared the situations with $z_{developing} = 3$ or $z_{developing} = 4$ in the last section, it was seen that all the prices increased with this model, as they are directly or indirectly affected by higher advertising cost. Manufacturers need more revenue in order to have positive profits with higher costs, thus they increase both outlet and wholesale prices, which also leads to an increase in retailers' price, as their "cost" also increase (wholesale prices).

Steiner (1993) defends that manufacturers' advertising shifts powers away from retailers to manufacturers. When a brand is heavily advertised, manufacturers can use their new power to raise the wholesale prices. A negative relationship between manufacturer advertising and retail margins is implied from the theoretical perspective, $\frac{\partial \pi_r}{\partial \lambda} < 0$. Since, the service levels are lower on the retailers in developed countries, we assumed this is because average service valuation is lower at the retailers ($\theta_a > \theta_{b,developing} > \theta_{b,developed}$). Not enough Bajos consumers receive the ad to go to the outlet stores, therefore they still go to the retailers.

Regarding profits, Domowitz et al (1986) stated that it might be expected that the relationship between advertising concentration and profitability is deteriorated. In this paper we take into account that our demand is inelastic, however, advertising increases this elasticity. Therefore, when having higher cost and a lower level of advertising, outlet prices will raise, and quantity demanded will increasingly drop. All of this would have a negative effect on the manufacturers' profit. Since consumers in developing countries show higher levels of brand loyalty than consumers in developed countries -due to higher risk aversion- advertising cost needs to be higher in order to show this obstacle, (Naransimhan, 1988). Therefore, this will lead to a bigger negative impact on the manufacturers' profit, due to higher prices, than in developed countries. The dual channel distribution would be less profitable in developing countries.

Hence, it can be very difficult to compare the manufacturer profits just in advertising terms. As far as we can see from the elasticities: manufacturers are better off when the advertising costs are lower as they can increase their levels of advertising. This is because all prices would be lower and the price elasticity of demand would be less affected. However, it seems that for developing countries these costs need to be higher, therefore the higher price elasticity of demand and the higher costs would have a negative impact on manufacturers' profits. A numerical example is made in the next section regarding their final decision based on total profit.

4.2.2. Cultural and economic influence

Although there will be some situations where manufacturers prefer to distribute via individual channel instead of dual channel, the thresholds will vary as we take into account developing or developed countries. As regards to the total risk aversion parameter of the country:θ_i, the condition[4] stated in the previous section stablishes that for low values of θ, the dual channel distribution can be more profitable. Nevertheless, when there is a higher value of service, the manufacturers are better off with single channel. Besides, it establishes that it is not always optimal to segment the market, (Coughlan & Soberman, 2005). Nevertheless, as we cannot relate this manufacturer profit parameter in our model with a different value of service, we are not able to prove these statements.

In addition, we can compare the situation in both scenarios with a numerical example. However, first of all, we need to normalize the manufacturer profits to be just dependent on one parameter that differs between countries. In this case, the segment of Altos γ is used. In order to normalize, we opted for a "more realistic" situation where there is a higher difference in costs of transport and cost of advertising $t_a = 15 > t_b = 4$ & $z_{developing} = 20 > z_{developed} = 10 > \frac{t_i}{2}$. The results of this normalization are represented in Figure 1 & Figure 2 for the different situations in each country, where we can see the manufacturer's decision depending on the percentage of Altos.

This example shows how the manufacturer's profit always increases as the fraction of Altos rises on the market, on both distribution channels. Examining the developed countries scenario, it is demonstrated that dual channel is not an optimal option for the manufacturers until at least around the 50% of the population are Altos. However, after the half of the population are Altos, this profit increases exponentially, being the best route for the manufacturer.

Regarding developing countries, this situation varies a bit. The dual channel distribution is not an optimal solution for the manufacturers even before the threshold of the 50% of the

4 ($\theta_a > \theta_{b,developing} > \theta_{b,developed}$), developed Bajos have less risk aversion than developing Bajos.

population is passed. Nonetheless, when rising to higher shares of Altos in the market, dual channel distribution in developing countries is the optimal and most profitable solution. Moreover, even after growing exponentially, the profits on the dual channel in developing countries are always smaller than in developed countries. Therefore opening outlets in developed countries is more cost-effective, taking into account the simple terms of the normalization.

On the other hand, it is seen that, regarding single channel distribution, both scenarios have the same profits for the manufacturer. One reason for this outcome could be that in this situation the manufacturer just deals with the primary retailer and not the consumers, however, the retailers do increase their profits as we saw in the previous section with Sobel (1984) and Pesendorfer (2002). In addition to this, we can also find that higher quotes of Altos in the market are less possible, or almost impossible for developing countries, compared to the others. For example, it is indicated in D'Andrea & Stengel (2004), that low-income buyers are women and men who constitute, at least, 60% of the different countries' population in Latin America. Therefore, this optimal solution for manufacturers should be restricted to lower that 50% of Altos in developing countries.

Moreover, we have seen there is not an official definition of developed and developing countries. Still, the United Nations classify them based on different measures of their economic status: per capita income, industrialization or standard of living. Delving into the income inequalities between these countries, one of the main variables that matter is the Gini Index. This index measures the extent to which the distribution of income among individuals or households within an economy diverges from a perfectly equal distribution, (OECD, 2002). This ratio represents 0 when the income is equally distributed among all the population (egalitarian society), while 100 would represent a hypothetical situation in which only one person has all the capital (iniquitous society).

Countries with higher Gini Index fall into the developing countries characteristics and vice versa. This variable can be used as an example to measure which percentage of the population are Altos, higher income and lower price sensitivity, or Bajos, lower income and higher price sensitivity. I.e. the Gini Index for Sweden, developed country, is 27.2[5]. Therefore we could estimate, roughly, that around 30% of the population are Bajos (less wealthy class) and 70%, which income is distributed equally, are Altos (high and middle classes). In this case, we assume that the percentage of Altos is 70% and all the other variables stay constant. It is seen that the optimal solution for the manufacturer in a developed country is to distribute by dual channel with primary retailers and outlet stores.

However, if we look at the Gini Index of a developing country, as Brazil: 53.1[6], we realized that the percentage of Altos needed in order to have the dual channel as the optimal solution cannot be accomplished. In developing countries, the economic situation is unequal and therefore the Bajos segment of the population is big. Even living under poverty line, these consumers are very risk averse and they do not trust easily new brands or stores opened in the market.

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[54] Source: World Bank-World Development Indicators, 2011.

In conclusion, dual channel distribution cannot be an optimal solution for manufacturers in developing countries, since the larger quotes for Altos cannot be reached. However, for developed countries, this situation can be possible as there will be more percentage of the population on the upper-middle class. This deduction is restraining the assumptions of the normalization made in the previous pages. Alterations due to different industries or countries will be taken into account for the final conclusions.

Figure 1: Example of Manufacturer's profit outcomes with normalization in Developed Countries.

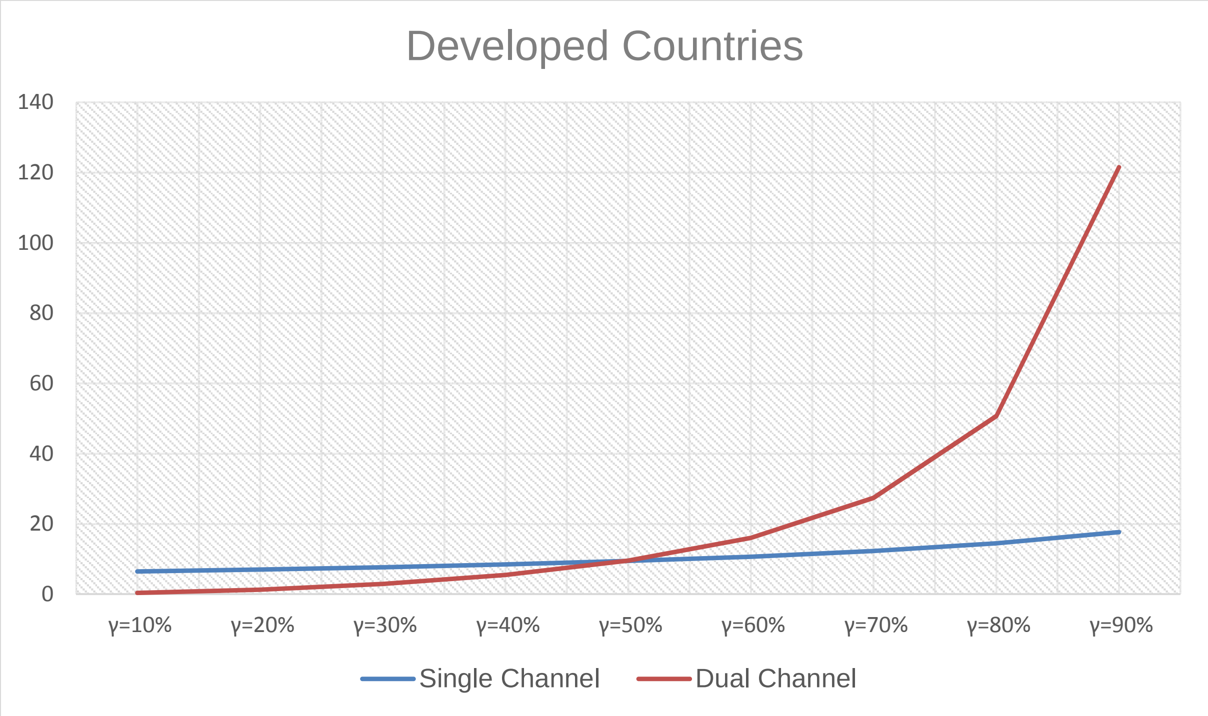
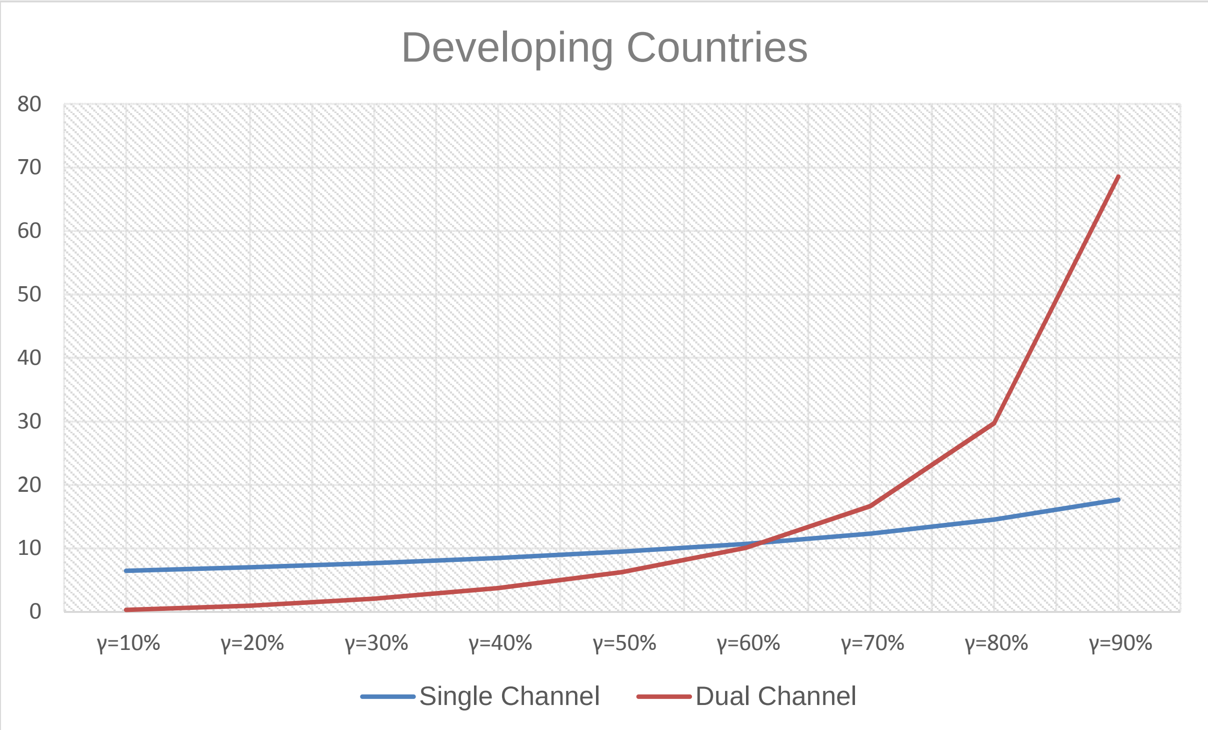


Figure 2: Example of Manufacturer's profit outcomes with normalization in Developing Countries.



5. Conclusions

This paper delves into the discrimination of distribution channels due to consumer behaviour, when this is influenced by cultural background. It establishes that there are other individualities related to the consumer, that the manufacturer should take into account before opening an outlet in a certain country. Three principal research questions are considered: Why in some countries outlets are extremely popular, for endorsed industries, but not in others? Is the manufacturers' choice of distribution influenced by cultural consumer behaviour? And, could advertising influence the manufacturers' decision in this case?

A theoretical model is created to give an answer to these questions. We assess the differences in behaviour by associating it with a difference in countries of origin: developed and developing. Consumers from developing countries have higher risk aversion, finding low-quality products when changing store. They are more "loyal" to their trusted but more expensive retailer brand, by means that their valuation of service is higher, even if they are price sensitive as well. Below we consider and answer all the research questions individually.

5.1. Is manufacturers' choice of distribution influenced by cultural consumer behaviour?

On the one hand, it is understood from our results that, on Single Channel distribution, manufacturers' decision is not linked to consumer behaviour. The manufacturers' benefit and wholesale prices do not depend on the market's sensitivity to service. Since manufacturers just sell their products through primary retailers, they don't need to confront the consumers firsthand.

Therefore, in this situation, we have a Stackelberg equilibrium on a duopoly, using a sequential game with two retailers and two manufacturers. As manufacturers are the leaders, in this case, they have first-mover advantage, and they are better off than retailers, (Stackelberg, 1934). However, as he states in his research, this equilibrium is not Pareto efficient and therefore, there is a loss in economic efficiency.

On the other hand, we can also see that on Dual Channel, when subtracting the effects of advertising costs, manufacturers' decision is still not linked to consumer behaviour. Retailers have higher profits in developing countries, however, manufacturers' profits stay the same. It seems that with this symmetric equilibrium structure, wholesale prices and profits are not affected by the service level at the retailers' stores.

Principally, it looks as if the desirability of opening outlet malls for the manufacturers is determined only by the price sensitivity heterogeneity between Altos and Bajos consumers. Surprisingly, Coughlan and Soberman (2005) found similar results in their model when service levels of the retailers are set before the wholesale prices. However, on their model, they did not take into account advertising levels, which fragment the demand of Bajos, when opening an outlet store.

In addition, when considering both situations of Single and Dual Channel with same advertising costs, we can see that: if price sensitivity is the main source of heterogeneity in this market, it could be possible that a distribution structure with outlet stores is optimal. Since, it will increase both manufacturers and retailers' profit, by enabling higher prices in the primary market. Therefore, in our model, the manufacturers' reason is not linked to consumer behaviour influenced by cultural background, represented by consumers' risk aversion.

5.2. Could advertising influence the manufacturers' decision in this case?

Despite this fact, when considering the difference in advertising costs, we observe the fact that reaching a given Bajos' consumer in a developing country is more expensive, (De Mooij, 2003, 2011). Since they are more risk adverse to the change of store. Besides, there are other problems as, inadequate or low-efficient infrastructures, or simply higher cost of production, (Ewah & Ekeng, 2009). It is seen in the previous section that higher advertising cost decreases the level of advertising given by manufacturers to the market, as it becomes more expensive.

Furthermore, a higher level of advertising also increases the elasticity of demand. By advertising, a firm creates a noticeable shift in its demand curve. Chamberlin (1993) states that when advertising transfers information concerning the existence of the firm's product, the effect is to expand the firm's share within a market. If advertising delivers price information as well, then the firm's extended demand also might be more elastic as more buyers can be cognizant of the price reduction. Besides, Telser (1964) implies that advertising facilitates entry of more firms in the market as it is a significant source of information that encourages competition.

However, it is difficult to determine what this shift in demand does to the manufacturers' profit, just by itself. Since, when levels of advertising are higher, this increases the elasticity and consumers become more "price" sensitive. This leads to the fact that there will be a bigger change in quantity for a small change in price. Therefore, given the results, we could presume that when there is lower advertising level but higher prices, the price elasticity of demand has a deeper negative influence on the manufacturers' profits, than when there is higher level of advertising but lower prices.

The results in Table 2 have the appearance that a larger level of advertising increases the manufacturer profits. Subsequently, we found the same effect in our numerical example, with the market conditions stated above. It is seen that manufacturers are better off in dual channel distribution, when advertising costs are lower, as the advertising levels are higher and profits as well. Besides, as prices are lower, the price elasticity of demand will be less affected. Consumers are also better off since, when firms advertise more, they set those lower prices, hoping to attract more consumers. Therefore, we can conclude that, as a matter of fact, higher advertising levels at lower costs make the dual channel more profitable for the manufacturers in this case.

5.3. Why in some countries outlets are extremely popular, but not in others?

All in connection with our main question, why this segmentation? We wanted to approach this by means of analyzing whether a single channel distribution would be more profitable than a dual channel distribution, taking into account the cultural and economic aspects of the consumer behaviour. Since there are other characteristics related to the consumer that the manufacturer should take into account in order to open an outlet in a certain country.

Our study demonstrates that the relationship between consumer heterogeneity, and the attraction of dual distribution channel for manufacturers, cannot be completely determined by simply asking what different background the consumers have, or how they respond to informative advertising. In our numerical example, it is seen that, when there is a higher percentage of wealthy consumers, even with a higher cost of advertising, dual distribution channel can be an optimal solution for the manufacturers in developed countries. However, this fraction of wealthy consumers cannot be reached in the developing countries, as the income is distributed unequally in those countries. A small percentage of the population accumulates all the wealth.

However, there are limitations on our study. The main one is our model conditions. It would be interesting so see the results with a different order of stages, i.e. service levels decided before wholesale prices. Besides, another limitation from our conditions is the assumption that a manufacturer can open an outlet mall without practically any cost, just affronting advertising cost. This assumption may overemphasize the case for outlet stores, as the principal costs of opening outlet stores are fixed i.e. rental charges. In addition, our equilibrium is static, taking into account just one period. The model should be reconsidered in a dynamic context.

An additional limitation is the selection of informative advertising. A good direction for further research could be the analysis of the advertising effects as a persuasion tool on this model. It could be worth to see if the persuasive effect on consumers' demand will change the manufacturers' decision of opening outlets in developing countries, by increasing the desirability of the product and consumers' brand loyalty.

In conclusion, regarding our analysis and restrictions of numerical assumptions, we suspect that: dual channel distribution is not an optimal solution for manufacturers in developing countries. This is mainly because, the higher percentages for Altos -the service sensitive consumers- cannot be reached in the developing societies, besides a higher cost of advertising that has a negative effect on profits. Nevertheless, in developed countries, this situation is possible as there will be more percentage of the population on the upper-middle class and advertising cost are lower and more effective. Hence, we think our analysis has a significant impact on the worldwide outlets' phenomenon, as it can explain the massive arrival of outlet malls in some countries but not in others, by taking into account the manufacturers' choice of channel distribution.

References

Anderson, P. L., McLellan, R. D., Overton, J. P., & Wolfram, G. L. (1997). Price elasticity of demand. Makinac Center for Public Policy, 13.

Bagwell, K. (2007). The economic analysis of advertising. Handbook of industrial organization, 3, 1701-1844.

Belleflamme, P., & Peitz, M. (2015). Industrial organization: markets and strategies. Cambridge University Press.

Bester, H., & Petrakis, E. (1995). Price competition and advertising in oligopoly. European Economic Review, 39(6), 1075-1088.

Bucklin, L. P. (1966). A theory of distribution channel structure. University of California, Institute of Business and Economic Research.

Butters, G. R. (1977). Equilibrium distributions of sales and advertising prices. The Review of Economic Studies, 465-491.

Chamberlin, E. H. (1933). The theory of monopolistic competition (Vol. 6). Cambridge, MA: Harvard University Press.

Conlisk, J., Gerstner, E., & Sobel, J. (1984). Cyclic pricing by a durable goods monopolist. The Quarterly Journal of Economics, 489-505.

Coughlan, A., & Soberman, D. A. (2004). A survey of outlet mall retailing: Past, present, and future. INSEAD.

Coughlan, A. T., & Soberman, D. A. (1999). Good marketing to" bad consumers": Outlet malls, warehouses, and gray markets. Working paper, INSEAD, Fontainebleau, France.

Coughlan, A. T., & Soberman, D. A. (2005). Strategic segmentation using outlet malls. International Journal of Research in Marketing, 22(1), 61-86.Dixit and Norman (1978)

Cournot, A. A. (1838). Recherches sur les principes mathématiques de la théorie des richesses par Augustin Cournot. chez L. Hachette.

De Mooij, M. (2003). Convergence and divergence in consumer behaviour: implications for global advertising. International Journal of advertising, 22(2), 183-202.

De Mooij, M., & Hofstede, G. (2011). Cross-cultural consumer behaviour: A review of research findings. Journal of International Consumer Marketing, 23(3-4), 181-192.

Domowitz, I., Hubbard, R. G., & Petersen, B. C. (1986). Business cycles and the relationship between concentration and price-cost margins. The RAND Journal of Economics, 1-17.

D'Andrea, G., & Stengel, E. (2004). 6 Truths about Emerging-Market Consumers. Strategy+ Business, (34), 58-69.

Ewah, S. O., & Ekeng, A. B. (2009). Problems and prospects of marketing in developing economies: The Nigerian experience. International Journal of Business and Management, 4(9), 187.

Fudenberg, D., & Tirole, J. (1984). The fat-cat effect, the puppy-dog ploy, and the lean and hungry look. The American Economic Review, 74(2), 361-366.

Galeotti, A., & Moraga-González, J. L. (2008). Segmentation, advertising and prices. International Journal of Industrial Organization, 26(5), 1106-1119.

Grossman, G. M., & Shapiro, C. (1984). Informative advertising with differentiated products. The Review of Economic Studies, 51(1), 63-81.Ireland (1993)

Iyer, G. (1998). Coordinating channels under price and nonprice competition.Marketing Science, 17(4), 338-355.Naransimhan (1988)

Klaffke, P. (2003). Spree: A cultural history of shopping. arsenal pulp press.

Marshall, A. (1919). Industry and trade: A study of industrial technique and business organization. London: Macmillan.

Nash Jr, J. F. (2009). John Forbes Nash, Jr. Mariana Cook, comp.: Mathematicians: An outer view of the inner world, Princeton University Press, Princeton, 42-43.

Nelson, P. (1974). Advertising as information. Journal of political economy, 82(4), 729-754.

Ngwe, D. (2014). Why Outlet Stores Exist: Averting Cannibalization in Product Line Extensions.

OECD (2002). Glossary of Stadistical Terms.

Ozga, S. A. (1960). Imperfect markets through lack of knowledge. The quarterly journal of Economics, 29-52.

Pesendorfer, M. (2002). Retail sales: A study of pricing behaviour in supermarkets. The Journal of Business, 75(1), 33-66.

Porter, S. S., & Claycomb, C. (1997). The influence of brand recognition on retail store image. Journal of product & brand management, 6(6), 373-387.

Roy, S., & Scheurs, A. (1994). Competition, exclusive territories and the emergence of local monopoly. Erasmus University of Rotterdam-Econometric Institute Papers.

Steiner, R. L. (1993). The inverse association between the margins of manufacturers and retailers. Review of Industrial Organization, 8(6), 717-740.

Stigler, G. J. (1961). The economics of information. The journal of political economy, 213-225.

Solomon, M., Russell-Bennett, R., & Previte, J. (2012). Consumer behaviour. Pearson Higher Education AU.

Telser, L. G. (1964). Advertising and competition. The Journal of Political Economy, 537-562.

Varian, H. R. (1980). A model of sales. The American Economic Review, 651-659.

Von Stackelberg, H. (2010). Market structure and equilibrium. Springer Science & Business Media.

APPENDIX:

Derivation of prices, service levels, wholesale prices and advertising of the two scenarios and four structures taken under consideration.

A. Equilibrium in Developed Countries Scenario

a. Model without Outlets Malls:

a.1. Equilibrium

The manufactures profit functions are given by:

$$\pi_{m1} = (w_1 - c)[\gamma x_a + (1-\gamma)x_b] \qquad \pi_{m2} = (w_2 - c)[\gamma(1-x_a) + (1-\gamma)(1-x_b)]$$

The retailers profit functions are given by:

$$\pi_{r1} = (p_1 - w_1)[\gamma x_a + (1-\gamma)x_b] - s_1^2 \qquad \pi_{r2} = (p_2 - w_2)[\gamma(1-x_a) + (1-\gamma)(1-x_b)] - s_2^2$$

Where: $x_a = \frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}$ $\qquad x_b = \frac{t_b - p_1 + p_2}{2t_b}$

If we substitute in the retailer profit functions and differentiate with respect p_1 & p_2:

$$\pi_{r1} = (p_1 - w_1)\left[\gamma\left(\frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + (1-\gamma)\left(\frac{t_b - p_1 + p_2}{2t_b}\right)\right] - s_1^2$$

$$\pi_{r2} = (p_2 - w_2)\left[\gamma\left(1 - \left(\frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}\right)\right) + (1-\gamma)(1-x_b)\right] - s_2^2$$

$$\frac{\partial \pi_{r1}}{\partial p_1} = 0 \rightarrow p_1 = \frac{(s_2 - s_1)t_b\gamma\theta + [(t_a - t_b)w_1 - p_2(t_b - t_a)]\gamma - t_a(w_1 + t_b + p_2)}{(2t_b - 2t_a)\gamma + 2t_a}$$

$$\frac{\partial \pi_{r2}}{\partial p_2} = 0 \rightarrow p_2 = \frac{(s_2 - s_1)t_b\gamma\theta + [(t_b - t_a)w_2 - p_1(t_b - t_a)]\gamma + t_a(w_2 + t_b + p_1)}{(2t_b - 2t_a)\gamma + 2t_a}$$

With this system of two equations and two unknowns we can solve it obtaining:

$$p_1 = \frac{(s_2 - s_1)t_b\gamma\theta + [(t_a - t_b)w_2 + (2t_a - 2t_b)w_1]\gamma - t_a(w_2 + 2w_1 + 3t_b)}{(3t_b - 3t_a)\gamma - 3t_a}$$

$$p_2 = \frac{(s_2 - s_1)t_b\gamma\theta + [(t_b - t_a)w_1 + (2t_b - 2t_a)w_2]\gamma + t_a(w_1 + 2w_2 + 3t_b)}{(3t_b - 3t_a)\gamma - 3t_a}$$

Afterwards we substitute into the retailers ‘profit functions (π_{r1} & π_{r2}) and differentiate with respect s_1 & s_2:

$$\frac{\partial \pi_{r1}}{\partial s_1} = 0 \rightarrow s_1 = \frac{s_2 t_b \gamma^2 \theta^2 + \theta\left[\left((t_a - t_b)w_2 + (t_b - t_a)w_1\right)\gamma^2 + (w_1 - w_2 + 3t_b)\gamma t_a\right]}{t_b \gamma^2 \theta^2 + (18t_a^2 - 18t_a t_b)\gamma - 18t_a^2}$$

$$\frac{\partial \pi_{r2}}{\partial s_2} = 0 \rightarrow s_2 = \frac{s_1 t_b \gamma^2 \theta^2 + \theta\left[\left((t_b - t_a)w_2 + (t_a - t_b)w_1\right)\gamma^2 + (w_2 - w_1 + 3t_b)\gamma t_a\right]}{t_b \gamma^2 \theta^2 + (18t_a^2 - 18t_a t_b)\gamma - 18t_a^2}$$

Solving these two equations we get:

$$s_1 = \frac{{t_b}^2\gamma^3\theta^3 + 3\theta[\gamma^3(t_b^2 - 2t_a t_b + t_a^2)(w_1 - w_2)] + \gamma^2[(2t_a t_b - 2t_a^2)(w_1 - w_2) - 3t_a t_b^2 + 3t_b t_a^2] + \gamma\left(t_a^2(w_1 - w_2 - 3t_b)\right)}{6\theta^2\left((t_b^2 - t_a t_b)\gamma^3 + t_a t_b \gamma^2\right) + 9t_a\gamma^2(2t_a - t_b^2 - t_a^2) + (18t_a^3 - 18t_a^2 t_b)\gamma - 9t_a^3}$$

$$s_2 = \frac{{t_b}^2\gamma^3\theta^3 + 3\theta[\gamma^3(t_b^2 - 2t_a t_b + t_a^2)(w_2 - w_1)] + \gamma^2[(2t_a t_b - 2t_a^2)(w_2 - w_1) - 3t_a t_b^2 + 3t_b t_a^2] + \gamma\left(t_a^2(w_2 - w_1 + 3t_b)\right)}{6\theta^2\left((t_b^2 - t_a t_b)\gamma^3 + t_a t_b \gamma^2\right) + 9t_a\gamma^2(2t_a - t_b^2 - t_a^2) + (18t_a^3 - 18t_a^2 t_b)\gamma - 9t_a^3}$$

We substitute now x_a, x_b, p_1, p_2, s_1& s_2 into the manufacturers´profit functions π_{m1}&π_{m2}. Then we differentiate with respect w_1 & w_2 to obtain:

$$w_1 = \frac{9t_a^2 t_b + 3ct_a^2 - t_b^2\gamma^2\theta^2 - 3c\gamma^2(2t_a t_b - t_a^2 - t_b^2) - 3t_a\gamma(3t_a t_b - 3t_b^2 - 2ct_b + 2ct_a)}{\gamma^2(3t_b^2 - 6t_a t_b + 3t_a^2) + \gamma(6t_a t_b - 6t_a^2) + 3t_a^2}$$

$$w_2 = \frac{9t_a^2 t_b + 3ct_a^2 - t_b^2\gamma^2\theta^2 - 3c\gamma^2(2t_a t_b - t_a^2 - t_b^2) - 3t_a\gamma(3t_a t_b - 3t_b^2 - 2ct_b + 2ct_a)}{\gamma^2(3t_b^2 - 6t_a t_b + 3t_a^2) + \gamma(6t_a t_b - 6t_a^2) + 3t_a^2}$$

After finding the equilibrium values for the wholesale prices we substitute them to find the other unknown dependent variants:

$$\boldsymbol{p_1 = p_2 = \frac{3ct_a^2 + 12t_a^2 t_b - t_b^2\gamma^2\theta^2 - 3c\gamma^2\left(2t_a t_b - t_a^2 - t_b^2\right) + 6t_a\gamma\left(+ct_b - 2t_a - ct_a + 2t_b^2\right)}{\gamma^2(3t_b^2 - 6t_a t_b + 3t_a^2) + \gamma(6t_a t_b - 6t_a^2) + 3t_a^2}}$$

$$\boldsymbol{s_1 = s_2 = \frac{t_b\theta\gamma}{(6t_b - 6t_a)\gamma + 6t_a}}$$

$$\boldsymbol{w_1 = w_2 = \frac{9t_a^2 t_b + 3ct_a^2 - t_b^2\gamma^2\theta^2 - 3c\gamma^2\left(2t_a t_b - t_a^2 - t_b^2\right) - 3t_a\gamma\left(3t_a t_b - 3t_b^2 - 2ct_b + 2ct_a\right)}{\gamma^2(3t_b^2 - 6t_a t_b + 3t_a^2) + \gamma(6t_a t_b - 6t_a^2) + 3t_a^2}}$$

$$\boldsymbol{\pi_{m1}} = \boldsymbol{\pi_{m2}} = \frac{\mathbf{9}\boldsymbol{t_a^2 t_b} - \boldsymbol{t_b^2 \gamma^2 \theta^2} - \boldsymbol{\gamma}\left(\mathbf{9}\boldsymbol{t_a^2 t_b} - \mathbf{9}\boldsymbol{t_b^2 t_a}\right)}{\boldsymbol{\gamma^2}(\mathbf{6}\boldsymbol{t_b^2} - \mathbf{12}\boldsymbol{t_a t_b} + \mathbf{6}\boldsymbol{t_a^2}) + \boldsymbol{\gamma}(\mathbf{12}\boldsymbol{t_a t_b} - \mathbf{12}\boldsymbol{t_a^2}) + \mathbf{6}\boldsymbol{t_a^2}}$$

$$\boldsymbol{\pi_{r1}} = \boldsymbol{\pi_{r2}} = \frac{\mathbf{18}\boldsymbol{t_a^2 t_b} - \boldsymbol{t_b^2 \gamma^2 \theta^2} - \boldsymbol{\gamma}\left(\mathbf{18}\boldsymbol{t_a^2 t_b} - \mathbf{18}\boldsymbol{t_b^2 t_a}\right)}{\boldsymbol{\gamma^2}(\mathbf{36}\boldsymbol{t_b^2} - \mathbf{72}\boldsymbol{t_a t_b} + \mathbf{36}\boldsymbol{t_a^2}) + \boldsymbol{\gamma}(\mathbf{72}\boldsymbol{t_a t_b} - \mathbf{72}\boldsymbol{t_a^2}) + \mathbf{36}\boldsymbol{t_a^2}}$$

FOC for Manufacturer and Retailers profits on marginal valuation of service θ:

$$\frac{\partial \pi_r}{\partial \theta} \rightarrow -\frac{2\, t_b^2 \gamma^2 \theta}{(6\, t_b^2 - 12\, t_a t_b + 6\, t_a^2)\gamma^2 + (12\, t_a t_b - 12\, t_a^2)\gamma + 6\, t_a^2} < 0 \qquad \uparrow \boldsymbol{\theta} \rightarrow \downarrow \boldsymbol{\pi_r}$$

$$\frac{\partial \pi_m}{\partial \theta} \rightarrow -\frac{2\, t_b^2 \gamma^2 \theta}{(36\, t_b^2 - 72\, t_a t_b + 36\, t_a^2)\gamma^2 + (72\, t_a t_b - 72\, t_a^2)\gamma + 36\, t_a^2} < 0 \qquad \uparrow \boldsymbol{\theta} \rightarrow \downarrow \boldsymbol{\pi_m}$$

FOC for Manufacturer on percentage of Altos in the market γ:

$$\frac{\partial \pi_m}{\partial \gamma} \rightarrow \frac{-4\gamma - 9}{3\gamma^2 - 12\gamma + 12} - \frac{(6\gamma - 12)(-2\gamma^2 - 9\gamma + 18)}{(3\gamma^2 - 12\gamma + 12)^2} > 0 \qquad \uparrow \gamma \rightarrow \uparrow \boldsymbol{\pi_m}$$

a.2. Normalization

The results presented by normalizing the model with $t_a = 2 > t_b = 1$ & $z_{developing} = 4 > z_{developed} = 3 > \frac{t_i}{2}$, in addition in order to be able to compare two scenarios taking into consideration $\theta_a > \theta_{b,developing} > \theta_{b,developed} \neq 0$:

$$w = \frac{6}{2 - \gamma}$$

$$p = \frac{180 - (4\gamma^2 - 8\gamma + 4)\theta_{b,developed}^2 - ((4\gamma - 4\gamma^2)\theta_a - 6\gamma^3 + 18\gamma^2 - 12\gamma)\theta_{b,developed} - \gamma^2\theta_a^2 - (3\gamma^3 - 6\gamma^2)\theta_a - 90\gamma}{9\gamma^2 - 36\gamma + 36}$$

$$s = \frac{36 - (4\gamma^2 - 8\gamma + 4)\theta_{b,developed}^2 - (4\gamma - 4\gamma^2)\theta_a\theta_{b,developed} - \gamma^2\theta_a^2 - 18\gamma}{(-6\gamma^2 + 18\gamma - 12)\theta_{b,developed} + (3\gamma^2 - 6\gamma)\theta_a}$$

$$\pi_m = \frac{6}{4 - 2\gamma}$$

$$\pi_r = \frac{(12\gamma^4 - 24\gamma^3 + 12\gamma^2)\theta_a^2 + (6\gamma^4 - 24\gamma^3 + 30\gamma^2 - 12\gamma)\theta_a - (8\gamma^4 - 32\gamma^3 + 48\gamma^2 - 32\gamma + 8)\theta_{b,developed}^4 + ((-16\gamma^4 + 48\gamma^3 - 48\gamma^2 + 16\gamma)\theta_a - 4\gamma^4 + 20\gamma^3 - 36\gamma^2 + 28\gamma - 8)\theta_{b,developed}^3}{(12\gamma^4 - 72\gamma^3 + 156\gamma^2 - 144\gamma + 48)\theta_{b,developed}^2 + (3\gamma^4 - 12\gamma^3 + 12\gamma^2)\theta_a^2}$$

b. *Model with Outlet Malls:*

b.1. Equilibrium

The manufactures profit functions are given by:

$$\pi_{m1}{}' = (w_1 - c)\left[(\gamma x_a^*) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\, x^*{}_{b,uninf}\right)\right] + \pi'_{1,outlet} \quad \text{and}$$

$$\pi_{m2}{}' = (w_2 - c)\left[\gamma(1 - x_a^*) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)\left(1 - x^*{}_{b,uninf}\right)\right)\right] + \pi'_{2,outlet}$$

with:

$$\pi'_{1,outlet} = \left(p_{1,outlet} - c\right)(1-\gamma)\left[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 x_{b,inf}^*\right] - z\frac{\lambda_1^2}{2}$$

$$\pi'_{2,outlet} = \left(p_{2,outlet} - c\right)(1-\gamma)\left[\lambda_2(1-\lambda_1) + \lambda_2\lambda_1(1 - x_{b,inf}^*)\right] - z\frac{\lambda_2^2}{2}$$

The retailers profit functions are given by:

$$\pi'_{r1} = (p_1 - w_1)\left[(\gamma x_a^*) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\, x^*{}_{b,uninf}\right)\right] - s_1^2 \quad \text{and}$$

$$\pi'_{r2} = (p_2 - w_2)\left[\gamma(1 - x_a^*) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)\left(1 - x^*{}_{b,uninf}\right)\right)\right] - s_2^2$$

Where:

$$x^*{}_a = \frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}\,,\; x^*{}_{b,uninformed} = \frac{t_b - p_1 + p_2}{2t_b}\; and\; x^*{}_{b,informed} = \frac{t_b - p_{1,outlet} + p_{2,outlet}}{2t_b}$$

Looking at the retailers functions we start by differentiating with respect the prices with just the *Altos* demand $x_a{}^*$:

$$\pi'_{r1} = (p_1 - w_1)\left[\gamma\left(\frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\left(\frac{t_b - p_1 + p_2}{2t_b}\right)\right)\right] - s_1^2 \quad \text{and}$$

$$\pi'_{r2} = (p_2 - w_2)\left[\gamma(1 - \left(\frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\left(1 - \frac{t_b - p_1 + p_2}{2t_b}\right)\right)\right]) - s_2^2$$

$$\frac{\partial \pi'_{r1}}{\partial p_1} = 0 \rightarrow$$

$$p_1 = \frac{\left(\left((w_1 + t_b + p_2)\gamma - w_1 - t_b - p_2\right)\lambda_1 + (-t_b - w_1 - p_2)\gamma + w_1 + t_b + p_2\right)\lambda_2 + \left((-t_b - w_1 - p_2)\gamma + w_1 + t_b + p_2\right)\lambda_1 + (s_2 - s_1)\theta\gamma + (t_b - t_a)\gamma - w_1 - t_b - p_2}{\left((2\gamma - 2)\lambda_1 - 2\gamma + 2\right)\lambda_2 + (2\gamma - 2)\lambda_1 - 2}$$

$$\frac{\partial \pi'_{r2}}{\partial p_2} = 0 \rightarrow$$

$$p_2 = \frac{\left(\left((w_2 - t_b + 2t_a + p_1)\gamma - w_2 + t_b - 2t_a - p_1\right)\lambda_1 + (t_b - 2t_a - w_2 - p_1)\gamma + w_2 - t_b + 2t_a + p_1\right)\lambda_2 + \left((t_b - 2t_a - w_2 - p_1)\gamma + w_2 - t_b + 2t_a + p_1\right)\lambda_1 + (s_1 - s_2)\theta\gamma + (t_a - t_b)\gamma - w_2 + t_b - 2t_a - p_1}{\left((2\gamma - 2)\lambda_1 - 2\gamma + 2\right)\lambda_2 + (2\gamma - 2)\lambda_1 - 2}$$

With this system of two equations and two unknowns we can solve obtaining:

$$p_1 = \frac{\left(\left((w_2 + 2w_1 + t_b + 2t_a)\gamma - w_2 - 2w_1 - t_b - 2t_a\right)\lambda_1 + (-w_2 - t_b - 2w_1 - 2t_a)\gamma + w_2 + 2w_1 + t_b + 2t_a\right)\lambda_2 + \left((-w_2 - t_b - 2w_1 - 2t_a)\gamma + w_2 + 2w_1 + t_b + 2t_a\right)\lambda_1 + (s_2 - s_1)\theta\gamma + (t_b - t_a)\gamma - 2w_1 - w_2 - t_b - 2t_a}{\left((3\gamma - 3)\lambda_1 - 3\gamma + 3\right)\lambda_2 + (3\gamma - 3)\lambda_1 - 3}$$

$$p_2 = \frac{\left(\left((w_1 + 2w_2 - t_b + 4t_a)\gamma - 2w_2 - w_1 + t_b - 4t_a\right)\lambda_1 + (t_b - 2w_2 - w_1 - 4t_a)\gamma + 2w_2 + w_1 - t_b + 4t_a\right)\lambda_2 + \left((t_b - 2w_2 - w_1 - 4t_a)\gamma + 2w_2 + w_1 - t_b + 4t_a\right)\lambda_1 + (s_1 - s_2)\theta\gamma + (t_a - t_b)\gamma - w_1 - 2w_2 + t_b - 4t_a}{\left((3\gamma - 3)\lambda_1 - 3\gamma + 3\right)\lambda_2 + (3\gamma - 3)\lambda_1 - 3}$$

Using the same procedure as before with s_1 & s_2 and solving these two equations we get:

$$\frac{\partial \pi'_{r1}}{\partial s_1} = 0 \rightarrow$$

$$s_1 = \frac{\left(\left((3w_2 + 3w_1 + 3t_b + 6t_a)\gamma^2 + (-3w_2 + 3w_1 - 3t_b - 6t_a)\gamma\right)\theta\lambda_1 + \left((-3w_2 + 3w_1 - 3t_b - 6t_a)\gamma^2 + (3w_2 + 3w_1 + 3t_b + 6t_a)\gamma\right)\theta\right)\lambda_2 + \left((-3w_2 + 3w_1 - 3t_b - 6t_a)\gamma^2 + (3w_2 + 3w_1 + 3t_b + 6t_a)\gamma\right)\theta\lambda_1 + \gamma^3\theta^3 + \left((3t_b - 3t_a)\gamma^2 + (-3w_2 + 3w_1 - 3t_b - 6t_a)\gamma\right)\theta}{\left((54t_a\gamma - 54t_a)\lambda_1 - 54t_a\gamma + 54t_a\right)\lambda_2 + (54t_a - 54t_a\gamma)\lambda_1 - 6\gamma^2\theta^2 - 54t_a}$$

$$\frac{\partial \pi'_{r2}}{\partial s_2} = 0 \rightarrow$$

$$s_2 = -\frac{\begin{gathered}(((3\,w_2 - 3\,w_1 + 3\,t_b - 12\,t_a)\gamma^2 + (-3\,w_2 + 3\,w_1 - 3\,t_b + 12\,t_a)\gamma)\theta\,\lambda_1 + ((-3\,w_2 + 3\,w_1 - 3\,t_b + 12\,t_a)\gamma^2 + (3\,w_2 - 3\,w_1 + 3\,t_b - 12\,t_a)\gamma)\theta)\lambda_2 + \\ ((-3\,w_2 + 3\,w_1 - 3\,t_b + 12\,t_a)\gamma^2 + (3\,w_2 - 3\,w_1 + 3\,t_b - 12\,t_a)\gamma)\theta\,\lambda_1 - \gamma^3\theta^3 + ((3\,t_b - 3\,t_a)\gamma^2 + (-3\,w_2 + 3\,w_1 - 3\,t_b + 12\,t_a)\gamma)\theta\end{gathered}}{((54\,t_a\gamma - 54\,t_a)\lambda_1 - 54\,t_a\gamma + 54\,t_a)\lambda_2 + (54\,t_a - 54\,t_a\gamma)\lambda_1 + 6\,\gamma^2\,\theta^2 - 54\,t_a}$$

We substitute now $x_a, x^*_{b,uninformed}, x^*_{b,informed}\ p_1, p_2, s_1 \&\ s_2$ into the manufacturers´profit functions $\pi_{m1} \& \pi_{m2}$. Then we differentiate and solve with respect w_1 & w_2 to obtain:

$$\frac{\partial \pi_{m1}}{\partial w_1} = 0 \rightarrow w_1 = \frac{\begin{gathered}(((t_b + 8\,t_a + 3\,c)\gamma - t_b - 8\,t_a - 3\,c)\lambda_1 + (-t_b - 8\,t_a - 3\,c)\gamma + t_b + 8\,t_a + 3\,c)\lambda_2 + \\ ((-t_b - 8\,t_a - 3\,c)\gamma + t_b + 8\,t_a + 3\,c)\lambda_1 + \gamma^2\theta^2 + (t_b - t_a)\gamma - t_b - 8\,t_a - 3\,c\end{gathered}}{((3\,\gamma - 3)\lambda_1 - 3\,\gamma + 3)\lambda_2 + (3 - 3\,\gamma)\lambda_1 - 3}$$

$$\frac{\partial \pi_{m2}}{\partial w_2} = 0 \rightarrow \quad w_2 = -\frac{\begin{gathered}(((t_b - 10\,t_a - 3\,c)\gamma - t_b + 10\,t_a + 3\,c)\lambda_1 + (-t_b + 10\,t_a + 3\,c)\gamma + t_b - 10\,t_a - 3\,c)\lambda_2 + \\ ((-t_b + 10\,t_a + 3\,c)\gamma + t_b - 10\,t_a - 3\,c)\lambda_1 - \gamma^2\theta^2 + (t_b - t_a)\gamma - t_b + 10\,t_a + 3\,c\end{gathered}}{((3\,\gamma - 3)\lambda_1 - 3\,\gamma + 3)\lambda_2 + (3 - 3\,\gamma)\lambda_1 - 3}$$

We substitute the values of w_1, w_2 into the other variables in order to have all just depending on advertising and the different cost for the next step:

$$s_1 = \frac{(((t_b + 8\,t_a)\gamma^2 + (-t_b - 8\,t_a)\gamma)\theta\,\lambda_1 + ((-t_b - 8\,t_a)\gamma^2 + (t_b + 8\,t_a)\gamma)\theta)\lambda_2 + ((-t_b - 8\,t_a)\gamma^2 + (t_b + 8\,t_a)\gamma)\theta\,\lambda_1 + \gamma^3\theta^3 + ((t_b - t_a)\gamma^2 + (-t_b - 8\,t_a)\gamma)\theta}{((54\,t_a\gamma - 54\,t_a)\lambda_1 - 54\,t_a\gamma + 54\,t_a)\lambda_2 + (54\,t_a - 54\,t_a\gamma)\lambda_1 + 6\,\gamma^2\theta^2 - 54\,t_a}$$

$$s_2 = -\frac{(((t_b - 10\,t_a)\gamma^2 + (10\,t_a - t_b)\gamma)\theta\,\lambda_1 + ((10\,t_a - t_b)\gamma^2 + (t_b - 10\,t_a)\gamma)\theta)\lambda_2 + ((10\,t_a - t_b)\gamma_2 + (t_b - 10\,t_a)\gamma)\theta\,\lambda_1 - \gamma^3\theta^3 + ((t_b - t_a)\gamma^2 + (10\,t_a - t_b)\gamma)\theta}{((54\,t_a\gamma - 54\,t_a)\lambda_1 - 54\,t_a\gamma + 54\,t_a)\lambda_2 + (54\,t_a - 54\,t_a\gamma)\lambda_1 + 6\,\gamma^2\theta^2 - 54\,t_a}$$

$$p_2 = -\frac{\begin{gathered}(((4\,t_b - 40\,t_a - 9\,c)\gamma - 4\,t_b + 40\,t_a + 9\,c)\lambda_1 + (-4\,t_b + 40\,t_a + 9\,c)\gamma + 4\,t_b - 40\,t_a - 9\,c)\lambda_2 + \\ ((-4\,t_b + 40\,t_a + 9\,c)\gamma + 4\,t_b - 40\,t_a - 9\,c)\lambda_1 - 3\,\gamma^2\theta^2 + (4\,t_b - 4\,t_a)\gamma - 4\,t_b + 40\,t_a + 9\,c\end{gathered}}{((9\,\gamma - 9)\lambda_1 - 9\,\gamma + 9)\lambda_2 + (9 - 9\,\gamma)\lambda_1 - 9}$$

$$p_1 = \frac{\begin{gathered}(((4\,t_b + 32\,t_a + 9\,c)\gamma - 4\,t_b - 32\,t_a - 9\,c)\lambda_1 + (-4\,t_b - 32\,t_a - 9\,c)\gamma + 4\,t_b + 32\,t_a + 9\,c)\lambda_2 + \\ ((-4\,t_b - 32\,t_a - 9\,c)\gamma + 4\,t_b + 32\,t_a + 9\,c)\lambda_1 + 3\,\gamma^2\theta^2 + (4\,t_b - 4\,t_a)\gamma - 4\,t_b - 32\,t_a - 9\,c\end{gathered}}{((9\,\gamma - 9)\lambda_1 - 9\,\gamma + 9)\lambda_2 + (9 - 9\,\gamma)\lambda_1 - 9}$$

After this, manufacturers decide simultaneously prices and number of ads. Therefore, if we substitute de Bajos demand, x_b , into the outlet profit with the Bajos demand section and we differentiate with respect $p_{1,outlet}$ & $p_{2,outlet}$ we obtain:

$$\pi_{m1,outlet} = (w_1 - c)\left[\left(\gamma \frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\ \frac{t_b - p_1 + p_2}{2t_b}\right)\right] + (p_{1,outlet} - c)(1-\gamma)\left[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 \frac{t_b - p_{1,outlet} + p_{2,outlet}}{2t_b}\right] - z\frac{\lambda_1^2}{2}$$

$$\pi_{m2,outlet} = (w_2 - c)\left[\gamma\left(1 - \frac{t_a + \theta(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)\left(1 - \frac{t_b - p_1 + p_2}{2t_b}\right)\right)\right] + (p_{2,outlet} - c)(1-\gamma)\left[\lambda_2(1-\lambda_1) + \lambda_2\lambda_1(1 - \frac{t_b - p_{1,outlet} + p_{2,outlet}}{2t_b})\right] - z\frac{\lambda_2^2}{2}$$

$$\frac{\partial \pi_{m1,outlet}}{\partial p_{1,outlet}} = 0 \rightarrow p_{1,outlet} = -\frac{\lambda_2\left(t_b - p_{2,outlet} - c\right) - 2t_b}{2\lambda_2}$$

$$\frac{\partial \pi_{m2,outlet}}{\partial p_{2,outlet}} = 0 \rightarrow p_{2,outlet} = -\frac{\lambda_1\left(t_b - p_{1,outlet} - c\right) - 2t_b}{2\lambda_1}$$

We obtain:

$$p_{1,outlet} = \frac{4t_b\lambda_1 - \lambda_2\left((3t_b - 3c)\lambda_1 - 2t_b\right)}{2\lambda_1\lambda_2} \quad \text{and} \quad p_{2,outlet} = \frac{2t_b\lambda_1 - \lambda_2\left((3t_b - 3c)\lambda_1 - 4t_b\right)}{2\lambda_1\lambda_2}$$

Afterwards we differentiate the same profit functions from the manufacturers' outlet profits with respect λ_1 & λ_2:

$$\frac{\partial \pi_{m1,outlet}}{\partial \lambda_1} = 0$$

$$\lambda 1 = \frac{(((p_{1o} - c)t_b + (c - p_{1o})p_{2o} + p_{1o}^2 - c\,p_{1o})\gamma + (c - p_{1o})t_b + (p_{1o} - c)p_{2o} - p_{1o2} + c\,p_{1o})\lambda_2 + (2\,c - 2\,p_{1o})t_b\gamma + (2\,p_{1o} - 2\,c)t_b}{2\,t_b z}$$

$$\frac{\partial \pi_{m2,outlet}}{\partial \lambda_2} = 0$$

$$\lambda 2 = \frac{(((p_{2o} - c)t_b + p_{2o}^2 + (-p_{1o} - c)p_{2o} + c\,p_{1o})\gamma + (c - p_{2o})t_b - p_{2o}^2 + (p_{1o} + c)p_{2o} - c\,p_{1o})\lambda_1 + (2\,c - 2\,p_{2o})t_b\gamma + (2\,p_{2o} - 2\,c)t_b}{2\,t_b z}$$

As we are in a symmetric equilibrium we can presume $p_{1,outlet} = p_{2,outlet} = \boldsymbol{p_{outlet}}$ & $\lambda_1 = \lambda_2 = \boldsymbol{\lambda}$. Therefore we have two equations and two unknowns that we can solve it obtaining:

$$\lambda = \lambda_1 = \lambda_2 = \frac{t_b(2\gamma - 2)}{t_b(\gamma - 1) - 2z}$$

$$p_{outlet} = p_{1,outlet} = p_{2,outlet} = \frac{c\gamma - 2z - c}{\gamma - 1}$$

After finding the equilibrium values for the wholesale prices we substitute them to find the other unknown dependent variants:

$$p = \frac{\begin{gathered}(t_b^2\gamma^4 + (-4\,t_b z - 2\,t_b^2)\gamma^3 + (4\,z_2 + 4\,t_b z + t_b^2)\gamma^2)\theta^2 + (2\,t_b^3 - 2\,t_a t_b^2)\gamma^3 + ((8\,t_b^2 + (88\,t_a + 24\,c)t_b)z - 6\,t_b^3 + (-6\,t_a - 3\,c)t_b^2)\gamma^2 + \\ ((8\,t_b - 8\,t_a)z^2 + ((-128\,t_a - 36\,c)t_b - 16\,t_b^2)z + 6\,t_b^3 + (18\,t_a + 6\,c)t_b^2)\gamma + (-8\,t_b - 40\,t_a - 12\,c)z^2 + (8\,t_b^2 + (40\,t_a + 12\,c)t_b)z - 2\,t_b^3 + (-10\,t_a - 3\,c)t_b^2\end{gathered}}{(24\,t_b z - 3\,t_b^2)\gamma^2 + (6\,t_b^2 - 36\,t_b z)\gamma - 12\,z^2 + 12\,t_b z - 3t_b^2}$$

$$s = \frac{\begin{gathered}((3\,t_b^2 + 6\,t_a t_b)\gamma^3 + ((6\,t_b + 12\,t_a)z - 6\,t_b^2 - 12\,t_a t_b)\gamma^2 + ((-6\,t_b - 12\,t_a)z + 3\,t_b^2 + 6\,t_a t_b)\gamma)\theta \\ + (t_b\gamma^4 + (-2\,z - t_b)\gamma^3)\theta^3 + ((-3\,t_b^2 - 15\,t_a t_b)\gamma^3 + ((6\,t_a - 6\,t_b)z + 6\,t_b^2 + 21\,t_a t_b)\gamma^2 + ((6\,t_b + 12\,t_a)z - 3\,t_b^2 - 6\,t_a t_b)\gamma)\theta\end{gathered}}{(54\,t_a t_b\gamma^2 + (108\,t_a z - 108\,t_a t_b)\gamma - 108\,t_a z + 54\,t_a t_b)\gamma + (6\,t_b\gamma^3 + (-12\,z - 6\,t_b)\gamma^2)\theta^2 - 108\,t_a t_b\gamma^2 + 162\,t_a t_b\gamma + 108\,t_a z - 54\,t_a t_b}$$

$$w = \frac{\begin{gathered}(t_b^2\gamma^4 + (-4\,t_b z - 2\,t_b^2)\gamma^3 + (4\,z^2 + 4\,t_b z + t_b^2)\gamma^2)\theta^2 + (t_b^3 - t_a t_b^2)\gamma^3 + ((4\,t_b^2 + (68\,t_a + 24\,c)t_b)z - 3\,t_b^3 + (-6\,t_a - 3\,c)t_b^2)\gamma^2 + \\ ((4\,t_b - 4\,t_a)z^2 + ((-100\,t_a - 36\,c)t_b - 8\,t_b^2)z + 3\,t_b^3 + (15\,t_a + 6\,c)t_b^2)\gamma + (-4\,t_b - 32\,t_a - 12\,c)z^2 + (4\,t_b^2 + (32\,t_a + 12\,c)t_b)z - t_b^3 + (-8\,t_a - 3\,c)t_b^2\end{gathered}}{(24\,t\_b\,z - 3\,t\_b\hat{}2)\gamma\hat{}2 + (6\,t_b^2 - 36\,t_b z)\gamma - 12z\hat{}2 + 12\,t\_b\,z - 3\,t\_b\hat{}2}$$

$$\lambda = \frac{t_b(2\,\gamma - 2)}{t_b(\gamma - 1) - 2\,z}$$

$$p_{oulet} = \frac{c\,\gamma - 2\,z - c}{\gamma - 1}$$

$$\pi_r = (t_b\gamma^4 + (-2\,z - t_b)\gamma^3)\theta^3 + \left(\frac{t_b(2\,\gamma - 2)((3\,t_b^2 + 6\,t_a t_b)\gamma^3 + ((6\,t_b + 12\,t_a)z - 6\,t_b^2 - 12\,t_a t_b)\gamma^2 + ((-6\,t_b - 12\,t_a)z + 3\,t_b^2 + 6\,t_a t_b)\gamma)\theta}{t_b(\gamma - 1) - 2\,z}\right) \\ + \frac{\begin{gathered}(t_b^3 - t_a t_b^2)\gamma^3 + ((4\,t_b^2 + 20\,t_a t_b)z - 3\,t_b^3)\gamma^2 + ((4\,t_b - 4\,t_a)z^2 + (-8\,t_b^2 - 28\,t_a t_b)z + 3\,t_b^3 + 3\,t_a t_b^2)\gamma + \\ (-4\,t_b - 8\,t_a)z^2 + (4\,t_b^2 + 8\,t_a t_b)z - t_b^3 - 2\,t_a t_b^2\end{gathered}}{(24\,t_b z - 3\,t_b^2)\gamma^2 + (6\,t_b^2 - 36\,t_b z)\gamma - 12\,z^2 + 12\,t_b z - 3t_b^2}$$

$$\pi_m = \frac{\begin{gathered}\begin{pmatrix}(t_b^5 - t_a t_b^4)\gamma^7 + (8\,t_a t_b^3 z - 5\,t_b^5 + 4\,t_a t_b^4)\gamma^6 + ((-8\,t_b^3 - 24\,t_a t_b^2)z^2 - 24\,t_a t_b^3 z + 10\,t_b^5 - 6\,t_a t_b^4)\gamma^5 + \\ (32\,t_a t_b z^3 + (24\,t_b^3 + 48\,t_a t_b^2)z^2 + 24\,t_a t_b^3 z - 10\,t_b^5 + 4\,t_a t_b^4)\gamma^4 + (-16\,t_b z^4 + 8\,t_b^3 z^2 - t_b^5)\gamma^2\end{pmatrix}\theta^2 + \\ (tb6 - 2\,ta\,tb5 + ta2\,tb4)\gamma 6\end{gathered}}{\begin{gathered}(48\,t_a t_b^3 z - 6\,t_a t_b^4)\gamma^4 + (-192\,t_a t_b^2 z^2 - 144\,t_a t_b^3 z + 24\,t_a t_b^4)\gamma^3 + (192\,t_a t_b z^3 + 432\,t_a t_b^2 z^2 + 144\,t_a t_b^3 z - 36\,t_a t_b^4)\gamma^2 + \\ (-192\,t_a t_b z^3 - 288\,t_a t_b^2 z^2 - 48\,t_a t_b^3 z + 24\,t_a t_b^4)\gamma - 96 t_a z^4 + 48\,t_a t_b^2 z^2 - 6\,t_a t_b^4\end{gathered}}$$

FOC for Manufacturer and Retailers profits on marginal valuation of service θ:

$$\frac{\partial \pi_r}{\partial \theta} \rightarrow 3\,(t_b\gamma^4 + (-2\,z - t_b)\gamma^3)\theta^2 + \left(\frac{t_b(2\,\gamma - 2)(\,(3\,t_b^2 + 6\,t_a t_b)\gamma^3 + \,((6\,t_b + 12\,t_a)z - 6\,t_b^2 - 12\,t_a t_b)\gamma^2 + \,((-6\,t_b - 12\,t_a)z + 3\,t_b^2 + 6\,t_a t_b)\gamma)}{t_b(\gamma - 1) - 2\,z}\right) > 0 \quad \uparrow \boldsymbol{\theta} \rightarrow \uparrow \boldsymbol{\pi_{r1}}$$

$$\frac{\partial \pi_m}{\partial \theta} \rightarrow \frac{2\theta\begin{pmatrix}(t_b^5 - t_a t_b^4)\gamma^7 + (8\,t_a t_b^3 z - 5\,t_b^5 + 4\,t_a t_b^4)\gamma^6 + (\,(-8\,t_b^3 - 24\,t_a t_b^2)z^2 - 24\,t_a t_b^3 z + 10\,t_b^5 - 6\,t_a t_b^4)\gamma^5 + \\ (32\,t_a t_b z^3 + (24\,t_b^3 + 48\,t_a t_b^2)z^2 + 24\,t_a t_b^3 z - 10\,t_b^5 + 4\,t_a t_b^4)\gamma^4 + (-16\,t_b z^4 + 8\,t_b^3 z^2 - t_b^5)\gamma^2\end{pmatrix}}{\begin{matrix}(48\,t_a t_b^3 z - 6\,t_a t_b^4)\gamma^4 + (-192\,t_a t_b^2 z^2 - 144\,t_a t_b^3 z + 24\,t_a t_b^4)\gamma^3 + (192\,t_a t_b z^3 + 432\,t_a t_b^2 z^2 + 144\,t_a t_b^3 z - 36\,t_a t_{b4})\gamma^2 + \\ (-192\,t_a t_b z^3 - 288\,t_a t_b^2 z^2 - 48\,t_a t_b^3 z + 24\,t_a t_b^4)\gamma - 96 t_a z^4 + 48\,t_a t_b^2 z^2 - 6\,t_a t_b^4\end{matrix}} > 0 \qquad \uparrow \boldsymbol{\theta} \rightarrow \uparrow \boldsymbol{\pi_{m1}}$$

FOC for Manufacturer on percentage of Altos in the market γ:

$$\frac{\partial \pi_m}{\partial \gamma} \rightarrow \frac{-28\gamma^6 + 462\gamma^5 - 2120\gamma^4 + 3680\gamma^3 - 72\gamma}{84\gamma^4 - 624\gamma^3 + 1464\gamma^2 - 1008\gamma + 108} - \frac{(336\gamma^3 - 1872\gamma^2 + 2928\gamma - 1008)(-4\gamma^7 + 77\gamma^6 - 424\gamma^5 + 920\gamma^4 - 36\gamma^2)}{(84\gamma^4 - 624\gamma^3 + 1464\gamma^2 - 1008\gamma + 108)^2} < 0 \qquad \uparrow \gamma \rightarrow \uparrow \boldsymbol{\pi_m}$$

b.2. Elasticities

Elasticity of demand: At symmetric prices and advertising intensities, more informative advertising increases the elasticity of demand.

$$Q_1 = (1-\gamma)[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 x_b^*] = (1-\gamma)\left[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2\left(\frac{t_b - p_{1,outlet} + p_{2,outlet}}{2t_b}\right)\right]$$

$$\frac{\partial Q_1}{\partial p_{1,outlet}} = -\frac{(1-\gamma)\lambda_1\lambda_2}{2t_b}$$

$$\eta_1 = -\frac{\partial Q_1}{\partial p_{1,outlet}} \times \frac{p_{1,outlet}}{Q_1} = \frac{p_{1,outlet}\lambda_1\lambda_2}{2t_b(1-\gamma)\left(\left(\frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}\right)\lambda_1\lambda_2 + (1-\lambda_2)\lambda_1\right)}$$

If we evaluated at the symmetric equilibrium in which one we are solving the model $p_{outlet} = p_{1,outlet} = p_{2,outlet}$ and $\lambda = \lambda_1 = \lambda_2$:

$$\eta_1 = \frac{p_{outlet}\lambda_1}{2t_b - t_b\lambda_1} \qquad \frac{\partial \eta_1}{\partial \lambda} = \frac{p_{outlet} t_b \lambda_1}{(2t_b - t_b\lambda_1)^2} - \frac{p_{outlet}}{2t_b - t_b\lambda_1} > 0 \qquad \frac{\partial^2 \eta_1}{\partial^2 \lambda} = \frac{2p_{outlet} t_b}{(2t_b - t_b\lambda_1)^2} - \frac{p_{outlet} {t_b}^2 \lambda_1}{(2t_b - t_b\lambda_1)^3} < 0$$

$$\eta_1 = \frac{p_{outlet}\lambda_1}{2t_b - t_b\lambda_1} \qquad \frac{\partial \eta_1}{\partial p_{outlet}} = \frac{\lambda_1}{2t_b - t_b\lambda_1} > 0$$

b.3. Normalization

The results presented by normalizing the model with $t_a = 2 > t_b = 1$ & $z_{developing} = 4 > z_{developed} = 3 > \frac{t_i}{2}$, in addition in order to be able to compare two scenarios taking into consideration $\theta_a > \theta_{b,developing} > \theta_{b,developed} \neq 0$:

$$w = \frac{\sqrt{22\,\gamma}\,(12\,\gamma^2 + 60\,\gamma\, - 72) - 516\,\gamma}{\sqrt{22\,\gamma}\,(4\,\gamma^2 + 20\,\gamma\, - 24) - 2\gamma^3}$$

$$p = \frac{-4\gamma^3 + \sqrt{22\,\gamma}\,(56\,\gamma^2 + 280\,\gamma\, - 336) - 2064\gamma}{\sqrt{22\,\gamma}\,(4\,\gamma^2 + 20\,\gamma\, - 24) - 2\gamma^3}$$

$$s = \frac{\sqrt{22\gamma}\,\big(\,(30\,\gamma^4 + 36\,\gamma^3 - 294\,\gamma^2 + 348\,\gamma\, - 120)\theta_{b,developed} + \,(44\,\gamma^2 - 16\,\gamma)\theta_a\big)}{\sqrt{22\,\gamma}\,(12\,\gamma^3 + 12\,\gamma^2 - 312\,\gamma\, + 288) - 6\,\gamma^4}$$

$$\pi_m = \frac{-2\,\sqrt{22}\,\gamma^{3/2}\big(\sqrt{22\,\gamma}\,(12\,\gamma^2 + 60\,\gamma\, - 72) - 516\,\gamma\big)}{(4\,\gamma\, - 16)\big(-2\,\gamma^3 + \sqrt{22\,\gamma}\,\,(4\,\gamma^2 + 20\,\gamma\, - 24) + 1\big)}$$

$$\pi_r = \frac{\begin{gathered}(348\,\gamma\, - 120)\theta_{b,developed} + \,(44\,\gamma^2 - 16\,\gamma)\theta_a + \\ (1-\gamma)\big(\sqrt{22\gamma}\,(56\,\gamma^2 + 280\,\gamma\, - 336) - 4\,\gamma^3 - 2064\,\gamma\big)\end{gathered}}{\sqrt{22\,\gamma}\,(12\,\gamma^3 + 12\,\gamma^2) - 6\,\gamma^4}$$

$$\lambda = \frac{3\gamma + \sqrt{22\gamma} - 2}{8 - 2\gamma}$$

$$p_{oulet} = \frac{\gamma\sqrt{24 - 26\gamma}}{2 - 2\gamma}$$

B. Equilibrium in Developing Countries Scenario:

a. Model with No Outlets Malls:

a.1. Equilibrium

The manufactures profit functions are given by:

$$\pi_{m1} = (w_1 - c)[\gamma x_a + (1-\gamma)x_b] \qquad \pi_{m2} = (w_2 - c)[\gamma(1-x_a) + (1-\gamma)(1-x_b)]$$

The retailers profit functions are given by:

$$\pi_{r1} = (p_1 - w_1)[\gamma x_a + (1-\gamma)x_b] - s_1^2 \qquad \pi_{r2} = (p_2 - w_2)[\gamma(1-x_a) + (1-\gamma)(1-x_b)] - s_2^2$$

Where:

$x^*{}_a = \frac{t_a+\theta_a(s_1-s_2)-p_1+p_2}{2t_a}$ $x^*{}_b = \frac{t_b-p_1+p_2+\theta_b(s_1-s_2)}{2t_b}$

If we substitute in the retailer profit functions and differentiate with respect p_1 & p_2:

$$\pi_{r1} = (p_1 - w_1)\left[\gamma\left(\frac{t_a+\theta(s_1-s_2)-p_1+p_2}{2t_a}\right) + (1-\gamma)\left(\frac{t_b-p_1+p_2+\theta_b(s_1-s_2)}{2t_b}\right)\right] - s_1^2$$

$$\pi_{r2} = (p_2 - w_2)\left[\gamma\left(1-\left(\frac{t_a+\theta(s_1-s_2)-p_1+p_2}{2t_a}\right)\right) + (1-\gamma)\left(1-\frac{t_b-p_1+p_2+\theta_b(s_1-s_2)}{2t_b}\right)\right] - s_2^2$$

$$\frac{\partial \pi_{r1}}{\partial p_1} = 0 \rightarrow p_1 = \frac{((s_2-s_1)t_a\gamma + (s_1-s_2)t_a)\theta_b + (s_1-s_2)t_b\gamma\,\theta_a + ((t_b-t_a)w_1 + p_2 tb - p_2 t_a)\gamma + t_a w_1 + t_a t_b + p_2 t_a}{(2\,t_b - 2\,t_a)\gamma + 2\,t_a}$$

$$\frac{\partial \pi_{r2}}{\partial p_2} = 0 \rightarrow p_2 = -\frac{((s_2-s_1)t_a\gamma + (s_1-s_2)t_a)\theta_b + (s_1-s_2)t_b\gamma\,\theta_a + ((t_a-t_b)w_2 - p_1 t_b + p_1 t_a)\gamma - t_a w_2 - t_a t_b - p_1 t_a}{(2\,t_b - 2\,t_a)\gamma + 2\,t_a}$$

With this system of two equations and two unknowns we can solve it obtaining:

$$p_1 = \frac{((s_2-s_1)t_a\gamma + (s_1-s_2)t_a)\theta_b + (s_1-s_2)t_b\gamma\,\theta_a + ((t_b-t_a)w_2 + (2\,t_b - 2\,t_a)w_1)\gamma + t_a w_2 + 2\,t_a w_1 + 3\,t_a t_b}{(3\,t_b - 3\,t_a)\gamma + 3\,t_a}$$

$$p_2 = -\frac{((s_2-s_1)t_a\gamma + (s_1-s_2)t_a)\theta_b + (s_1-s_2)t_b\gamma\,\theta_a + ((2\,t_a - 2\,t_b)w_2 + (t_a-t_b)w_1)\gamma - 2\,t_a w_2 - t_a w_1 - 3\,t_a t_b}{(3\,t_b - 3\,t_a)\gamma + 3\,t_a}$$

Afterwards we substitute into the retailers ‘profit functions (π_{r1} & π_{r2}), we differentiate with respect s_1 & s_2 and solve these two equations to get:

$$\frac{\partial \pi_{r1}}{\partial s_1} = 0 \rightarrow$$

$$s_1 = \frac{(t_a^2\gamma^2 - 2\,t_a^2\gamma\ + t_a^2)\theta_b^2 + \ (2\,t_at_b\gamma\ - 2\,t_at_b\gamma^2)\theta_a\theta_b + t_b^2\gamma^2\theta_a^2 + (\,(-3\,t_b^2 + 6\,t_at_b - 3\,t_a^2)w_2 + \ (3\,t_b^2 - 6\,t_at_b + 3\,t_a^2)w_1)\gamma^2 + (\,(6\,t_a^2 - 6\,t_at_b)w_2 + \ (6\,t_at_b - 6\,t_a^2)w_1 - 9\,t_at_b^2 + 9\,t_a^2t_b)\gamma\ - 3\,t_a^2w_2 + 3\,t_a^2w_1 - 9\,t_a^2t_b}{(\,(3\,t_at_b - 3\,t_a^2)\gamma^2 + \ (6\,t_a^2 - 3\,t_at_b)\gamma\ - 3\,t_a^2)\theta_b + \ (\,(3\,t_at_b - 3\,t_b^2)\gamma^2 - 3\,t_at_b\gamma)\theta_a}$$

$$\frac{\partial \pi_{r2}}{\partial s_2} = 0 \rightarrow$$

$$s_2 = -\frac{(t_a^2\gamma^2 - 2\,t_a^2\gamma\ + t_a^2)\theta_b^2 + \ (2\,t_at_b\gamma\ - 2\,t_at_b\gamma^2)\theta_a\theta_b + t_b^2\gamma^2\theta_a^2 + (\,(-3\,t_b^2 + 6\,t_at_b - 3\,t_a^2)w_1 + \ (3\,t_b^2 - 6\,t_at_b + 3\,t_a^2)w_2)\gamma^2 + (\,(6\,t_a^2 - 6\,t_at_b)w_1 + \ (6\,t_at_b - 6\,t_a^2)w_2 - 9\,t_at_b^2 + 9\,t_a^2t_b)\gamma\ - 3\,t_a^2w_1 + 3\,t_a^2w_2 - 9\,t_a^2t_b}{(\,(3\,t_at_b - 3\,t_a^2)\gamma^2 + \ (6\,t_a^2 - 3\,t_at_b)\gamma\ - 3\,t_a^2)\theta_b + \ (\,(3\,t_at_b - 3\,t_b^2)\gamma^2 - 3\,t_at_b\gamma)\theta_a}$$

We substitute now x_a, x_b, p_1, p_2, s_1& s_2 into the manufacturers´profit functions π_{m1}&π_{m2}. Then we differentiate with respect w_1 & w_2 to obtain:

$$w_1 = \frac{(c\,t_b - c\,t_a)\gamma\ + 3\,t_at_b + c\,t_a}{(t_b - t_a)\gamma\ + t_a}$$

$$w_2 = \frac{(c\,t_b - c\,t_a)\gamma\ + 3\,t_at_b + c\,t_a}{(t_b - t_a)\gamma\ + t_a}$$

After finding the equilibrium values for the wholesale prices we substitute them to find the other unknown dependent variants:

$$p\ = \frac{45\,t_a^2t_b + 9\,c\,t_a^2 - \ (t_a^2\gamma^2 - 2\,t_a^2\gamma\ + t_a^2)\theta_b^2 - \big(\,(2\,t_at_b\gamma\ - 2\,t_at_b\gamma^2)\theta_a + \ (3\,t_at_b - 3\,t_a^2)\,\gamma^2 + \ (6\,t_a^2 - 3\,t_at_b)\,\gamma\ - 3\,t_a^{2\gamma}\big)\theta_b - t_b^2\gamma^2\theta_a^2 - (\,(3\,t_at_b - 3\,t_b^2)\,\gamma^2 - 3\,t_at_b\gamma)\theta_a - \ (-9\,c\,t_b^2 + 18\,c\,t_at_b - 9\,c\,t_a^2)\gamma^2 - (-45\,t_at_b^2 + \ (45\,t_a^2 - 18\,c\,t_a)t_b + 18\,c\,t_a^2)\gamma}{(9\,t_b^2 - 18\,t_at_b + 9\,t_a^2)\gamma^2 + \ (18\,t_at_b - 18\,t_a^2)\gamma + 9\,t_a^2}$$

$$s = \frac{9\,t_a^2t_b\ - \ (t_a^2\gamma^2 - 2\,t_a^2\gamma\ + t_a^2)\theta_b^2 - \ (2\,t_at_b\gamma\ - 2\,t_at_b\gamma^2)\theta_a\theta_b - t_b^2\gamma^2\theta_a^2 - \ (9\,t_a^2t_b - 9\,t_at_b^2)\gamma}{\big(\,(3\,t_at_b - 3\,t_a^2)\gamma^2 + \ (6\,t_a^2 - 3\,t_at_b)\gamma\ - 3\,t_a^2\big)\theta_b + \ \big(\,(3\,t_at_b - 3\,t_b^2)\gamma^2 - 3\,t_at_b\gamma\big)\theta_a}$$

$$w = \frac{(c\,t_b - c\,t_a)\gamma\ + 3\,t_at_b + c\,t_a}{(t_b - t_a)\gamma\ + t_a}$$

$$\pi_r\ = \frac{(4\,t_a^4\gamma^3 + 4\,t_a^4\gamma - t_a^4\gamma^4 - 6\,t_a^4\gamma^2\ - t_a^4)\theta_b^4 - \big((-4\,t_a^3t_b\gamma^4 + 12\,t_a^3t_b\gamma^3 - 12\,t_a^3t_b\gamma^2 + 4\,t_a^3t_b\gamma)\theta_a + \ (t_a^3t_b - t_a^4)\gamma^4 + \ (4\,t_a^4 - 3\,t_a^3t_b)\gamma^3 + \ (3\,t_a^3t_b - 6\,t_a^4)\gamma^2 + \ (4\,t_a^4 - t_a^3t_b)\gamma\ - t_a^4\big)\theta_b^3 - (6\,t_a^2t_b^2\gamma^4 - 12\,t_a^2t_b^2\gamma^3 + 6\,t_a^2t_b^2\gamma^2)\theta_a^2 - (\,(3\,t_a^3t_b - 3\,t_a^2t_b^2)\gamma^4 + \ (6\,t_a^2t_b^2 - 9\,t_a^3t_b)\gamma^3 + \ (9\,t_a^3t_b - 3\,t_a^2t_b^2)\gamma^2 - 3\,t_a^3t_b\gamma)\theta_a}{\Big((6\,t_a^2t_b^2 - 12\,t_a^3t_b + 6\,t_a^4)\gamma^4 + \ (-12\,t_a^2t_b^2 + 36\,t_a^3t_b - 24\,t_a^4)\gamma^3 + \ (6\,t_a^2t_b^2 - 36\,t_a^3t_b + 36\,t_a^4)\gamma^2 + (12\,t_a^3t_b - 24\,t_a^4)\gamma\ + 6\,t_a^4\Big)\theta_b^2 + (\,(6\,t_b^4 - 12\,t_at_b^3 + 6\,t_a^2t_b^2)\gamma^4 + \ (12\,t_at_b^3 - 12\,t_a^2t_b^2)\gamma^3 + 6\,t_a^2t_b^2\gamma^2)\theta_a^2}$$

$$\pi_m = \frac{3\, t_a t_b}{(2\, t_b - 2\, t_a)\gamma\ + 2\, t_a}$$

FOC for Manufacturers profits on marginal valuation of service θ_a & $\theta_b = 0$

FOC for Manufacturer on percentage of Altos in the market γ:

$$\frac{\partial \pi_m}{\partial \gamma} \rightarrow \frac{12}{(4-2\gamma)^2} > 0 \qquad \uparrow \gamma \ \rightarrow \uparrow \boldsymbol{\pi_m}$$

a.2. Normalization

The results presented by normalizing the model with $t_a = 2 >\ t_b = 1$ & $z_{developing} = 4 > z_{developed} = 3 > \frac{t_i}{2}$, in addition in order to be able to compare two scenarios taking into consideration $\theta_a > \theta_{b,developing} > \theta_{b,developed}\ \neq 0$:

$$w = \frac{6}{2-\ \gamma}$$

$$p = \frac{180 -\ (4\,\gamma^2 - 8\,\gamma\ + 4)\theta_{b,developing}^2 -\ ((4\,\gamma\ - 4\,\gamma^2)\theta_a - 6\,\gamma^3 + 18\,\gamma^2 - 12\,\gamma)\theta_{b,developed} - \gamma^2\theta_a^2 -\ (3\,\gamma^3 - 6\,\gamma^2)\theta_a - 90\,\gamma}{9\,\gamma^2 - 36\,\gamma\ + 36}$$

$$s = \frac{36 - (4\,\gamma^2 - 8\,\gamma\ + 4)\theta_{b,developed}^2 -\ (4\,\gamma\ - 4\,\gamma^2)\theta_a\theta_{b,developing} - \gamma^2\theta_a^2 - 18\,\gamma}{(-6\,\gamma^2 + 18\,\gamma\ - 12)\theta_{b,developing} +\ (3\,\gamma^2 - 6\,\gamma)\theta_a}$$

$$\pi_m = \frac{6}{4 - 2\,\gamma}$$

$$\pi_r = \frac{(12\,\gamma^4 - 24\,\gamma^3 + 12\,\gamma^2)\theta_a^2 +\ (6\,\gamma^4 - 24\,\gamma^3 + 30\,\gamma^2 - 12\,\gamma)\theta_a - (8\,\gamma^4 - 32\,\gamma^3 + 48\,\gamma^2 - 32\,\gamma\ + 8)\theta_{b,developing}^4 + ((-16\,\gamma^4 + 48\,\gamma^3 - 48\,\gamma^2 + 16\,\gamma)\theta_a - 4\,\gamma^4 + 20\,\gamma^3 - 36\,\gamma^2 + 28\,\gamma\ - 8)\theta_{b,developing}^3}{(12\,\gamma^4 - 72\,\gamma^3 + 156\,\gamma^2 - 144\,\gamma\ + 48)\theta_{b,developing}^2 + (3\,\gamma^4 - 12\,\gamma^3 + 12\,\gamma^2)\theta_a^2}$$

b. Model with Outlets Malls:

b.1. Equilibrium

The manufactures profit functions are given by:

$$\pi_{m1}' = (w_1 - c)\left[(\gamma x_a^*) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\, {x^*}_{b,uninf}\right)\right] + \pi_{1,outlet}' \quad \text{and}$$

$$\pi_{m2}' = (w_2 - c)\left[\gamma(1 - x_a^*) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)\left(1 - {x^*}_{b,uninf}\right)\right)\right] + \pi_{2,outlet}'$$

with:

$$\pi_{1,outlet}' = \left(p_{1,outlet} - c\right)(1-\gamma)\left[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 x_{b,inf}^*\right] - z\frac{\lambda_1^2}{2}$$

$$\pi_{2,outlet}' = \left(p_{2,outlet} - c\right)(1-\gamma)\left[\lambda_2(1-\lambda_1) + \lambda_2\lambda_1(1 - x_{b,inf}^*)\right] - z\frac{\lambda_2^2}{2}$$

The retailers profit functions are given by:

$$\pi_{r1}' = (p_1 - w_1)\left[(\gamma x_a^*) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\, {x^*}_{b,uninf}\right)\right] - s_1^2 \quad \text{and}$$

$$\pi_{r2}' = (p_2 - w_2)\left[\gamma(1 - x_a^*) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)\left(1 - {x^*}_{b,uninf}\right)\right)\right] - s_2^2$$

Where:

$${x^*}_a = \frac{t_a + \theta_a(s_1 - s_2) - p_1 + p_2}{2t_a}\ , {x^*}_{b,uninformed} = \frac{t_b - p_1 + p_2 + \theta_b(s_1 - s_2)}{2t_b}\ and\ {x^*}_{b,informed} = \frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}$$

Looking at the retailers functions we start by differentiating with respect the prices with just the A*ltos* demand ${x_a}^*$:

$$\pi_{r1}' = (p_1 - w_1)\left[\gamma\left(\frac{t_a+\theta_a(s_1-s_2)-p_1+p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\left(\frac{t_b-p_1+p_2+\theta_b(s_1-s_2)}{2t_b}\right)\right)\right] - s_1^2 \quad \text{and}$$

$$\pi_{r2}' = (p_2 - w_2)\left[\gamma(1 - \left(\frac{t_a + \theta_a(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\left(1 - \frac{t_b - p_1 + p_2 + \theta_b(s_1 - s_2)}{2t_b}\right)\right)\right]) - s_2^2$$

$$\frac{\partial {\pi'}_{r1}}{\partial p_1} = 0 \rightarrow$$

$$p_1 = \frac{\begin{gathered}((((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta_b + (-t_a w_1 - t_a t_b - p_2 t_a)\gamma + t_a w_1 + t_a t_b + p_2 t_a)\lambda_1 + ((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b + (t_a w_1 + t_a t_b + p_2 t_a)\gamma - t_a w_1 - t_a t_b - p_2 t_a)\lambda_2 + \\ (((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b + (t_a w_1 + t_a t_b + p_2 t_a)\gamma - t_a w_1 - t_a t_b - p_2 t_a)\lambda_1 + ((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta_b + (s_1 - s_2)t_b\gamma\,\theta_a + ((t_b - t_a)w_1 + p_2 t_b - p_2 t_a)\gamma + \\ t_a w_1 + t_a t_b + p_2 t_a\end{gathered}}{((2\,t_a\gamma - 2\,t_a)\lambda_1 - 2\,t_a\gamma + 2\,t_a)\lambda_2 + (2\,t_a - 2\,t_a\gamma)\lambda_1 + (2\,t_a - 2\,t_b)\gamma - 2\,t_a}$$

$$\frac{\partial \pi'_{r2}}{\partial p_2} = 0 \rightarrow$$

$$p_2 = \frac{\begin{gathered}((((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta_b + (t_a w_2 + t_a t_b + p_1 t_a)\gamma - t_a w_2 - t_a t_b - p_1 t_a)\lambda 1 + ((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b + (-t_a w_2 - t_a t_b - p_1 t_a)\gamma + t_a w_2 + t_a t_b + p_1 t_a)\lambda_2 + \\ (((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b + (-t_a w_2 - t_a t_b - p_1 t_a)\gamma + t_a w_2 + t_a t_b + p_1 t_a)\lambda_1 + ((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta_b + (s_1 - s_2)t_b\gamma\,\theta_a + ((t_a - t_b)w_2 - p_1 t_b + p_1 t_a)\gamma - \\ t_a w_2 - t_a t_b - p_1 t_a\end{gathered}}{((2\,t_a\gamma - 2\,t_a)\lambda 1 - 2\,t_a\gamma + 2\,t_a)\lambda 2 + (2\,t_a - 2\,ta\,\gamma)\lambda_1 + (2\,t_a - 2\,t_b)\gamma - 2\,t_a}$$

With this system of two equations and two unknowns we can solve obtaining:

$$p_1 = \frac{\begin{gathered}((((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta_b + (-t_a w_2 - 2\,t_a w_1 - 3\,t_a t_b)\gamma + t_a w_2 + 2\,t_a w_1 + 3\,t_a t_b)\lambda_1 + ((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b)\lambda_2 + \\ (((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b + (t_a w_2 + 2\,t_a w_1 + 3\,t_a t_b)\gamma - t_a w_2 - 2\,t_a w_1 - 3\,t_a t_b)\lambda 1 + ((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta b + \\ (s_1 - s_2)t_b\gamma\,\theta_a + ((t_b - t_a)w_2 + (2\,t_b - 2\,t_a)w_1)\gamma + t_a w_2 + 2\,t_a w_1 + 3\,t_{at_b}\end{gathered}}{((3\,t_a\gamma - 3\,t_a)\lambda_1 - 3\,t_a\gamma + 3\,t_a)\lambda_2 + (3\,t_a - 3\,t_a\gamma)\lambda_1 + (3\,t_a - 3\,t_b)\gamma - 3\,t_a}$$

$$p_2 = \frac{\begin{gathered}((((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta_b + (2\,t_a w_2 + t_a w_1 + 3\,t_a t_b)\gamma - 2\,t_a w_2 - t_a w_1 - 3\,t_a t_b)\lambda_1 + ((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b)\lambda_2 + \\ (((s_1 - s_2)t_a\gamma + (s_2 - s_1)t_a)\theta_b + (-2\,t_a w_2 - t_a w_1 - 3\,t_a t_b)\gamma + 2\,t_a w_2 + t_a w_1 + 3\,t_a t_b)\lambda_1 + ((s_2 - s_1)t_a\gamma + (s_1 - s_2)t_a)\theta_b \\ + (s_1 - s_2)t_b\gamma\,\theta_a + ((2\,t_a - 2\,t_b)w_2 + (t_a - t_b)w_1)\gamma - 2\,t_a w_2 - t_a w_1 - 3\,t_{at_b}\end{gathered}}{((3\,t_a\gamma - 3\,t_a)\lambda_1 - 3\,t_a\gamma + 3\,t_a)\lambda_2 + (3\,t_a - 3\,t_a\gamma)\lambda_1 + (3\,t_a - 3\,t_b)\gamma - 3\,t_a}$$

Using the same procedure as before with s_1 & s_2 and solving these two equations we get:

$$\frac{\partial \pi'_{r1}}{\partial s_1} = 0 \rightarrow$$

$$s_1 = \frac{\begin{gathered}((t_a\gamma^2 - 2\,t_a\gamma + t_a)\theta_b\lambda_1^2 + (-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a)\theta_b\lambda_1 + (t_a\gamma^2 - 2\,t_a\gamma + t_a)\theta_b)\lambda_2^2 + \\ \big((-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a)\theta_b\lambda_1^2 + ((3\,t_a\gamma^2 - 7\,t_a\gamma + 4\,t_a)\theta_b + (t_b\gamma - t_b\gamma^2)\theta_a)\lambda_1 + (-t_a\gamma^2 + 3\,t_a\gamma - 2\,t_a)\theta_b + (t_b\gamma^2 - t_b\gamma)\theta_a\big)\lambda_2 \\ + (t_a\gamma^2 - 2\,t_a\gamma + t_a)\theta_b\lambda_1^2 + ((-t_a\gamma^2 + 3\,t_a\gamma - 2\,t_a)\theta_b + (t_b\gamma^2 - t_b\gamma)\theta_a)\lambda_1 + (t_a - t_a\gamma)\theta_b + t_b^{\gamma}\theta_a\end{gathered}}{((3\,t_a\gamma - 3\,t_a)\lambda_1 - 3\,t_a\gamma + 3\,t_a)\lambda_2 + (3\,t_a - 3\,t_a\gamma)\lambda_1 + (3\,t_a - 3\,t_b)\gamma - 3\,t_a}$$

$$\frac{\partial \pi'_{r2}}{\partial s_2} = 0 \rightarrow$$

$$s_2 = \frac{-\left(\left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\lambda_1^2 + \left(-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a\right)\theta_b\lambda_1 + \left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\right)\lambda_2^2 - \left(\left(-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a\right)\theta_b\lambda_1^2 + \left(\left(3\,t_a\gamma^2 - 7\,t_a\gamma + 4\,t_a\right)\theta_b + \left(t_b\gamma - t_b\gamma^2\right)\theta_a\right)\lambda_1 + \left(-t_a\gamma^2 + 3\,t_a\gamma - 2\,t_a\right)\theta_b + \left(t_b\gamma^2 - t_b\gamma\right)\theta_a\right)\lambda_2 - \left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\lambda_1^2 - \left(\left(-t_a\gamma^2 + 3\,t_a\gamma - 2\,t_a\right)\theta_b + \left(t_b\gamma^2 - t_b\gamma\right)\theta_a\right)\lambda_1 - \left(t_a - t_a\gamma\right)\theta_b - t_b\gamma\,\theta_a}{\left(\left(3\,t_a\gamma - 3\,t_a\right)\lambda_1 - 3\,t_a\gamma + 3\,t_a\right)\lambda_2 + \left(3\,t_a - 3\,t_a\gamma\right)\lambda_1 + \left(3\,t_a - 3\,t_b\right)\gamma - 3\,t_a}$$

We substitute now $x_a, x^*{}_{b,uninformed}, x^*{}_{b,informed}\ p_1, p_2, s_1 \&\ s_2$ into the manufacturers´profit functions $\pi_{m1} \& \pi_{m2}$. Then we differentiate and solve with respect w_1 & w_2 to obtain:

$$\frac{\partial \pi_{m1}}{\partial w_1} = 0 \rightarrow w_1 = \frac{\left(\left(\left(3\,t_a t_b + c\,t_a\right)\gamma - 3\,t_a t_b - c\,t_a\right)\lambda_1 + \left(-3\,t_a t_b - c\,t_a\right)\gamma + 3\,t_a t_b + c\,t_a\right)\lambda_2 + \left(\left(-3\,t_a t_b - c\,t_a\right)\gamma + 3\,t_a t_b + c\,t_a\right)\lambda_1 + \left(c\,t_a - c\,t_b\right)\gamma - 3\,t_a t_b - c\,t_a}{\left(\left(t_a\gamma - t_a\right)\lambda_1 - t_a\gamma + t_a\right)\lambda_2 + \left(t_a - t_a\gamma\right)\lambda_1 + \left(t_a - t_b\right)\gamma - t_a}$$

$$\frac{\partial \pi_{m2}}{\partial w_2} = 0 \rightarrow \quad w_2 = \frac{\left(\left(\left(3\,t_a t_b + c\,t_a\right)\gamma - 3\,t_a t_b - c\,t_a\right)\lambda_1 + \left(-3\,t_a t_b - c\,t_a\right)\gamma + 3\,t_a t_b + c\,t_a\right)\lambda_2 + \left(\left(-3\,t_a t_b - c\,t_a\right)\gamma + 3\,t_a t_b + c\,t_a\right)\lambda_1 + \left(c\,t_a - c\,t_b\right)\gamma - 3\,t_a t_b - c\,t_a}{\left(\left(t_a\gamma - t_a\right)\lambda_1 - t_a\gamma + t_a\right)\lambda_2 + \left(t_a - t_a\gamma\right)\lambda_1 + \left(t_a - t_b\right)\gamma - t_a}$$

We substitute the values of w_1, w_2 into the other variables in order to have all just depending on advertising and the different cost for the next step:

$$s_1 = -\frac{\left(\left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\lambda_1^2 + \left(-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a\right)\theta_b\lambda_1 + \left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\right)\lambda_2^2 + \left(\left(-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a\right)\theta_b\lambda_1^2 + \left(\left(3\,t_a\gamma^2 - 7\,t_a\gamma + 4\,t_a\right)\theta_b + \left(t_b\gamma - t_b\gamma^2\right)\theta_a\right)\lambda_1 + \left(-t_a\gamma^2 + 3\,t_a\gamma - 2\,t_a\right)\theta_b + \left(t_b\gamma^2 - t_b\gamma\right)\theta_a\right)\lambda_2 - \left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\lambda_1^2 - \left(\left(-t_a\gamma^2 + 3\,t_a\gamma - 2\,t^a\right)\theta_b + \left(t_b\gamma^2 - t_b\gamma\right)\theta_a\right)\lambda_1 + \left(t_a - t_a\gamma\right)\theta_b + t_b\gamma\,\theta_a}{\left(\left(3\,t_a\gamma - 3\,t_a\right)\lambda_1 - 3\,t_a\gamma + 3\,t_a\right)\lambda_2 + \left(3\,t_a - 3\,t_a\gamma\right)\lambda_1 + \left(3\,t_a - 3\,t_b\right)\gamma - 3\,t_a}$$

$$s_2 = -\frac{\left(\left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\lambda_1^2 + \left(-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a\right)\theta_b\lambda_1 + \left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\right)\lambda_2^2 + \left(\left(-2\,t_a\gamma^2 + 4\,t_a\gamma - 2\,t_a\right)\theta_b\lambda_1^2 + \left(\left(3\,t_a\gamma^2 - 7\,t_a\gamma + 4\,t_a\right)\theta_b + \left(t_b\gamma - t_b\gamma^2\right)\theta_a\right)\lambda_1 + \left(-t_a\gamma^2 + 3\,t_a\gamma - 2\,t_a\right)\theta_b + \left(t_b\gamma^2 - t_b\gamma\right)\theta_a\right)\lambda_2 - \left(t_a\gamma^2 - 2\,t_a\gamma + t_a\right)\theta_b\lambda_1^2 - \left(\left(-t_a\gamma^2 + 3\,t_a\gamma - 2\,t_a\right)\theta_b + \left(t_b\gamma^2 - t_b\gamma\right)\theta_a\right)\lambda_1 + \left(t_a - t_a\gamma\right)\theta_b + t_b\gamma\,\theta_a}{\left(\left(3\,t_a\gamma - 3\,t_a\right)\lambda_1 - 3\,t_a\gamma + 3\,t_a\right)\lambda_2 + \left(3\,t_a - 3\,t_a\gamma\right)\lambda_1 + \left(3\,t_a - 3\,t_b\right)\gamma - 3\,t_a}$$

$$p_2 = \frac{\left(\left(\left(4\,t_a t_b + c\,t_a\right)\gamma - 4\,t_a t_b - c\,t_a\right)\lambda_1 + \left(-4\,t_a t_b - c\,t_a\right)\gamma + 4\,t_a t_b + c\,t_a\right)\lambda_2 + \left(\left(-4\,t_a t_b - c\,t_a\right)\gamma + 4\,t_a t_b + c\,t_a\right)\lambda_1 + \left(c\,t_a - c\,t_b\right)\gamma - 4\,t_a t_b - c\,t_a}{\left(\left(t_a\gamma - t_a\right)\lambda_1 - t_a\gamma + t_a\right)\lambda_2 + \left(t_a - t_a\gamma\right)\lambda_1 + \left(t_a - t_b\right)\gamma - t_a}$$

$$p_1 = \frac{\left(\left(\left(4\,t_a t_b + c\,t_a\right)\gamma - 4\,t_a t_b - c\,t_a\right)\lambda_1 + \left(-4\,t_a t_b - c\,t_a\right)\gamma + 4\,t_a t_b + c\,t_a\right)\lambda_2 + \left(\left(-4\,t_a t_b - c\,t_a\right)\gamma + 4\,t_a t_b + c\,t_a\right)\lambda 1 + \left(c\,t_a - c\,t_b\right)\gamma - 4\,t_a t_b - c\,t_a}{\left(\left(t_a\gamma - t_a\right)\lambda_1 - t_a\gamma + t_a\right)\lambda_2 + \left(t_a - t_a\gamma\right)\lambda_1 + \left(t_a - t_b\right)\gamma - t_a}$$

After this, manufacturers decide simultaneously prices and number of ads. Therefore, if we substitute de Bajos demand, x_b , into the outlet profit with the Bajos demand section and we differentiate with respect $p_{1,outlet}$ & $p_{2,outlet}$ we obtain:

$$\pi_{m1,outlet} = (w_1 - c)\left[\left(\gamma \frac{t_a + \theta_a(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_1)(1-\lambda_2)\ \frac{t_b - p_1 + p_2 + \theta_b(s_1 - s_2)}{2t_b}\right)\right]$$
$$+ \left(p_{1,outlet} - c\right)(1-\gamma)\left[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 \frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}\right] - z\frac{\lambda_1^2}{2}$$

$$\pi_{m2,outlet} = (w_2 - c)\left[\gamma\left(1 - \frac{t_a + \theta_a(s_1 - s_2) - p_1 + p_2}{2t_a}\right) + \left((1-\gamma)(1-\lambda_2)(1-\lambda_1)\left(1 - \frac{t_b - p_1 + p_2 + \theta_b(s_1 - s_2)}{2t_b}\right)\right)\right]$$
$$+ \left(p_{2,outlet} - c\right)(1-\gamma)\left[\lambda_2(1-\lambda_1) + \lambda_2\lambda_1(1 - \frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b})\right] - z\frac{\lambda_2^2}{2}$$

$$\frac{\partial \pi_{m1,outlet}}{\partial p_{1,outlet}} = 0 \rightarrow p_{1,outlet} = -\frac{\lambda_2\left(t_b - p_{2,outlet} - c\right) - 2t_b}{2\lambda_2}$$

$$\frac{\partial \pi_{m2,outlet}}{\partial p_{2,outlet}} = 0 \rightarrow p_{2,outlet} = -\frac{\lambda_1\left(t_b - p_{1,outlet} - c\right) - 2t_b}{2\lambda_1}$$

We obtain:

$$p_{1,outlet} = \frac{4t_b\lambda_1 - \lambda_2\left((3t_b - 3c)\lambda_1 - 2t_b\right)}{2\lambda_1\lambda_2} \quad \text{and} \quad p_{2,outlet} = \frac{2t_b\lambda_1 - \lambda_2\left((3t_b - 3c)\lambda_1 - 4t_b\right)}{2\lambda_1\lambda_2}$$

Afterwards we differentiate the same profit functions from the manufacturers' outlet profits with respect λ_1 & λ_2:

$$\frac{\partial \pi_{m1,outlet}}{\partial \lambda_1} = 0$$

$$\lambda_1 = \frac{(((p_{1o} - c)t_b + (c - p_{1o})p_{2o} + p_{1o}^2 - c\,p_{1o})\gamma\ +\ (c - p_{1o})t_b + (p_{1o} - c)p_{2o} - p_{1o}^2 + c\,p_{1o})\lambda_2 + (2\,c - 2\,p_{1o})t_b\gamma\ +\ (2\,p_{1o} - 2\,c)t_b}{2\,t_b z}$$

$$\frac{\partial \pi_{m2,outlet}}{\partial \lambda_2} = 0$$

$$\lambda_2 = \frac{(((p_{2o} - c)t_b + p_{2o}^2 + (-p_{1o} - c)p_{2o} + c\,p_{1o})\gamma\ +\ (c - p_{2o})t_b - p_{2o}^2 + (p_{1o} + c)p_{2o} - c\,p_{1o})\lambda_1 + (2\,c - 2\,p_{2o})t_b\gamma\ +\ (2\,p_{2o} - 2\,c)t_b}{2\,t_b z}$$

As we are in a symmetric equilibrium we can presume $p_{1,outlet} = p_{2,outlet} = \boldsymbol{p_{outlet}}$ & $\lambda_1 = \lambda_2 = \boldsymbol{\lambda}$. Therefore we have two equations and two unknowns that we can solve it obtaining:

$$\lambda = \lambda_1 = \lambda_2 = \frac{\sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} + (3\,t_b - 2\,c)\gamma - 2\,t_b + 4\,c}{+2\,z + 2\,t_b - 4\,c - (2\,t_b - 4\,c)\gamma}$$

$$p_{outlet} = p_{1,outlet} = p_{2,outlet} = \frac{\sqrt{(-8\,t_b z - 2\,t_b^2)\gamma + 8\,t_b z} + (t_b + 2\,c)\gamma - 2\,c}{2 - 2\,\gamma}$$

After finding the equilibrium values for the wholesale prices we substitute them to find the other unknown dependent variants:

$$p = \frac{\begin{gathered}(-4\,t_a t_b^4 + (t_a^2 + 16\,c\,t_a)t_b^3 + (4\,c\,t_a^2 - 16\,c^2 t_a)t_b^2 + 4\,c^2 t_a^2 t_b)\gamma^3 + \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} \\ (\,(14\,t_a^2 t_b^2 + 32\,c\,t_a^2 t_b + 8\,c^2 t_a^2)\gamma^2 + (\,(28\,t_a^2 t_b + 8\,c\,t_a^2)z - 14\,t_a^2 t_b^2 - 32\,c\,t_a^2 t_b - 8\,c2\,t_a^2)\gamma + (-28\,t_a^2 t_b - 8\,c\,t_a^2)z) + \\ \left(\begin{gathered}(8\,c\,t_a^2 - 8\,c\,t_a t_b)z^2 + (\,(-168\,t_a^2 - 16\,c\,t_a)t_b^2 + (8\,c\,t_a^2 + 32\,c^2 t_a)t_b - 16\,c^2 t_a^2)z + (-12\,t_a^2 - 8\,c\,t_a)t_b^3 + (172\,c\,t_a^2 + 32\,c^2 t_a)t_b^2 + \\ (-24\,c^2 t_a^2 - 32\,c^3 t_a)t_b + 16\,c^3 t_a^2\end{gathered}\right)\gamma\end{gathered}}{\begin{gathered}(-4\,t_b^4 + (t_a + 16\,c)t_b^3 + (4\,c\,t_a - 16\,c^2)t_b^2 + 4\,c^2 t_a t_b)\gamma^3 + \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} \\ \left(\,(2\,t_a t_b^2 + 4\,c\,t_a t_b)\gamma^2 + (4\,t_a t_b z - 2\,t_a t_b^2 - 4\,c\,t_a t_b)\gamma - 4\,t_{a t_b z}\right)\end{gathered}}$$

$$s = \frac{\begin{gathered}\sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} \\ \left(\left(\begin{gathered}(15\,t_a t_b^2 - 4\,c\,t_a t_b - 4\,c^2 t_a)\gamma^4 + (\,(20\,t_a t_b - 8\,c\,t_a)z - 42\,t_a t_b^2 + 16\,c\,t_a t_b + 8\,c^2 t_a)\gamma^3 + (\,(36\,c\,t_a - 62\,t_a t_b)z + 39\,t_a t_b^2 - 16\,c\,t_a t_b - 4\,c^2 t_a)\gamma^2 + \\ (\,(62\,t_a t_b - 52\,c\,t_a)z - 12\,t_a t_b^2)\gamma + (24\,c\,t_a - 20\,t_a t_b)z + 4\,c\,t_a t_b\end{gathered}\right)\theta_b + \right. \\ \left. (\,(\,(10\,t_b^2 - 12\,c\,t_b)z + 14\,t_b^3 - 48\,c\,t_b^2 + 40\,c^2 t_b)\gamma^2 + (\,(8\,c\,t_b - 4\,t_b^2)z - 4\,t_b^3 + 16\,c\,t_b^2 - 16\,c^2 t_b)\gamma)\theta_a\right)\end{gathered}}{\begin{gathered}(-12\,t_b^4 + (3\,t_a + 72\,c)t_b^3 + (6\,c\,t_a - 144\,c^2)t_b^2 + (96\,c^3 - 12\,c^2 t_a)t_b - 24\,c^3 t_a)\gamma^4 + \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} \\ \left(\begin{gathered}(6\,t_a t_b^2 - 24\,c^2 t_a)\gamma^3 + (\,(6\,t_a t_b - 36\,c\,t_a)z - 12\,t_a t_b^2 + 48\,c_a^{2t})\gamma^2 + \\ (-12\,t_a z^2 + (60\,c\,t_a - 18\,t_a t_b)z + 6\,t_a t_b^2 - 24\,c^2 t_a)\gamma + 12\,t_a z^2 + (12\,t_a t_b - 24\,c\,t_a)z\end{gathered}\right)\end{gathered}}$$

$$w = \frac{\begin{gathered}\sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} \\ (\,(6\,t_a t_b^2 + 14\,c\,t_a t_b + 4\,c^2 t_a)\gamma^2 + (\,(12\,t_a t_b + 4\,c\,t_a)z - 6\,t_a t_b^2 - 14\,c\,t_a t_b - 4\,c^2 t_a)\gamma + (-12\,t_a t_b - 4\,c\,t_a)z) + \\ \left((4\,c\,t_a - 4\,c\,t_b)z^2 + (\,(-84\,t_a - 8\,c)t_b^2 + (4\,c\,t_a + 16\,c^2)tb - 8\,c^2 t_a)z + (-6\,t_a - 4\,c)t_b^3 + (86\,c\,t_a + 16\,c^2)t_b^2 + (-12\,c^2 t_a - 16\,c^3)t_b + 8\,c^3 t_a\right)\gamma\end{gathered}}{(-4\,t_b^3 + (t_a + 16\,c)t_b^2 + (4\,c\,t_a - 16\,c^2)t_b + 4\,c^2 t_a)\gamma^3 + \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b}(\,(2\,t_a t_b + 4\,c\,t_a)\gamma^2 + (4\,t_a z - 2\,t_a t_b - 4\,c\,t_a)\gamma - 4\,t_a z)}$$

$$\lambda = \frac{\sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} + (3\,t_b - 2\,c)\gamma - 2\,t_b + 4\,c}{(2\,t_b - 4\,c)\gamma - 2\,z - 2\,t_b + 4\,c}$$

$$p_{oulet} = \frac{\sqrt{(-8\,t_b z - 2\,t_b^2)\gamma + 8\,t_b z} + (t_b + 2\,c)\gamma - 2\,c}{2 - 2\,\gamma}$$

$$\pi_r = \frac{(1-\gamma)\left(\begin{array}{c} (((62\,t_a t_b - 52\,c\,t_a)z - 12\,t_a t_b^2)\gamma + (24\,c\,t_a - 20\,t_a t_b)z + 4\,c\,t_a t_b)\theta_b + \\ (((10\,t_b^2 - 12\,c\,t_b)z + 14\,t_b^3 - 48\,c\,t_b^2 + 40\,c^2 t_b)\gamma^2 + ((8\,c\,t_b - 4\,t_b^2)z - 4\,t_b^3 + 16\,c\,t_b^2 - 16\,c^2 t_b)\gamma)\theta_a + \\ \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b}\,((14\,t_a^2 t_b^2 + 32\,c\,t_a^2 t_b + 8\,c^2 t_a^2)\gamma^2 + ((28\,t_a^2 t_b + 8\,c\,t_a^2)z - 14\,t_a^2 t_b^2 - 32\,c\,t_a^2 t_b - 8\,c^2 t_a^2)\gamma + (-28\,t_a^2 t_b - 8\,c\,t_a^2)z) + \\ (-4\,t_a t_b^4 + (t_a^2 + 16\,c\,t_a)t_b^3 + (4\,c\,t_a^2 - 16\,c^2 t_a)t_b^2 + 4\,c^2 t_a^2 t_b)\gamma^3 + \\ ((8\,c\,t_a^2 - 8\,c\,t_a t_b)z^2 + ((-168\,t_a^2 - 16\,c\,t_a)t_b^2 + (8\,c\,t_a^2 + 32\,c^2 t_a)t_b - 16\,c^2 t_a^2)z + (-12\,t_a^2 - 8\,c\,t_a)t_b^3 + (172\,c\,t_a^2 + 32\,c^2 t_a)t_{b2} + (-24\,c^2 t_a^2 - 32\,c^3 t_a)t_b + 16\,c^3 t_a^2)\gamma \end{array}\right)}{\begin{array}{c} ((3\,t_a + 72\,c)t_b^3 + (6\,c\,t_a - 144\,c^2)t_b^2 + (96\,c^3 - 12\,c^2 t_a)t_b - 12\,t_b^4 - 24\,c^3 t_a)\gamma^4 + \\ \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b}\,((6\,t_a t_b^2 - 24\,c^2 t_a)\gamma^3 + ((6\,t_a t_b - 36\,c\,t_a)z - 12\,t_a t_b^2 + 48\,c^2 t_a)\gamma^2) \end{array}}$$

$$\pi_m = \frac{\begin{array}{c} ((2\,c\,t_b - 2\,c\,t_a)z^2 + ((42\,t_a + 4\,c)t_b^2 + (-2\,c\,t_a - 8\,c^2)t_b + 4\,c^2 t_a)z + (3\,t_a + 2\,c)t_b^3 + (-43\,c\,t_a - 8\,c^2)t_b^2 + (6\,c^2 t_a + 8\,c^3)t_b - 4\,c^3 t_a)\gamma^2 \\ \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} + ((-24\,t_a t_b^3 - 56\,c\,t_a t_b^2 - 16\,c^2 t_a t_b)z + 6\,t_a t_b^4 + 38\,c\,t_a t_b^3 + 84\,c^2 t_a t_b^2 + 72\,c^3 t_a t_b + 16\,c^4 t_a)\gamma^4 + \\ \left((-48\,t_a t_b^2 - 16\,c\,t_a t_b)z^2 + (60\,t_a t_b^3 + 164\,c\,t_a t_b^2 + 96\,c^2 t_a t_b + 16\,c^3 t_a)z - 6\,t_a t_b^4 - 50\,c\,t_a t_b^3 - 112\,c^2 t_a t_b^2 - 80c^3 t_a t_b - 16\,c^4 t_a\right)\gamma^3 + \\ ((96\,t_a t_b^2 + 32\,c\,t_a t_b)z^2 + (-36\,t_a t_b^3 - 132\,c\,t_a t_b^2 - 88\,c^2 t_a t_b - 16\,c^3 t_a)z + 12\,c\,t_a t_b^3 + 28\,c^2 t_a t_b^2 + 8\,c^3 t_a t_b)\gamma^2 + \\ ((-48\,t_a t_b^2 - 16\,c\,t_a t_b)z^2 + (24\,c\,t_a t_b^2 + 8\,c^2 t_a t_b)z)\gamma \end{array}}{\begin{array}{c} (-4\,t_b^4 + (t_a + 24\,c)t_b^3 + (2\,c\,t_a - 48\,c^2)t_b^2 + (32\,c^3 - 4\,c^2 t_a)t_b - 8\,c^3 t_a)\gamma^4 + \sqrt{(8\,t_b z - 2\,t_b^2 - 8\,c\,t_b - 8\,c^2)\gamma - 8\,t_b z + 4\,c\,t_b} \\ ((2\,t_a t_b^2 - 8\,c^2 t_a)\gamma^3 + ((2\,t_a t_b - 12\,c\,t_a)z - 4\,t_a t_b^2 + 16\,c^2 t_a)\gamma^2 + (-4\,t_a z^2 + (20\,c\,t_a - 6\,t_a t_b)z + 2\,t_a t_b^2 - 8\,c^2 t_a)\gamma + 4\,t_a z^2 + (4\,t_a t_b - 8\,c\,t_a)z) + \\ \left((4\,t_b^3 + (-t_a - 16\,c)t_b^2 + (16\,c^2 - 4\,c\,t_a)t_b - 4\,c^2 t_a)z + 4\,t_b^4 + (-t_a - 24\,c)t_b^3 + (48\,c^2 - 2\,c\,t_a)t_b^2 + (4\,c^2 t_a - 32c^3)t_b + 8\,c^3 t_a\right)\gamma^3 + \\ (t_b^2 - 4\,c^2)\gamma + (-t_b - 2\,c)z - t_b^2 + 4\,c^2 \end{array}}$$

FOC for Manufacturers profits on marginal valuation of service θ_a & $\theta_b = 0$

FOC for Manufacturer on percentage of Altos in the market γ:

$$\frac{\partial \pi_m}{\partial \gamma} \rightarrow \frac{-336\gamma^3 - 468\gamma^2 - 1596\gamma - 384}{-2\gamma^4 + 10\gamma^3 - 51\gamma + 45} - \frac{(-8\gamma^3 + 30\gamma^2 - 51)(-84\gamma^4 - 156\gamma^3 + 798\gamma^2 - 384\gamma)}{(-2\gamma^4 + 10\gamma^3 - 51\gamma + 45)^2} < 0 \qquad \uparrow\gamma \rightarrow \uparrow \boldsymbol{\pi_m}$$

b.2. Elasticities

Elasticity of demand: At symmetric prices and advertising intensities, more informative advertising increases the elasticity of demand.

$$Q_1 = (1-\gamma)[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2 x_b^*] = (1-\gamma)\left[\lambda_1(1-\lambda_2) + \lambda_1\lambda_2\left(\frac{t_b - p_{1,outlet} + p_{2,outlet}}{2t_b}\right)\right]$$

$$\frac{\partial Q_1}{\partial p_{1,outlet}} = -\frac{(1-\gamma)\lambda_1\lambda_2}{2t_b}$$

$$\eta_1 = -\frac{\partial Q_1}{\partial p_{1,outlet}} \times \frac{p_{1,outlet}}{Q_1} = \frac{p_{1,outlet}\lambda_1\lambda_2}{2t_b(1-\gamma)\left(\left(\frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}\right)\lambda_1\lambda_2 + (1-\lambda_2)\lambda_1\right)}$$

If we evaluated at the symmetric equilibrium in which one we are solving the model $p_{outlet} = p_{1,outlet} = p_{2,outlet}$ and $\lambda = \lambda_1 = \lambda_2$:

$$\eta_1 = \frac{p_{outlet}\lambda_1}{2t_b - t_b\lambda_1} \qquad \frac{\partial \eta_1}{\partial \lambda} = \frac{p_{outlet}t_b\lambda_1}{(2t_b - t_b\lambda_1)^2} - \frac{p_{outlet}}{2t_b - t_b\lambda_1} > 0 \qquad \frac{\partial^2 \eta_1}{\partial^2 \lambda} = \frac{2p_{outlet}t_b}{(2t_b - t_b\lambda_1)^2} - \frac{p_{outlet}{t_b}^2\lambda_1}{(2t_b - t_b\lambda_1)^3} < 0$$

$$\eta_1 = \frac{p_{outlet}\lambda_1}{2t_b - t_b\lambda_1} \qquad \frac{\partial \eta_1}{\partial p_{outlet}} = \frac{\lambda_1}{2t_b - t_b\lambda_1} > 0$$

However to take into account the impact of θ_b on the elasticity of demand, if we don't take into account symmetric equilibrium:

$$\eta_1 = \frac{p_{1,outlet}\lambda_1\lambda_2}{2t_b\left(\left(\frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}\right)\lambda_1\lambda_2 + (1-\lambda_2)\lambda_1\right)} \qquad \frac{\partial \eta_1}{\partial \theta_b} = -\frac{p_{1,outlet}(s_1 - s_2){\lambda_1}^2{\lambda_2}^2}{4{t_b}^2\left(\left(\frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}\right)\lambda_1\lambda_2 + (1-\lambda_2)\lambda_1\right)^2} < 0$$

$$\frac{\partial^2 \eta_1}{\partial^2 \theta_b} = \frac{2p_{1,outlet}(s_1 - s_2)^2{\lambda_1}^3{\lambda_2}^3}{4{t_b}^3\left(\left(\frac{t_b + \theta_b(s_1 - s_2) - p_{1,outlet} + p_{2,outlet}}{2t_b}\right)\lambda_1\lambda_2 + (1-\lambda_2)\lambda_1\right)^3} > 0$$

b.3. Normalization

The results presented by normalizing the model with $t_a = 2 > \ t_b = 1$ & $z_{developing} = 4 > z_{developed} = 3 > \frac{t_i}{2}$, in addition in order to be able to compare two scenarios taking into consideration $\theta_a > \theta_{b,developing} > \theta_{b,developed} \ \neq 0$:

$$w = \frac{\sqrt{30\,\gamma}\,(12\,\gamma^2 + 84\,\gamma\ - 96) - 684\,\gamma}{\sqrt{30\,\gamma}\,(4\,\gamma^2 + 28\,\gamma\ - 32) - 2\gamma^3}$$

$$p = \frac{-4\gamma^3 + \sqrt{30\,\gamma}\,(56\,\gamma^2 + 392\,\gamma\ - 448) - 2736\gamma}{\sqrt{30\,\gamma}\,(4\,\gamma^2 + 28\,\gamma\ - 32) - 2\gamma^3}$$

$$s = \frac{\sqrt{30\gamma}\,\big(\,(30\,\gamma^4 + 76\,\gamma^3 - 418\,\gamma^2 + 472\,\gamma\ - 160)\theta_{b,developing} +\ (54\,\gamma^2 - 20\,\gamma)\theta_a\big)}{\sqrt{30\,\gamma}\,(12\,\gamma^3 + 24\,\gamma^2 - 516\,\gamma\ + 480) - 6\,\gamma^4}$$

$$\pi_m = \frac{-2\sqrt{30}\,\gamma^{3/2}\big(\sqrt{30\,\gamma}\,(12\,\gamma^2 + 84\,\gamma\ - 96) - 684\,\gamma\big)}{(4\,\gamma\ - 20)\big(-2\,\gamma^3 + \sqrt{30\,\gamma}\,(4\,\gamma^2 + 28\,\gamma\ - 32) + 1\big)}$$

$$\pi_r = \frac{\begin{array}{c}(472\,\gamma\ - 160)\theta_{b,developing} +\ (54\,\gamma^2 - 20\,\gamma)\theta_a + \\ (1-\gamma)\big(\sqrt{30\gamma}\,(56\,\gamma^2 + 392\,\gamma\ - 448) - 4\,\gamma^3 - 2736\,\gamma\big)\end{array}}{\sqrt{30\,\gamma}\,(12\,\gamma^3 + 24\,\gamma^2) - 6\,\gamma^4}$$

$$\lambda = \frac{3\gamma + \sqrt{30\gamma} - 2}{10 - 2\gamma}$$

$$p_{oulet} = \frac{\gamma\sqrt{32 - 34\gamma}}{2 - 2\gamma}$$