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The Short-Term Effect of Low-Quality Sellers' Voluntary Information Disclosure

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제품에 대한 부정적 정보 공개의 단기적 효과에 대한 연구

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Abstract This study examines whether, when, and how sellers with low-quality products can instantly enhance profitability by fully disclosing quality information. Our analytic model has found that a low-quality seller can increase demand even in the short run by voluntarily sharing the information about its quality, if he can sufficiently reduce perceived risk of buyers. Moreover, a low-quality seller's information disclosure may increase both the market's and the competitor's demand, depending on the level of perceived risk. The finding of this study is expected to provide meaningful implications to managers and policy makers on solving market dilemmas under information asymmetry.

Key Words : Information asymmetry, Information disclosure, Perceived risk, Risk sensitivity, Customer orientation

요 약 본 논문은 시장에서 저품질의 제품을 판매하는 판매자가 언제, 그리고 어떠한 방식으로 품질에 대한 정보를 공개함으로써 이윤을 증대시킬 수 있을지를 이해하고자 한다. 이를 위해 본 논문은 제품의 품질 및 가격, 고객의 위험 인식 수준, 위험과 관련된 비용, 위험에 대한 민감도 등의 요소를 반영한 새로운 이론 모델 분석을 통해 저품질의 제품을 판매하는 판매자가 품질에 대한 부정적인 정보를 자발적으로 공개하여도 고객이 인식하는 위험 수준을 충분히 감소시킬 수만 있다면 단기간에 수요를 증대시킬 수 있음을 보여준다. 또한 본 이론 모델은 이러한 정보 공개가 고객의 위험 수준을 어떻게 조정하느냐에 따라 시장 전체 수요와 경쟁 제품의 수요까지도 증대시킬 수 있다는 점을 보여준다. 본 논문의 연구 결과는 제품의 부정적 요소에 대한 정보를 관리하는 마케팅 실무자 뿐 아니라 시장에서의 정보 불균형으로 인해 생기는 여러 문제점들을 해결하고자 하는 정책 담당자에게도 유의미한 시사점을 제공해 줄 것으로 기대된다.

주제어 : 정보 불균형, 정보 공개, 위험 인식, 위험 민감도, 고객지향

1. Introduction

Whether to tell a lie or be honest to customers may be one important decision that most sellers make everyday, regarding negative aspects of their products. According to conventional wisdom, sellers better conceal negative information about their products if they want to maximize profit, especially when there is high level of information asymmetry in the market. Many sellers generally believe this and often do not reveal their low quality levels. When more than 500 cars were tested in the U.K. in 2012, the miles per gallon (MPG) of more than 90 percent of those cars were lower than advertised figures even with

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manufacturers' suggested conditions. It seems that those car manufacturers were concealing their low MPG figures knowing that consumers may not be able to fully test those figures. We can easily find similar examples of false information disclosure in many other markets under information asymmetry.

What is interesting is that we can also find those cases where sellers voluntarily disclose negative information regarding their products. Many online sellers these days, such as Amazon.com, disclose information about the weaknesses of their products on their websites in many different ways. Not only those online sellers, but also many traditional firms communicate negative aspects about their products with their customers. For example, Four Seasons Hotels shows customer reviews from Twitter, Facebook, and TripAdvisor for more than 80 properties in their websites, without censoring customers' unfavorable opinions. These and other examples tell us that many sellers actually voluntarily share negative information about their products, raising the question of whether, when, and how sellers can benefit from revealing negative information with customers. This is a very important and interesting question for many people, as sellers' dishonesty often end up hurting consumers and other participants in many markets.

Nevertheless, the question of how honesty helps sellers has not been a major topic in the literature, except for those studies on long-term relationships between sellers and buyers. More specifically, these literature have found that sellers may try to build reputations by voluntarily sharing negative information [1-3] or build trust through being honest to buyers [1,4-7], suggesting the possibility that repeated purchases may solve adverse selection issues in markets under information asymmetry. However, these studies cannot fully explain the instances where sellers are voluntarily being honest even in one-off or short-term based transaction with buyers. For example, although Craiglist does not provide reputation-building mechanisms and many transactions are one-time interactions with no concern for reputation, Craigslist sellers often reveal negative information about their listings to potential buyers. The literature on reputation or trust cannot explain the rationale behind these sellers' honest behaviors.

More importantly, this lack of understanding on the effect of voluntary information disclosure is becoming more serious these days, as consumers generally feel bigger risk from online purchase. According to the literature, consumers feel more risk when they shop online, compared with offline shopping [8] because they have to deal with more complicated decisions online [9]. They also experience more opportunism in an online setting as they usually purchase from anonymous sellers [10]. Therefore, the understanding of how honest disclosure affects seller profit is essential from marketing managers' perspectives, as most firms manage online channels these days.

In order to fill this gap and provide meaningful guidelines to marketing managers, this study attempts to provide a basic conceptual framework for sellers' information disclosure of quality information to customers. More specifically, the analytic model in our paper examines whether, when, and how sellers benefit from voluntarily sharing negative information even in the short run. For this purpose, this paper focuses on the perceived risk of purchase, because any new information affects the level of the risk of a buyer and affects his purchasing decisions. After Bauer first explained how the risk of purchase affects consumer choice [11], many researchers have produced general understandings about buyers'

perceived risk [12-16]. They have defined the probability of loss from purchase and the size of that loss as major factors of the perceived risk of purchase, and shown that the probability of possible loss from purchase may negatively affect buyers' purchase intention. Perceived risk shows a pseudo-vertical characteristic because, when customers attempt to reduce the risk prior to making purchase decisions, they usually decrease the probability, not the size of loss [17-20]. Moreover, as the probability of loss decreases with more information, information search is a popular risk-reduction method used by customers.

Based on this understanding, we analyze the impact of negative information of a low-quality seller using an analytic model which focuses on the tradeoff between the perceived risk and the expected benefit. The model looks at a duopoly market; one seller claims high quality, while the other seller who has low-quality products may claim high quality (false information disclosure) or low quality (honest information disclosure). This assumption of low-quality sellers' available disclosure options enables us to analyze the impact of low-quality sellers' honest disclosure. More specifically, we can compare the market outcomes between when a low-quality seller hides negative information versus when a low-quality seller reveals its weaknesses, which is expected to provide meaningful understanding on the effect of honesty in markets. As is explained above, sellers are assumed to be myopic in our model, and our analysis is based on a non-repeating transaction (i.e., one-time purchase) in order to exclude any reputation or trust related factors. As we investigate only one stage and focus on the factors of our interest including perceived risk and claimed quality level, price is also fixed in our model. In short, we basically try to see the tradeoff between perceived risk and claimed quality when the price remains same.

Therefore, this study is related with a number of previous studies that have investigated information disclosure considering the effect of risk from purchase. For example, Peyrache and Quesada [21] have shown that a monopolistic seller may directly reveal quality information when buyers are risk-averse. Our study can supplement this finding by focusing on a duopoly setting. While Zhang and Li [22] have also explained how buyers' risk attitude may affect the information disclosure of sellers along with their profit, they have focused on loss aversion instead of risk aversion as in our study. There are also several studies which investigate the effect of risk aversion of sellers on certification decisions, which is one of the main factors of our model [23,24]. However, they do not consider buyers' risk attitudes as in this study.

2. Risk-Return Framework

The concept of perceived risk is applied in our analytic model through the risk-return framework [25,26], which considers the impacts of both the perceived risk and the expected benefit on the utility level of consumers. In particular, this framework treats the perceived risk as a separate variable. In our model, the utility function of a buyer i purchasing a product j is defined with the following elements.

2.1 Claimed Quality and Price

The buyer's utility from purchase is determined by the expected value of the claimed quality of the product j (v_j^C) and the price of product j (p_j) (where $v_j^C \geq p_j$).

2.2 Perceived Risk

The utility level of this buyer is also affected by the perceived risk of purchase, as he prefers

the product which has less perceived risk. According to the definition above, perceived risk means the expected loss of purchase, which is illustrated as the function of the size of purchase loss and the probability of loss.

More specifically, buyers worry about potential purchase failure from product j, costing c_j^F (i.e., cost of purchase failure). The probability of purchase failure from product j is also defined here as q_j ($0 \leq q_j \leq 1$). Therefore, the total risk that buyers perceive from purchase (i.e., the expected loss that occur from purchase) can thus be represented as $E(c_j^F) = q_j \cdot c_j^F$. Moreover, when purchase failure from product j is q_j, the probability of product j's quality being equivalent to the claimed quality (i.e., the probability of no purchase failure) is (1 - q_j). Then, the product's expected value can be denoted as $E(v_j^c) = (1-q_j) \cdot v_j^c$.

2.3 Risk Sensitivity

In this model, we also specify the buyer i 's risk sensitivity as s_i. This concept is equivalent to perceived-risk attitude and risk repugnance from the literature [27,28]. s_i is higher when a buyer has higher risk sensitivity, and the same level of perceived risk impacts the buyer's total utility more negatively than when a buyer is less risk-sensitive (and thus s_i is lower). One simple example can be found from the fear of using airplanes. Even though the likelihood of flight accidents and their outcomes are known to almost everyone, some people are more afraid of using airplanes than others, presumably due to their higher risk sensitivity. In our model, we suppose that there is no risk-loving customers and assume that $s_i \geq 0$. We also assume that customers are uniformly distributed with regards to their risk sensitivities, making s_i follow $U[0,S]$ (unit frequency), where S indicates the customer's risk sensitivity who has the highest risk sensitivity in this market.

2.4 Analytic Model

Based on the factors explained above, we define the utility function of a buyer i's purchase of product j as follows.

$$U_{i,j} = E(v_j^c) - p_j - s_i \cdot E(c_j^F)$$
$$= (1-q_j) \cdot v_j^c - p_j - s_i \cdot q_j \cdot c_j^F \quad (1)$$

In this model, the probability of failure from purchasing the product (q_j), the product's claimed quality (v_j^C), the product's price (p_j), the customer's risk sensitivity (s_i), and the cost from purchase failure (c_j^F) determine the total utility from purchase. According to this model, the same perceived risk ($q_j \cdot c_j^F$) has higher impact on the utility when the buyer has higher risk sensitivity (higher s_i).

In the following section, we first investigate a simple monopoly case using this utility function, and then examine a duopoly case in order to understand whether there is a motivation for a low-quality seller to voluntarily disclose negative information.

3. Analysis

3.1 Monopoly Case

3.1.1 Overview

There is one seller in this monopolistic market and customers get to decide whether to purchase the product or not, depending on their utility levels; a customer purchases the product if his utility from purchase is bigger than zero. In the utility function defined above, only one variable is heterogeneous among

customers, that is the risk sensitivity (s_i). As other factors such as the probability and the cost of purchase failure and the product's claimed quality and price are all assumed to be same for all customers, the level of risk sensitivity will differentiate the purchase decisions of these customers for the same product. In Fig. 1, the equilibrium of this market is represented with the risk sensitivity of the indifferent customer, s_0.

3.1.2 The Equilibrium

Let's assume that there exists the indifferent customer in this market who has the same utility regardless of purchasing the product or not, and his risk sensitivity is s_0. When a customer makes a purchase decision depending on the level of perceived risk, the sensitivity to risk may affect this decision. For example, there are a certain type of customers who hesitate to visit car mechanics because they hate the possibility that they get "ripped off", while some other people do not care about it. Accordingly, in this market, those customers with lower risk sensitivity than s_0 will purchase the product, while those with higher risk sensitivity than s_0 will not. This explains the equilibrium of this market which is shown in Fig. 1.

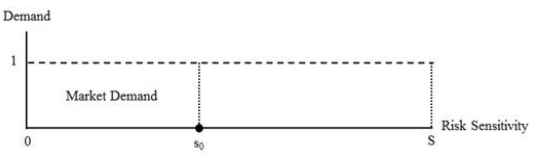

Fig. 1. Equilibrium of Monopoly Market

Let's say that v_M^c denotes the claimed value and q_M is the probability of purchase failure of *M*, which is a monopoly product. As explained, the price of the product is fixed at p for our analysis. The cost of purchase failure is also fixed at c^F, as we consider only one product category in this model. Therefore, this indifferent customer who has the risk sensitivity of s_0 has the utility from purchasing product *M* as follows.

$$\begin{aligned} u_{0,M} &= E(v_M^c) - p - s_0 \cdot E(c^F) \\ &= (1 - q_M) \cdot v_M^c - p - s_0 \cdot q_M \cdot c^F \\ &= 0 \end{aligned} \quad (2)$$

Because this customer is indifferent between purchase and no purchase, his utility from purchase equals zero. Therefore, the market demand can be calculated as follows.

∴ Market demand

$$= s_0 - 0 = \frac{(1-q_M) \cdot v_M^c - p}{c^F \cdot q_M}$$

Some primary findings from this result are as follows. The demand in this monopoly market will be larger when the probability of failure from purchase (q_M) is lower and the seller claimed quality (v_M^c) is higher. For this reason, the monopoly firm would prefer to increase the quality claim and lower the perceived risk of purchase.

3.2 Duopoly Case

Based on this observation, we now examine the duopoly market where one seller claims high quality when the other seller claims either high or low quality. First, we look at how factors such as the claimed quality and the perceived risk affect each seller's demand and also the entire market demand.

3.2.1 Sizes of Demands

3.2.1.1 Information Collusion

In this first duopoly market case, both firms claim their products to be of high quality and even a seller with a low-quality product does not reveal its type. We can thus say that both

firms implicitly engage in collusion on the disclosure of negative information, which we denote as "information collusion." This type of information collusion is observed in many real market situations, especially when the level of information asymmetry is high. The aforementioned overstated MPG figures of U.K. car manufacturers is a good example of how information collusion happens in reality. Therefore, these products claim higher quality (v_H^c) and also have higher perceived risk due to higher possibility of purchase failure (q_H), than the market without information collusion separately analyzed in the next section. Fig. 2 shows the equilibrium of this duopoly when there is information collusion.

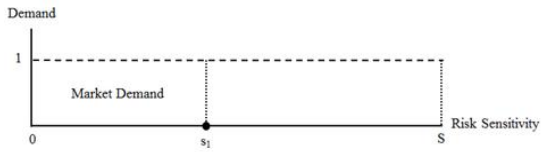

Fig. 2. Equilibrium of Duopoly with Information Collusion

Market equilibrium. We first assume that the indifferent customer shows the risk sensitivity of s_1. Then we can find s_1 through analyzing this indifferent customer's utility as follows.

$$u_{1,H} = E(v_H^c) - p - s_1 \cdot E(c^F)$$
$$= (1 - q_H) \cdot v_H^c - p - s_1 \cdot q_H \cdot c^F \quad (3)$$
$$= 0$$
$$s_1 = \frac{(1 - q_H) \cdot v_H^c - p}{c^F \cdot q_H}$$

∴ Market demand

$$= s_1 - 0 = \frac{(1 - q_H) \cdot v_H^c - p}{c^F \cdot q_H}$$

As we can see, this result is almost same with the case of monopoly. The difference is that each product takes a half of the total market demand, as there are two sellers in this market.

∴ Each product's Demand

$$= \frac{1}{2} \cdot \left\{ \frac{(1 - q_H) \cdot v_H^c - p}{c^F \cdot q_H} \right\}$$

From this result, we can establish the following proposition in terms of market demand and each product's demand in a duopoly market.

Proposition 1. *When there is information collusion in a duopoly market, the demand for the market and each seller's product are higher when the perceived risk of the sellers' products is lower and the claimed quality of those products is higher.*

3.2.1.2 No Information Collusion

In this next duopoly case, the low-quality seller voluntarily reveals its quality information and diminishes the risk from purchase using certain risk intermediaries including quality certification. Here we investigate the sizes of the demand for a low-quality seller, market demand, and the demand for the competitor who claims high quality, when there is no information collusion in this market. In the next section, we analyze how these demands change with this honest information disclosure through comparing the market under information collusion and the market under no information collusion.

Now, the product of the low-quality seller who honestly reveals quality information has both lower claimed quality v_L^c (which is lower than v_H^c) and lower perceived risk with a smaller chance of purchase failure q_L (which is lower than q_H), than in the market under information collusion. Fig. 3 shows the equilibrium of this duopoly when there is no information collusion.

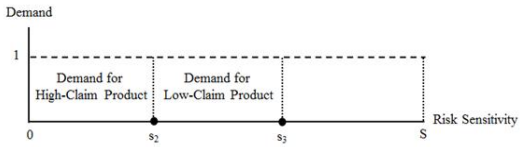

Fig. 3. Equilibrium of Duopoly Market with no Information Collusion

Market equilibrium. There are two varieties of indifferent customers in this market.

First, there is one customer who is indifferent to making purchase of either product and his risk sensitivity is s_2. From the analysis of the utility of this customer, we can come up with the value of s_2 as follows.

$$\begin{aligned} & u_{2,H} = E(v_H^c) - p - s_2 \cdot E(c^F) \\ & = (1-q_H) \cdot v_H^c - p - s_2 \cdot q_H \cdot c^F \\ & = u_{2,L} = E(v_L^c) - p - s_2 \cdot E(c^F) \\ & = (1-q_L) \cdot v_L^c - p - s_2 \cdot q_L \cdot c^F \\ & \therefore s_2 = \frac{(1-q_H) \cdot v_H^c - (1-q_L) \cdot v_L^c}{c^F \cdot (q_H - q_L)} \end{aligned} \quad (4)$$

Second, another customer is indifferent between purchasing the low-quality product and purchasing nothing. Let's say that this indifferent customer's risk sensitivity is s_3. From the analysis of this indifferent customer's utility, we can calculate s_3 as follows.

$$\begin{aligned} & u_{3,L} = E(v_L^c) - p - s_3 \cdot E(c^F) \\ & = (1-q_L) \cdot v_L^c - p - s_3 \cdot q_L \cdot c^F \\ & = 0 \\ & \therefore s_3 = \frac{(1-q_L) \cdot v_L^c - p}{c^F \cdot q_L} \end{aligned} \quad (5)$$

By analyzing these results, we can estimate the market demand and both products' demand in equilibrium as follows.

Demand for the low-quality product

$$\begin{aligned} & = s_3 - s_2 \\ & = \frac{(1-q_L) \cdot v_L^c - p}{c^F \cdot q_L} \\ & - \frac{(1-q_H) \cdot v_H^c - (1-q_L) \cdot v_L^c}{c^F \cdot q_H - c^F \cdot q_L} \end{aligned}$$

Proposition 2. *When there is no information collusion in a duopoly market, the demand for the low-quality product is higher as the perceived risk of low-quality product is smaller and the low-quality product's claimed quality is higher.*

Market demand

$$= s_3 - 0 = \frac{(1-q_L) \cdot v_L^c - p}{c^F \cdot q_L}$$

Proposition 3. *When there is no information collusion in a duopoly market, the market demand is higher as the low-quality product's perceived risk is smaller and the low-quality product's claimed quality is higher.*

Demand for the high-quality claim product

$$\begin{aligned} & = s_2 - 0 \\ & = \frac{(1-q_H) \cdot v_H^c - (1-q_L) \cdot v_L^c}{c^F \cdot q_H - c^F \cdot q_L} \end{aligned}$$

Proposition 4. *When there is no information collusion in a duopoly market, the demand for a product that claims high quality is larger as the low-quality product's perceived risk is higher and the low-quality product's claimed quality is lower.*

3.2.2 Impact of Low-Quality Seller's Information Disclosure

As we have observed the duopoly situation with and without information collusion, we can compare the demands of these two markets and analyze the effects of low-quality sellers' information disclosure on various market outcomes.

3.2.2.1 Impact on the Demand for the Low-Quality Product

We can figure out how low-quality seller's information disclosure affects its own demand from the demand with information collusion (*IC*) and the demand with no information collusion (*NIC*), as follows.

Difference in Demand for Low-Quality Product

= Demand for Low-Quality Product $_{NIC}$ - Demand for Each Product $_{IC}$

$$= \frac{(1-q_L) \cdot v_L^c - p}{c^F \cdot q_L} - \frac{(1-q_H) \cdot v_H^c - (1-q_L) \cdot v_L^c}{c^F \cdot q_H - c^F \cdot q_L} - \frac{1}{2} \cdot \frac{(1-q_H) \cdot v_H^c - p}{c^F \cdot q_H}$$

Therefore, we can make some predictions about the impact on the low-quality product's demand as follows.

Proposition 5. *When there is information collusion in a duopoly market, if a low-quality seller reveals its quality, the change in low-quality product's demand will be higher as the low-quality product's perceived risk is smaller and the low-quality product's claimed quality is higher.*

There is one important finding in this result. Even when a low-quality seller honestly reveals quality information, its impact on low-quality product's demand (his own demand) will always be positive if he can sufficiently reduce perceived risk (so that $q_L \approx 0$). In other words, sellers with low-quality product can increase their demand by honestly disclosing the negative information, which is somewhat counterintuitive, if they can reduce the perceived risk accordingly.

3.2.2.2 Impact on Market Demand

As above, we can figure out the impact of low-quality sellers' information disclosure on market demand through the market demand with information collusion (*IC*) and the market demand with no information collusion (*NIC*), as follows.

Difference in Market Demand

= Market Demand $_{NIC}$ - Market Demand $_{IC}$

$$= \frac{(1-q_L) \cdot v_L^c - p}{c^F \cdot q_L} - \frac{(1-q_H) \cdot v_H^c - p}{c^F \cdot q_H}$$

Again, we can come up with some predictions about the impact on market demand.

Proposition 6. *When there is information collusion in a duopoly market, if a low-quality seller reveals its quality, the impact on market demand will be bigger as the low-quality product's perceived risk is smaller and the low-quality product's claimed quality is higher.*

Again, if a low-quality seller discloses its quality information and at the same time sufficiently reduces perceived risk ($q_L \approx 0$), the change in the demand for the market will always be positive. Therefore, the low-quality seller can even increase the entire market demand by honestly disclosing its quality information, if it can reduce perceived risk accordingly.

3.2.2.3 Impact on High-Claim Seller's Demand

We can also figure out how the information disclosure from low-quality seller affects high-claim seller's demand, through subtracting the demand with information collusion (*IC*) from the demand with no information collusion (*NIC*), which is shown as follows.

Difference in Demand for the Product with High-Quality Claim

= Demand for the Product with High-Quality Claim $_{NIC}$ - Demand for Each Product $_{IC}$

$$= \frac{(1-q_H) \cdot v_H^c - (1-q_L) \cdot v_L^c}{c^F \cdot q_H - c^F \cdot q_L} - \frac{(1-q_H) \cdot v_H^c - p}{2 \cdot c^F \cdot q_H}$$

Based on this result, we can come up with some predictions on how high-claim product's demand is affected.

Proposition 7. *When there is information collusion in a duopoly market, if a low-quality seller reveals quality information, the change in high-quality product's demand will be bigger as low-quality product's perceived risk is higher and the quality level of low-quality product is lower.*

There is an interesting observation in this prediction: If the low-quality seller cannot sufficiently reduce perceived risk with his information disclosure and therefore $q_L \approx q_H$, the change in the demand for high-quality claim product will always be positive, meaning that information disclosure of low-quality seller can even help the competitor by increasing its demand.

3.3 Summary of Results

Using an analytic model on information asymmetry in a market, this study has established several predictions about the impact of the information disclosure by a low-quality seller on various market outcomes. These results are summarized in Table 1 and Table 2.

Table 1. Predictions on the Sizes of Demand

	Market Situation	Demand of Interest	Condition for Higher Demand	
			Perceived risk of low-quality product	Claimed quality of low-quality product
Prop 1	Info collusion	Market	Lower	Higher
Prop 2	No info collusion	Low-quality product	Lower	Higher
Prop 3		Market	Lower	Higher
Prop 4		High-qualit y product	Higher	Lower

Table 2. Predictions on the Impact of Information Disclosure of a Low-Quality Seller

	Impacted Demand	Conditions for Bigger Impact	
		Perceived risk of low-quality product	Claimed quality of low-quality product
Prop 5	Low-quality product	Lower	Higher
Prop 6	Market	Lower	Higher
Prop 7	High-quality product	Higher	Lower

Some important findings from these results are as follows. First, a low-quality seller can instantly increase its own demand by honestly disclosing quality information, if that information disclosure is supported by appropriate risk reducing method. This is somewhat counterintuitive, as the positive impact of sharing negative information with buyers has rarely been verified in the literature. Second, this type of honest disclosure by a low-quality seller can also increase the demand of the entire market, as those risk-averse customers who used to avoid purchase now participate in this market due to reduced perceived risk from the disclosure. Third, a low-quality seller's disclosure can sometimes increase demand for the seller who claims to sell high-quality products, as those customers who are not really concerned about perceived risk may prefer to purchase from the seller claiming high quality, if the low-quality seller reveals its weaknesses.

4. Conclusion

Through investigating an analytic model, this study has attempted to provide a new perspective to the understanding of information asymmetry in markets by showing how voluntarily disclosure of low quality can help sellers in a one-off purchase situation. More specifically, this study has presented the situations where the information disclosure of

low-quality seller can immediately enhance the seller's profitability, and also shown that a low-quality seller can even increase the market demand and the demand for the product with high-quality claim through voluntary information disclosure. The central reason for this counter-intuitive result is as follows. If a low-quality seller voluntarily reveals its quality information and reduces perceived risk accordingly, consumers do not have to do information search and thus save search cost, and even competitors and other participants in this market can benefit from that. Moreover, as the prices have been fixed in our model, the result explains that a low-quality seller does not have to lower price to make up for the disclosure of low quality.

The result of this study is expected to provide an important implication to solve many market dilemmas from information asymmetry and contribute to both marketing theory and marketing strategy. First, this study provides meaningful implications to researchers. The literature on information disclosure has been debating on whether voluntary disclosure or mandatory disclosure can solve adverse selections under information asymmetry. However, most of these literature has analyzed the information disclosure of those sellers who sell high-quality products, and the motivation of low-quality sellers to disclose quality information has been somewhat neglected. This study fills this gap by explaining whether, when, and how low-quality sellers benefit from honestly disclosing quality information even in the short run, possibly supporting the literature of voluntary disclosure. Second, this study can also offer some useful knowledge to the field about marketing communications strategy which use risk intermediaries such as certifications. Marketing managers may learn from this study that honestly revealing weakness of their products can still increase profit if they can use appropriate risk intermediaries, even when reputation or trust is not a big concern.

We believe future studies can work on the limitations of this paper and provide deeper knowledge on the subject of seller's honesty. For example, although price was assumed to be fixed for the purpose and scope of this study, it can be relaxed to become more relevant to various market situations. The buyer's utility and the interactions between sellers and buyers can also be analyzed to suggest more relevant strategies to marketing managers. A more reasonable distribution of risk propensities among buyers will also improve this study's connection to real markets. Last but not least, empirical verification on some of the theoretical predictions from this study should enhance the understandings on the effect of sellers' honesty, and eventually contribute to sellers, buyers, and the society.

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