High-Tech Products and the Double Adverse Selection: Does Commercial Distribution Worsen Efficiency?

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We all know that information about products drives consumption choices. But knowledge comes first. Without the correct consciousness about products, even with complete information inefficient outcomes may result. The adverse selection problem is revisited in this paper, successfully interpreting what happens any time when, even if a contract is complete and the information about the good being sold known, consumers either do not know enough about the existence of some relevant characteristic of products, or do not fully understand their specifications. One can argue that intermediaries (e.g., shop-assistants) can solve the issue. But, unfortunately, this is not true. Intermediaries affect market mechanism, alter consumption experiences and can even create incentives for firms to cheat. This implies that high quality firms should quit commercial distribution to create self-owned mono brand dedicated shops, where assistants are educated (since they work directly for the producer), any asymmetry is equilibrated and the incentive to cheat for firms is ceased. The total social welfare will be increased and, in qualitative terms, consumers buy something that fits better their preferences.

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Introduction

When a consumer goes to buy high tech products, very often she does not exactly know the basket of characteristics of the product she is going to buy. Usually, she does not know how many qualities are available, as well. She knows her own needs, which functions the good being purchased should have, maybe some aesthetic idea, but nothing more. Only informed consumers, -i.e. individuals who can perfectly distinguish among products, have complete information. Remaining consumers (uninformed) buy products that are somehow unknown to them: to some extent their purchase builds upon trust in intermediaries, such as advisors or shop assistants. Resulting outcomes are predictably inefficient, since these intermediaries can be either ignorant (maybe less than consumers, but still ignorant enough to alter market mechanism) or not interested as they should be in consumer satisfaction. Thus, some products seem to fit consumer needs, just because those needs are defined in an incomplete way, and because those products are presented vaguely, without the correct amount of details. Resulting outcome is that differentiation strategies fail to obtain desired results, in case they are based on details that will be neglected.

Let us imagine what happens when a consumer decides to buy a CD player. Maybe she will be careful to check that it can program a track list, that it has a friendly remote, but it is hard to expect that she knows how important is the jitter error of the laser beam, or how much either the signal-to-noise ratio or the dynamic range or the total harmonic distortion can influence the listening experience. If, e.g., an audio equipment exhibits a total harmonic distortion index (THD) less than 1%, it is defined HIGH FIDELITY (HIFI henceforth). Therefore, a famous brand, can correctly say to sell HIFI audio equipment even if its product rates $\text{THD} = 0.9\%$. Are consumers able to understand the difference between that product and another one that rates, say, $\text{THD} = 0.65\%$? Since this difference is basically observable just after listening the equipment, and since this difference emerges clearly only if the listening experience is conducted comparatively with both equipments available at the same time, and since the correct understanding of the meaning of the THD index is rare, the reply
to the question is no. If two qualities of the same good were provided, two perfectly identical players, except for the THD index, with a little difference in price, the greater part of consumers will buy the lower priced one.

Alternatively, one can argue that a consumer could decide to buy a player that possibly satisfies less important needs, on the basis of a secondary function (let us say, shuffle play) compared to another that, instead, is technologically better (say, a lower THD index) but without that secondary function. This happens because the consumer does not know (and does not give the correct weight to) fundamental specifications. After one hour of continue listening with headphones at medium volume, with a player that rates \( \text{THD} = 0.9\% \), consumer’s ears will be tired and, also after the listening is terminated, will hear light rumours, as a pavement below any other sound, that will take several minutes to vanish. This problem is completely absent (in same conditions of use) if the player rates \( \text{THD} = 0.01\% \).

This kind of effects are very difficult to be predicted by consumers: no one can have doubts that if a consumer had known these consequences before the purchase, she surely would have bought another CD player, with a lower THD index, even without the shuffle play! Thus, the reader must be aware that the point here is not a matter of preference! No one would buy a distortive sound player, if the idea of the added distortion is known in acoustic terms as it should be. This is just an example, but many other characteristics can be considered or thousands of examples in the high tech sector can be done, such as: cache memory level in CPUs for personal computers, vertex/shader calculation capacity and memory amounts for video cards, plasma/LCD/LED technological details for TV sets, and many more.

The rationale is unique: consequences of ignorance in market actions. This ignorance cannot be solved because sources of information about this kind of topics are difficult to reach and to understand. The focus is on the ignorance about important details. These details are not blinded by the seller, in the attempt to complete the transaction at a “wrong” price: these specifications are just difficult to understand, barely known. Therefore, even if the seller applies an honest price segmentation of her products, unavoidably an asymmetric bargaining occurs: if consumers knew real
characteristics of products they would choose to pay the difference. This problem is so true that in many situations, producers’ pricing strategies are not based on what they should refer to (-i.e. fundamental specifications) but, instead, on secondary options, referring solely to particulars that consumers are aware of!

From another point of view, this builds a strong incentive for mimicking strategies of producers and correspondingly reduce the authentic differentiation: some of producers take advantage of the ignorance of consumers and sell low-profile products at high prices thanks to their brand appeal. Thus, in the market, three firms type will exists: high prices firms with authentic high quality, high prices firms with mimicking strategy with low quality, and low prices firms with low quality. The first and the third types are perfectly and easily recognizable: in fact, very well known brand producers decide to sell very high quality products at high prices, whereas unknown brand producers place their products in a low-price segment and therefore they are perfectly recognizable as well. The mimicking firms (the second group) obtain positive extra profits, thanks to ignorant consumers, who trust the “brand-high price” signal and incur in the bad purchase.

This paper aims to show therefore that the traditional meaning of adverse selection is not sufficient to describe the truly existing asymmetry in the market. This asymmetry is constituted by two parts: the first comes from a lack of information (this is the well known adverse selection that every microeconomic textbook describes recalling Akerlof, 1970); the second comes from a lack of knowledge. This is not responsibility of any seller. But this creates inefficiencies and bad purchases. This, further, creates the incentive for firms to cheat, relying on the ignorance of consumers. Only intermediaries can operate as “knowledge-providers-on-demand”.

However, intermediaries, such as shopassistants, are not always able to accomplish their function, either because of their ignorance or due to other interests. Consider the case when a distributor store is relevantly interested in selling a particular brand, or a particular model, for any reason: what will the shop assistant do if that brand, or that model, is not better than another? Maybe, apart from moral hazard issues between worker and principal, if the assistant has to give a suggestion, probably she will try to pursue his principal’s profit. Consequent distortions can affect distributive channels chosen by producers to sell their products and their profits.
The model here considers these issues because tries to cope with a broader definition of asymmetric information. The adverse selection occurring when buyers and sellers do not share the same informative set is usually described as the situation where one of the two contract parts is endowed with more information than the other, before the transaction happens. This incompleteness generates sub-optimal results, widely known in literature. But this kind of asymmetry is not the only one: consumer’s choices are driven by what she knows. Thus, from this perspective, it does not really matter how informed is the seller: the buyer chooses adversely because she ignores the existence (or does not understand characteristics) of something else that could fit better his preferences. In a very simple textbook model of rational consumer choice, we could depict the situation in which an individual allocates all his income between a TV set and good-x (say, clothes), according to his preferences, subject to his budget constraint. But, let us ask a question: which TV set? The sole type he knows.

The problem, then, is a lack of knowledge, not just of information. This, in turn, requires a new approach to describe how agents decide and how their incentives are structured. This broader definition of adverse selection, which tries to enlarge the idea of limited-rationality invoked by the mainstream literature, will allow a deeper understanding of many actual circumstances, when consumers choose rationally in a limited-knowledge context.

This links the model more to the literature about selling strategies than to the one about adverse selection. Eventually, the lack of information in incomplete contracts and the signalling strategies to solve it have widely been treated in lots of previous contributions, since the famous papers by Akerlof (1970), Spence (1974) and Rothschild and Stiglitz (1976), Wolinsky (1983), Engers an Fernandez (1987), and many more. Literature about selling strategies accounts for the relation between influence on buyers and ignorance. Examples of this kind of contributions are Wagner et al. (2001), Schmitz (2007), Fay and Xie (2010).

The correct consciousness about the goods that are being consumed is the very core of the work by Bui et al. (2008), where the asked question is exactly how to know what is inside a drink. The reason behind this contribution is that if consumers knew exactly how harmful the alcohol consumption is, they would certainly moderate it. The same insight comes
from Kopp and Kemp (2007), about funeral services and related laws: capability to choose in a limited rationality and knowledge context. The theoretical definition of *merit goods* lies underneath our argument: what Musgrave (1957) told us in a way is in fact that there are goods that are not fully evaluated and the policy maker can intervene to solve the inefficiency arising from the lack of consciousness.

Furthermore, the self-confidence that consumers feel about their decisions leads to a deeper research for their satisfaction, as documented by Loibl *et al.* (2009). This can imply that less aware consumers are exactly those who do not search enough and who rely on salespersons. From another perspective, the difference between ignorance and information is the leading perspective in Rotfeld’s words (2008), who underlined how consumers are not just pawns to be moved. They can have (and of course they should have) the correct consciousness to maximize their utility. Otherwise, most of the economic theory addressed to define and analyse drivers of preferences’ satisfaction should be reconsidered as a delegation problem that acknowledges solely a fundamental role in intermediaries who influence consumers’ purchase decisions.

Our model obtains two results. First of all, it shows that two sources of asymmetry exist: incomplete information and ignorance. Secondly, it demonstrates that if intermediaries act honestly to defend consumers’ interests, the issue is solved, with net gain in terms of social welfare: general quality of products will be improved, low-quality products will disappear, mimicking firms have no more incentives to cheat. Third, it gives the evidence of a possibly misleading role of commercial distribution: as long as producers are not involved is the final sale, they have the incentive to mimic, with lower satisfaction for consumers and lower well-being for the entire society. On the contrary, if producers quit the commercial distribution and create self-owned mono brand dedicated shops, their shop-assistants will be responsibly educated to support buyers, without any other incentive to sell wrong products. This happens because if the owner of the store is not simply a distributor (with his own profit objectives) but is exactly the producer of the products, the result of the sale will impact on the reputation of the brand and so does the actual quality of the sold goods (both in absolute and in relative-comparative terms).
Then, the idea of adverse selection is being redesigned: what literature already knows is an “absolute” definition of adverse selection: e.g., the buyer does not know that a second-hand car has an almost broken engine. Here, a “relative-comparative” adverse selection problem appears: e.g., the buyer chooses a product because she does not know (or fully understand) its and other product’s specifications; therefore the comparative analysis and the choice mechanism both fail to lead to the best outcome and preferences are not fully satisfied (sometimes unconsciously, i.e. the consumer is not fully satisfied and she does not think she could have had more). Responsibility is assigned: this is a matter of knowledge, not just of information.

Section two presents the model, and section three will conclude.

A model of double adverse selection

In this model, I hypothesize that consumers do not know exactly quality of goods: they know just the final appearance, they can judge the correspondence to advertised technology, and maybe they can be endorsed by a sufficient level of knowledge to judge their consumption experience. Only a very little part of them know actual characteristics of technological goods. It often occurs that “a friend”, “a colleague” or, more generally, “someone” who is supposed to be an expert, suggests the final choice. Finally, the shop-assistant works to address the purchase to some good in particular. In what follows, we will never consider the principal-agent problem between a shop assistant and the owner of the shop. We will suppose they have the same incentive profile. The reason for this highly simplifying assumption is that the model here is not addressed to study how far can be a worker’s behaviour from hers principal’s profit maximization. This topic is widely known and already analysed in literature. The point here is, instead, to study consumers’ side to find how exogenous factors can alter their satisfaction, very often unconsciously.

A continuum of consumer and firms exists. Products are of two types: high tech high profile goods (high quality) and standard tech low profile goods (low quality). Their prices are different because of factors of production, technology embedded, and production processes; in particular standard tech goods costs less than high tech food. Firms are of two types:
famous brand and no brand. The first type produces the high tech high profile good (HQ henceforth), and sells it at the correct high price HP. The second type produces the standard tech low profile good (LQ henceforth), and sells it at the correct low price LP. The setting must be amended because, in the first group of firms, some producers use their famous brand to hide an LQ good behind an HQ branded appearance.

So we have three groups of firms, and the difference between firms in the second and the third type is that they sell the same product differently: branded (high price) and unbranded (low price). Their quality level is the same, the price is different. However, consumers do not know that quality of goods produced by the second and third type is the same, unless they buy it. Technological products are not experience goods, since the correct knowledge can make every consumer able to choose without hesitation among all different opportunities for his consumption.

The lack of information transforms the setting of the problem, which assumes characteristics of experience consumption. This complicates further the issue, since the consumption cannot be a complete source of information: e.g., if a consumer buys an integrated stereo amplifier of a given channel power, he will simply observe that it sounds (as it is absolutely obvious to happen), but nobody will buy two, three, or four amplifiers to compare them in his own living room! Moreover, since in some store every consumer may ask to listen the audio components, their experience will give information just about those elements that are used in the trial. Theoretically speaking, a perfectly informed consumer, endowed with complete knowledge on technological standards, may ask to listen precisely some models, instead of those already present in the shop.

**Summing up:**
- the first type of firms is made of \( N_1 \) producers, split in two groups: the first is populated by \( N_1^A \) producers who sell their high quality products (HQ) at high prices (HP); the second counts \( N_1^B \) producers who sell their standard quality products (LQ) at high price (HP) to mimic high quality and obtain higher profits;
• the second type of firms is made of $N_2$ producers selling their standard quality products at the correct low price (LP).

For simplicity, in the model the number of firms has been normalized to one, so that $N^A_1 + N^B_1 + N_2 = N = 1$.

Since consumers cannot observe quality, but they can rely solely on prices, their choice is affected by a lack of information. Moreover they suffer also by a lack of knowledge. Because of the lack of information, part of consumers will not be able to distinguish among high prices products: they are all interested in high quality products, but they can’t properly distinguish between them, and therefore, some of them incurs in the bad purchase (buying LQ at HP). Because of the lack of knowledge, part of consumers who ignore characteristics of HQ products will decide to buy LQ at low prices.

Summing up, we consider three groups of consumers:

• the first group is populated by $M^A_1$ consumers, who buy HQ products at correct HP prices, because they do not suffer either from the lack of knowledge or from the lack of information;

• the second group is populated by $M^B_1$ consumers, who want to buy HQ products, and are willing to pay HP prices, but, unfortunately for them, they suffer from lack of information; thus, a part of them $(\beta M^B_1)$ will incur in the bad purchase, even if the remaining part $((1 - \beta)M^B_1)$ will fortunately reach their goal;

• the third group is populated by $M_2$ consumers, who buy LQ products at LP prices and reach their goal. It must be noted that these consumers either decide to buy LQ products because they suffer from lack of knowledge and therefore do not understand the difference. Alternatively, it could be said also that they understand to be ignorant and, since do not find how to learn what they need, decide to avoid the risk to incur in the bad purchase.

For simplicity, in the model the number of consumers has been normalized to one, so that $M^A_1 + M^B_1 + M_2 = M = 1$. 
Each consumer buys one good and, of course, he maximizes his own utility. The net utility for consumers is defined as the difference between the quality value $jQ$, net of paid price $jP$, ($j = H, L$)

$$U = jQ - jP$$

(1)

The eq. (1) is founded on the same idea that is used in literature about quality and differentiation; e.g., Cooper and Ross (1984), Perloff and Salop (1985), and Albrecht et al. (2002). An important assumption is that aware consumers do prefer HQ goods, since it is assumed

$$HQ - HP > LQ - LP$$

(2)

Who mistakenly buys the low-quality good at high price, (the bad purchase) obtains

$$LQ - HP < 0$$

(3)

Who does not suffer from none of the adverse selection sources buys high quality equipment at the correct high price, since difference in quality is worth the difference in prices, as shown in eq. (2). Then, it is

$$HQ - HP > LQ - LP > LQ - HP$$

(4)

Further details are needed in order to explain consumers’ decisions. Consumers can decide to buy the HQ good because know exactly how good it is, how satisfactory it is, and definitely because they know rationally that the increase in quality is greater than the increase in price. This is the same position that is assumed by those who suffer from lack of information (first source of adverse selection): their problem is that they cannot recognize HQ
as well as they should and look exclusively to the price signal in order to make their choice for a quality purchase. Finally, those who ignore the difference between technological qualities, choose to buy the LQ good (second source of adverse selection).

Possible outcomes for consumers in $M^A_1$ and in $M^B_2$ groups are easily predicted

$$(HQ - HP) \text{ for } M^A_1 \text{ consumers, and}$$

$$(LQ - LP) \text{ for } M^B_2 \text{ consumers.}$$

The problem is different for $M^B_1$ consumers, since their possible outcome is given by the following expected value:

$$EU(M^B_1) = \frac{N^A_1}{N^A_1 + N^B_1} (HQ - HP) + \frac{N^B_1}{N^A_1 + N^B_1} (LQ - HP)$$

The first addend is the probability to find an HQ producer anyway, while the second addend is the probability to suffer the negative outcome deriving from a bad purchase.

A first result of the model comes out from the eq. (6): an increase in knowledge about technology, information about product characteristics, and, broadly speaking, increasing the average awareness level of buyers actively operate to reduce the second addend: it is evident that eq. (6) is decreasing in $N^B_1$ and vanishes if consumers do not suffer from lack of information. Here the role of shop assistant would be central.

Let us rethink the problem, following a completely different approach and accounting for social welfare distribution, to obtain again and definitely the desired result.

Firms know differences between HQ and LQ. Firms are supposed to be identical, with same technology and for simplicity I will assume no fixed
costs. Total costs of each firm depend on chosen quantity \( (q) \) and quality \( (jQ) \), as widely assumed in literature (see for example for similar cost functions, Shapiro, 1982, Cooper and Ross, 1984, and Albrecht et al., 2002):

\[
TC = c(q, jQ)q
\]  

(7)

therefore, two different cost specifications can emerge, according to two different qualities:

\[
TC^{HQ} = c(q, HQ)q
\]  

(8)

\[
TC^{LQ} = c(q, LQ)q
\]  

(9)

and, of course, \( TC^{HQ} > TC^{LQ} \). Profits of HQ producers are defined by (remember that we are hypothesizing for simplicity that each consumer buys only one unit):

\[
\pi^{HQ} = [HP - c(q, HQ)][M_1^A + (1 - \beta)M_1^B]
\]  

(10)

In similar way, profits of sincere LQ producers can be written as:

\[
\pi^{LQ} = [LP - c(q, LQ)]M_2
\]  

(11)

Mimicking firms have a different profit profile, which can be written as

\[
\pi^{MIM} = [HP - c(q, LQ)]\beta M_1^B
\]  

(12)
where, $\beta \in (0,1)$ is the share of $M^B_1$ consumers who buy from a mimicking firm.

Correspondingly, in eq. (10), we find the $(1-\beta)$ share of “lucky” $M^B_1$ consumers who buy from HQ firms. The incentive to cheat for firms arises because $\pi^{MIM} > \pi^{HQ} = \pi^{LQ}$. Two assumptions have been imposed here: the first is that profits for cheaters are greater than other possible profits; the second is that HQ and LQ producers earn equal profits. The latter does not constitute an incentive to cheat, it is a simplifying assumption that is added to focus exclusively on the asymmetric information problem. Relaxing this assumption, however, does not revert necessarily results of the model. Consider, as a reinforcing example, that Albrecht et al. (2002), assume null profits for firms in equilibrium, as they impose free entry/free exit market conditions. I apply the same hypothesis, and therefore this implies that

$$jP = c(q, jQ)$$

(13)

for each HQ and LQ producers. Then, the profit differential that cheating firms will benefit (against each consumer) is equal to the damage of wrong purchases. In particular, recalling eq. (13), one can write that $\pi^{HQ} = 0$, $\pi^{LQ} = 0$, and consequently that:

$$\Delta\pi = \pi^{MIM} - \pi^{HQ/LQ} = HP - LP$$

(14)

Looking at our problem in welfare terms, I now analyse both side of the market to check what happens whether information and knowledge are available.

The source of consumers’ welfare loss is twofold: the first part derives directly form the first kind of asymmetry, -i.e. consumers who want the high quality product but do not distinguish it and buy the standard quality product paying the high price, $(HP - LQ)$, which is exactly the profit differential going to cheating firms; and the second part derives
indirectly from the second kind of asymmetry, i.e. consumers who ignore some characteristics and buy standard goods (or, possibly, risk-averse consumers who prefer to buy the standard good to avoid the probability of the loss caused by the adverse selection). Thus, such sources of consumers’ loss can be written as the sum of the loss suffered by $\beta M_1^B$ consumers who buy from the $N_1^B$ cheaters, plus the loss suffered by $M_2$ consumers who consciously buy the LQ good (due to either ignorance or risk-aversion). That is:

$$\text{consumer loss} = \beta M_1^B (HP - LQ) + M_2 \left[ (HQ - HP) - (LQ - LP) \right] > 0$$

(15)

If shop-assistant play the correct role, and help consumers as they are supposed to do, giving required information and awareness, they can solve the issue, improving total welfare because consequent consumer gains are greater than the restriction mimicking firms’ profits. Then, competent shop-assistants increase social welfare if the value expressed by eq. (15) is greater than the value in eq. (12), i.e. if

$$\beta M_1^B (HP - LQ) + M_2 \left[ (HQ - HP) - (LQ - LP) \right] > [HP - c(q, LQ)] \beta M_1^B$$

(16)

Recalling that the bad purchase has the same value of the positive profit differential for each unit sold, i.e.

$$(HP - LQ) = [HP - c(y, LQ)]$$

(17)

since it is

$$M_2 \left[ (HQ - HP) - (LQ - LP) \right] > 0$$
eq. (16) is true. Q.E.D.

This conclusion demonstrates that if shop-assistant act in order to inform about actual characteristics of HQ goods, allowing consumers to choose with perfect information, social welfare will be overall increased, since the loss for consumers that is consequent to the asymmetric information is greater than the reduction of profits suffered by mimicking firms by knowledge and information diffusion. Of course, from our point of view, the case with perfectly competent shop assistants gives the same outcome obtained in mono-brand shops, referring exclusively to the problem of consumers’ awareness about goods’ specifications.

When consumers are not ignorant and perfectly informed, cheating firms disappear, since no one will buy from them: mimicking profit in eq. (12) is zero. Also LQ producers will migrate to HQ productions, since we assumed $HQ - HP > LQ - LP$, therefore aware consumers will buy only HQ products. Be the reader aware that from model’s perspective, the difference between HQ and LQ is not a matter of differentiation among valuable characteristics: this is the reason why, if high quality specification is perfectly revealed, only HQ products will be sold in the market.

If producers sell their products by distributive channels with imperfectly informed intermediaries in stores, they can obtain mimicking profits since ignorance of consumers meets the imperfect action played by shop-assistants. On the contrary, as aforementioned, equivalently in both the case of mono brand self-owned shops and the case of commercial distribution with perfectly informed intermediaries, they obtain $\pi^{HQ}$.

So, in a static-one-period setting, the model demonstrates that commercial distribution negatively affects welfare maximization and creates advantages just to cheater firms. Then, the implication could be that the correct signal to let consumer distinguish between authentic HQ producers and cheaters is the creation of mono brand shops, where only HQ products are sold. In those shops, assistants are educated directly by HQ producers and thus both sources of asymmetry are solved. This leaves the mass distribution channel as the low price distribution. No asymmetries, and no welfare loss.
Concluding Remarks

The adverse selection problem has been re-defined to analyse the asymmetric information that characterize consumers’ choices under incomplete information and ignorance. By means of a welfare analysis it has been demonstrated that shop-assistants play a key role in divulging information about characteristics of goods. If they fail, no matter why, commercial distribution negatively affects welfare maximization. This suggests the adoption of a more credible signal: the creation of mono brand store, where only HQ product are sold by educated shop-assistant. The model demonstrates that in these conditions, welfare increases and cheating firms will disappear. Only high tech products will be sold. Differentiation and competition strategies among producers, as we all know them by literature about these topics, are different topics that have been neglected. The model will be extended for future research in order to cope with dynamic multi-periodical reputational issues, and account for dynamic mimicking price signalling. The relation between reputation of firms and market equilibrium, e.g. Kreps and Wilson (1982), will be investigated to show how this broader definition of adverse selection affect the incentive to cheat.

References


