The Truth about Sellers' Lies: Why Dishonesty Loses in Markets under Information Asymmetry

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Abstract

Purpose - This study analyzes the effect of sellers' dishonesty on various market outcomes such as seller profit, buyer profit, and market welfare, through precisely measuring the level of sellers' information disclosure and its economic impacts. As an explicit observation of sellers' dishonesty is not easy in most other settings, this study is expected to suggest unique and meaningful implications on the effect of sellers' incomplete information disclosure to researchers, managers, and policy makers.

Design/methodology/approach - In order to precisely measure the level of sellers' dishonesty under information asymmetry, this study analyzes the data from an incentive-based economic experiment using z-Tree software. This experimental method enables us to focus on the strategic interactions among participants, observe the integrity of seller's information disclosure, and reproduce real market situations.

Findings - The analysis of sellers' dishonesty has provided the following important and counterintuitive findings about the reality of buyer-seller interactions under information asymmetry. First, sellers' lies do not affect seller profit even when they are very intensive. Second, sellers' dishonesty negatively affects buyer profit and the entire market welfare. Third, a seller's quality claim has a positive effect on the seller profit only when a seller is being honest.

Research implications or Originality - This study analyzes sellers' dishonesty using incentive-based economic experiment using z-Tree software which provides a straightforward examination on dishonest behavior of sellers, that is not readily available with other types of observational or experimental data.

Ⅰ. Introduction

1. Motivation

In most markets, sellers usually have more information about their products than buyers do. According to the literature, although buyers may be able to evaluate the qualities of search attributes before purchase even under this type of information asymmetry, buyers cannot figure out the quality of experience attributes before purchase (Nelson, 1974), and will never be able to evaluate credence attributes even after purchase (Darby and Karni 1973). When sellers

and buyers have to deal with this type of information asymmetry with experience or credence attributes, one common issue is that sellers are often tempted to hide negative aspects of their products. Therefore, there are myriad cases of sellers' dishonesty under information asymmetry including the "Dieselgate" scandal in 2015, where it was found that the German's largest car company had been cheating on emissions tests of almost half a million of their diesel models, after years of driving "Clean Diesel" initiative. In this case, diesel emission can be regarded as a credence attribute, as buyers will hardly figure out actual emissions level even after purchase. Dealing with this type of information asymmetry, Volkswagen simply decided to exaggerate their emissions results by installing a specific software and deceive not only customers, but also the Environmental Protection Agency of the USA.

As observed in this and many other examples, many sellers believe that it is better to hide negative information about their products as much as possible to increase their profits, when there exists information asymmetry and buyers cannot easily evaluate the actual quality of the products they are purchasing. The literature has also generally agreed that negative aspects of products hurt sellers' profits through various routes including word-of-mouth (Berger, Sorensen, and Rasmussen 2010). However, whether to be dishonest to buyers can still be a dilemma for many sellers in a market under information asymmetry. In other words, while negative information usually harms sellers' profit, being dishonest to buyers may or may not help sellers. First, dishonesty may be helpful because sellers can conceal certain negative aspects of their products and encourage buyers to purchase. On the other hand, dishonesty might damage purchase intention of buyers as buyers may perceive risk of purchase through various signals when a seller is not revealing relevant information. Numerous studies on perceived risk have shown that perceived risk due to lack of relevant information negatively affects purchase intention of buyers (Bauer 1960; Dowling 1986; Markin, Jr. 1974; Ross 1975; Stone and Winter 1985; Taylor 1974).

Nevertheless, the specific question of whether dishonesty actually helps sellers has not been a focus of related literature, even though there are a lot of academic studies on information disclosure of sellers. We believe that one of the reasons why seller's dishonesty has not been a focus of related academic works is because it is usually very hard to accurately measure a seller's dishonesty. In other words, unless sellers who are being dishonest to buyers voluntarily (and honestly!) confess their wrongdoing, it is very hard to detect their fraud and investigate the impact of sellers' dishonesty on various market outcomes from an academic perspective. One of few examples is Jin and Kato (2006), who have actually purchased the collectible baseball cards from various sellers on eBay and requested professional graders to inspect true quality of those products, verifying which sellers are dishonest and how much so. However, in most other empirical settings, it is almost impossible to closely measure the level of dishonesty of sellers, leading to the lack of examination on the topic of sellers' lies.

This study thus attempts to fill this gap by directly observing and measuring sellers' dishonesty and investigate its impact on various market outcomes. In order to do this, we have examined experimental data from an incentive-based economic experiment about buyer-seller interaction under information asymmetry through z-Tree software (Fischbacher 2007). As the participants of this economic experiment are basically supposed to make the best possible decisions to maximize their profits either as a buyer or a seller, we can accurately observe many elements of buyers' and sellers' decisions and thus explicitly measure whether and how much sellers lie to buyers, which is usually not possible with other types of observational data.

Through analyzing this experimental data, this study investigates several important questions regarding a seller's dishonesty. First, we check whether a seller's profit increases with his or her dishonesty. Surprisingly, unlike common belief, our results show no evidence that dishonest sellers' profits are higher than honest sellers' profits, and we suggest possible reasons for this observation in a following analysis. Moreover, the result also shows that a seller does not enjoy bigger profit with more intensive levels of dishonesty. Second, we check how sellers' dishonesty affects buyers' profit and find that sellers' dishonesty strongly hurts buyers' profit and this relationship is also related with the level of dishonesty. Third, we look at whether sellers' dishonesty affects entire market welfare level. The result shows that market welfare is negatively affected by sellers' dishonesty, and then the level of dishonesty also matters for market welfare. Finally, we examine the relationships between sellers' dishonesty and several other factors such as pricing, purchase probability, and personal characteristics.

Overall, the results of this study suggest that hiding negative information may not be an appropriate solution for sellers, as it is actually found not to increase their profit. To make matters worse, sellers' dishonesty also damages buyers' profit and entire market welfare. Therefore, this study provides sellers with counterintuitive findings about the impact of their dishonesty, along with important implications on whether and why they should be honest to buyers under information asymmetry. As this study also shows the reasons behind these counterintuitive results regarding seller's dishonesty, sellers may gain better understandings on information disclosure under information asymmetry. This study may also present important policy implications, as sellers' dishonesty is found to damage most participants in the market and should thus be discouraged from the public policy's point of view.

In a following section, we first review some related literature. We then explain the experimental procedure and the structure of the experimental data in Chapter II. In Chapter III, we analyze the experimental data and examine various aspects of sellers' dishonesty. This study concludes with some detailed discussion about the implications of the results in Chapter IV.

2. Literature Review

This paper attempts to provide a meaningful perspective to the literature in marketing and economics, as this is one of a very few studies that have empirically shown how concealing negative information from customers may not help sellers, contrary to common understanding. While numerous studies in information disclosure have focused on the conflicting interests of the sellers with high-quality products who want to reveal their quality and the sellers with low-quality products who try to hide it, most empirical literature on this subject has mainly found how revealing negative information hurts sellers, suggesting little basis for low-quality sellers' full information disclosure. For example, many studies have shown that negative information decreases sales and purchase likelihood through publicity (Tybout, Calder, and Sternthal 1981; Wyatt and Badger 1984), word-of-mouth (Haywood 1989; Mizerski 1982), and customer reviews (Chevalier and Mayzlin 2006; Dellarocas, Zhang, and Awad 2007). Therefore, this study can be one of the rare attempts to empirically show how hiding negative information from customers may hurt sellers, possibly encouraging more diverse approaches in this subject. As previous studies on this subject may have provided feasible grounds for sellers' decisions to hide negative aspects of their products, our study is expected to provide more meaningful strategic implications to many sellers by suggesting that honesty may be the best policy when establishing marketing communication strategies.

In this sense, this study is related with a small number of studies in marketing and economics that have analyzed how honestly revealing negative information might help sellers. For example, a series of studies on two-sided advertising has shown that sellers can enhance their credibility by including negative claims in their advertising messages (Crowley and Hoyer 1994; Eisend 2006/2007; Settle and Golden 1974). These studies have employed "attribution theory," a concept from social psychology, and explained that buyers attribute seller's negative claims to their honesty and thus trust those sellers. Moreover, Berger et al. (2010) has focused on the awareness of products and shown that the products with lower awareness can benefit from negative publicity as it enhances their awareness level, and Tadelis and Zettelmeyer (2011) have looked at a situation where certain customers specifically look for low-quality products, finding that sharing negative information may match the customers who want low-quality products to sellers with low-quality products, thereby increasing sales of those sellers. Overall, these studies have addressed double-edged aspects of sharing negative information with buyers, and their findings are somewhat divided; honestly sharing negative information may or may not hurt seller profit. Moreover, some of these findings have limitations to be applied to more universal marketing settings as they have looked at certain settings such as advertising communication, low awareness, or a market with heterogeneous customer preferences. Therefore, this study contributes to the related literature by directly observing the effect of sellers' honesty vs. dishonesty on various market outcomes through analyzing the buyer-seller interactions in a more general market setting.

This study also follows several marketing studies that have employed an incentive-based economic experimental method from the perspective of behavioral economics. While this type of economic experimental approach is somewhat popular in economics, its use in marketing literature is somewhat limited so far; several subjects such as pricing, channel management, auction, and promotion (Amaldoss and Shin 2011; Ding et al. 2005; Özer, Subramanian, and Wang 2018; Yuan, Gómez, and Rao 2013) are analyzed through this method. This study can thus be added to the list of those marketing studies using behavioral experiments and become one of the first such studies focusing on strategic decisions on information disclosure.

II. Experimental Data

As is mentioned above, it is usually very hard to precisely measure the level of dishonesty of sellers with observational market data, unless we can specifically evaluate the qualities of all credence attributes just as Jin and Kato (2006) have done with their collectible baseball card data. Therefore, we have decided to look at the data from an incentive-based economic experiement using z-Tree software (Fischbacher 2007). The advantage of using this economic experiment over other types of consumer experiments or observtional data is very clear for our study. First, this type of economic experiment can not only observe buyers' reaction but also examine sellers' decisions at the same time, as it focuses on the strategic interactions among participants. Therefore, unlike with other types of data, we can closely observe the integrety of seller's information disclosure during this experiment. Second, as the information about true values of the products is given in the experiment, we can also clearly evaluate buyers' profit from transactions with information asymmetry, which has rarely been possible with other types of data since true value cannot be estimated for many experience or credence goods. Third, as the participants get rewarded based on their performances as buyers and

sellers, the interactions observed during the experiment are expected to reproduce what is happening in a real market, where buyers and sellers try their best to maximize profits.

1. Outline

The experimental data analyzed in this study was produced from an economic experiment measuring the effect of various risk intermediaries under information asymmetry, using z-Tree software. As the conditions perfectly fit the research questions of this study, we have specifically examined the data from the setting where there is no risk intermediary in the market (i.e., buyer-seller interactions based on cheap-talk communication).

In total, 58 students at a private university participated in this experimental study. In every experimental period, each participant was randomly matched with another participant by the software, one as a seller and the other as a buyer. As their roles were also randomly assigned and each participant was continuously re-matched with another, one participant could play a role of either a buyer or a seller in each different period. In total, we could observe the buyer-seller interactions from 435 transactions in 45 experimental periods.

2. Procedure

Each experimental transaction proceeded as follows. First, the value of the product was randomly determined by the software between 0 to 180. However, the type of products was not specified for this experiment, in order to avoid any possible bias from a specific product category. Second, as information asymmetry between buyers and sellers were assumed (i.e., experience or credence attributes), only the seller received the information about the value of the products. Third, after observing the value of the products, the seller then decided the price of the product. Fourth, the seller disclosed product quality and suggested its price to the matched buyer. At this stage, the seller could claim any quality between 0 to 180, regardless of it being true or not. Fifth, the buyer observed both the seller's claimed quality and suggested price, and decided whether to purchase the item, which finished one transaction.

After each transaction, the profits of the seller and the buyer could be calculated. First, when the buyer purchased the item, the seller profit was the *price* of the item, and the buyer profit was calculated as the *true value − price* of the item. Second, when the buyer did not purchase the item, both the seller profit and the buyer profit equaled *zero*. When all experimental sessions were finished, the software calculated each participant's total points, and cash rewards were provided based on those points. Therefore, the participants were believed to do their bests to maximize profit as both a buyer and a seller, so that the experiments could replicate the real market transactions as much as possible.

We could observe behaviors of buyers and sellers during this process, and the most important aspect of this analysis was that we could precisely investigate whether sellers are being dishonest about their quality claims, and also how much they exaggerated, since we had information about both the true quality of products and sellers' quality claims. Again, this is usually not possible with other types of market data and thus our experimental data can provide unique and deep understandings about seller's information disclosure and its impact on various market outcomes.

Ⅲ. Analysis

In this section, we analyze several important and interesting questions about seller's dishonesty, focusing on its impacts on various market outcomes. More specifically, we investigate how sellers' dishonesty is related with sellers' profit, buyers' profit, market welfare, and other factors. For most of our analysis, we cluster standard errors at the subject level as each subject participated in multiple transactions both as a buyer and as a seller during the experiment.

1. Estimation

1.1. Sellers' profit

As is mentioned above, one common belief about information disclosure in markets is that it is profitable for sellers to hide negative aspects about the products they are selling. Therefore, the first thing we check with our experimental data is whether being dishonest and overstating the quality of the products actually increases seller profit. For this analysis, we define a dummy variable indicating whether a seller is being dishonest or not. As we can observe both true value of products and the value claimed by sellers, we can easily determine whether a seller is overstating the product quality or not. More specifically, when a seller claims higher than true quality, this behavior is regarded as being dishonest in our analysis. On the other hand, we consider a seller is being honest if one reveals true value or claims lower than true value of the product.

After defining the variable indicating sellers' dishonesty, we can check whether dishonesty increases sellers' profit. We thus run a regression of sellers' profit on possible explanatory variables such as claimed value, suggested price, and dishonesty, and the result is shown in 〈Table 1〉.

Table 1. Regression of Sellers' Profit on Sellers' Dishonesty

(# obs. = 435)	Coefficient	Standard Errors	t-stat.	p-value
Constant	14.849	3.697	4.02	0.000
Claimed Value	0.095	0.046	2.07	0.043
Suggested Price	0.001	0.067	0.01	0.990
Dishonesty	1.646	3.368	0.49	0.627

This result shows that the coefficient for sellers' dishonesty is positive, meaning that being dishonest is positively related with sellers' profit, as is commonly believed by many. However, we can also see that this effect is not significant ($p=0.627$), and sellers' dishonesty thus does not seem to affect sellers' profit. Instead, sellers' profit is driven by claimed value ($p=0.043$), regardless of whether a seller is being honest or not. This result is somewhat counterintuitive, since we cannot conclude from this result that dishonest sellers make more profit than honest sellers. Among other independent variables, only the effect of sellers' claimed value is significant, meaning that a seller may still increase one's profit by claiming higher product value, regardless of whether one is being honest or not. We will examine more about this result in a following section.

Next, we analyze whether the degree of dishonesty affects sellers' profit. In other words, we check if a dishonest seller gets more profit with more intense lies. For this analysis, we focus on the cases where a seller overstates the quality, and define the degree of dishonesty as *claimed value − true value* of the product. The result of this regression is shown in ⟨Table 2⟩.

Table 2. Regression of Sellers' Profit on the Degree of Sellers' Dishonesty

(# obs. = 273)	Coefficient	Standard Errors	*t*-stat.	*p*-value
Constant	21.079	5.003	4.21	0.000
Claimed Value	-0.003	0.105	-0.02	0.981
Suggested Price	0.039	0.129	0.31	0.761
Degree of Dishonesty	0.082	0.113	0.72	0.473

Although the coefficient for the degree of dishonesty is positive, suggesting that more serious lies may increase sellers' profit, this effect is not significant ($p=0.473$). Therefore, we can see from this result that the degree of dishonesty does not affect sellers' profit either, and that dishonest sellers thus cannot increase their profits simply by more strongly overstating their qualities. This result somewhat conflicts with the finding from ⟨Table 1⟩, where higher claimed value is positively related with sellers' profit. We will investigate more about this inconsistency in 1.6.

Overall, although it is commonly believed that hiding negative aspects should help sellers, our result shows that dishonest sellers do not make more profit, and more serious lies do not increase sellers' profit either. In following sections, we attempt to explain possible reasons for these counterintuitive results.

1.2. Buyers' profit

Now we check the impact of sellers' dishonesty on buyers' profit. Although there have been many studies on how sellers' information disclosure affects buyers' choices, the impact on buyers' profit has not been seriously considered in the literature. One of the reasons why it has not been the focus of related research is because it is usually very difficult to precisely measure a buyer's true profit under information asymmetry, since true values of products are uncertain due to experience or credence attributes. Here, the economic experiment again provides appropriate data for examining buyers' profit, as we can observe both the true value of the product and the price buyers pay.

More specifically, we define the variable indicating a buyer's profit as *true value − price*. In other words, buyer profit is the difference between the true value of the product, not seller's claimed value, and the price buyers pay to purchase that product. We then run a regression of buyers' profit on independent variables including seller claimed value, suggested price, and whether a seller is being dishonest. The result is shown in ⟨Table 3⟩.

Table 3. Regression of Buyers' Profit on Sellers' Dishonesty

(# obs. = 435)	Coefficient	Standard Errors	t-stat.	p-value
Constant	17.163	4.303	3.99	0.000
Claimed Value	0.259	0.061	4.27	0.000
Suggested Price	-0.306	0.070	-4.4	0.000
Dishonesty	-26.161	3.762	-6.95	0.000

Here, all of the independent variables are shown to significantly affect buyers' profit (p=0.000). Therefore, as the seller's claimed value is higher, suggested price is lower, and when the seller is being honest, the buyer profit increases. In particular, the impact of a seller's dishonesty on a buyer's profit is shown as expected, as it seems to strongly hurt buyers' profit.

We also check whether the degree of dishonesty affects buyers' profit when a seller is being dishonest. We use the same variable defined in the previous section as the degree of a seller's dishonesty. The result of the regression of buyers' profit on the degree of seller's dishonesty is shown in 〈Table 4〉.

Table 4. Regression of Buyers' Profit on the Degree of Sellers' Dishonesty

(# obs. = 273)	Coefficient	Standard Errors	t-stat.	p-value
Constant	-2.629	2.321	-1.13	0.262
Claimed Value	0.408	0.072	5.63	0.000
Suggested Price	-0.375	0.085	-4.41	0.000
Degree of Dishonesty	-0.402	0.070	-5.71	0.000

Again, both claimed value and suggested price affects buyers' profit (p=0.000), as it increases with higher claimed value and lower suggested price. The degree of seller's dishonesty also strongly affects buyers' profit (p=0.000), meaning that buyers' profit more critically gets hurt if a seller more intensively overstates the product quality.

In summary, although sellers' profit is not affected by their dishonesty, buyers' profit does get hurt by sellers' lies. Moreover, the degree of sellers' dishonesty also matters for buyer profit, as more overstated quality claim damages buyer profit more.

1.3. Market welfare

As shown in previous sections, sellers' dishonesty has varying impacts on seller and buyer profit. More specifically, while sellers' dishonesty rarely affects sellers' profit, it obviously damages buyers' profit. Therefore, in this section, we try to measure overall impact of sellers' dishonesty on the market by investigating the welfare of the entire market participants. We thus define the welfare of the market in our experiment as *seller profit* + *buyer profit*. In other words, the total amount of profit all participants make out of their transactions can be regarded as the welfare of the entire market. We then run a regression of this market welfare on claimed quality, suggested price, and sellers' dishonesty. The result is shown in 〈Table 5〉.

Table 5. Regression of Market Welfare on Sellers' Dishonesty

(# obs. = 435)	Coefficient	Standard Errors	t-stat.	p-value
Constant	32.012	4.738	6.76	0.000
Claimed Value	-0.305	0.082	-3.73	0.000
Suggested Price	0.353	0.083	4.24	0.000
Dishonesty	-24.515	5.003	-4.9	0.000

We can see from this result that entire market welfare is significantly damaged by dishonest sellers (p=0.000). In other words, when sellers are dishonest, the sum of profit of sellers and buyers is smaller than when sellers are honest, meaning that seller's dishonesty overall hurts the entire market. We can find some important policy implications from this result, as sellers' dishonesty does not seem to be simply a matter of whether a seller or a buyer gets more profit. The fact that sellers' incomplete information disclosure damages the entire society may provide a strong support for more serious restrictions or regulations on sellers' overstatement of product quality regarding experience or credence attributes.

Just as in previous sections, we have also investigated whether the degree of sellers' dishonesty affects market welfare when sellers are being dishonest, and the result is shown in ⟨Table 6⟩.

Table 6. Regression of Market Welfare on the Degree of Sellers' Dishonesty

(# obs. = 273)	Coefficient	Standard Errors	t-stat.	p-value
Constant	18.450	4.293	4.3	0.000
Claimed Value	0.405	0.129	3.14	0.003
Suggested Price	-0.336	0.129	-2.6	0.012
Degree of Dishonesty	-0.320	0.097	-3.31	0.002

We can see that the negative effect of sellers' dishonesty on market welfare is also related with how seriously sellers are lying. Therefore, if a seller overstates the quality of the product more, the entire market welfare gets more strongly damaged (p=0.002). For this reason, we should focus not only on whether sellers are being dishonest, but also on how strong those lies are, in order to manage the welfare level of entire market under information asymmetry.

1.4. Purchase probability

In order to more deeply understand the relationship between sellers' dishonesty and seller/buyer profit, we analyze the impact of sellers' information disclosure on purchase probability of buyers. The literature's finding on how dishonesty might affect purchase probability of buyers is somewhat confusing, as is mentioned above. A buyer may be more likely to purchase a product if a seller overstates the quality, because of higher expected benefit. On the other hand, a buyer may be hesitant to purchase the item if one becomes suspicious about the seller's quality claim, because of potential risk from purchase (Bauer 1960; Dowling 1986; Markin, Jr. 1974; Ross 1975; Stone and Winter 1985; Taylor 1974). As we can observe a buyer's decision to purchase the item and whether a seller is being honest or not, we can thus estimate

the impact of sellers' dishonesty on purchase probability with our experimental results. For this analysis, we have defined a dummy variable indicating whether the buyer has purchased the product or not, and run a logistic regression of buyers' purchase probability on claimed quality, suggested price, and sellers' dishonesty. The result is shown in ⟨Table 7⟩.

Table 7. Regression of Purchase Probability on Sellers' Dishonesty

(# obs. = 435)	Coefficient	Standard Errors	z-stat.	p-value
Constant	0.567	0.332	1.7	0.088
Claimed Value	0.003	0.003	0.95	0.340
Suggested Price	-0.019	0.005	-3.83	0.000
Dishonesty	0.313	0.200	1.57	0.117

The result of this logistic regression shows the following facts. First, although sellers' dishonesty is positively related with purchase probability, meaning that overstating the quality might make buyers more likely to purchase, this effect is not significant (p=0.117). Second, what drives purchase decision is suggested price, as higher price decreases purchase probability of buyers and this effect is statistically significant (p=0.000). Therefore, we can conclude that although sellers' dishonesty is positively related with purchase probability, what really matters for purchase decision under information asymmetry is suggested price.

Interestingly, a seller's value claim does not seem to affect the buyer's purchase decision in our analysis (p=0.34), and this might be due to the fact that the products are high in experience or credence attributes. As buyers cannot evaluate those product attributes, they do not trust or consider the sellers' claimed value seriously when making purchase decisions (i.e., cheap talk of sellers).

1.5. Pricing

In a previous section, we have found that pricing is an important factor for buyers' purchase decision. Therefore, we now estimate the factors affecting seller's pricing decisions with our experimental data. For this analysis, we run a regression of sellers' suggested prices on true value of the product and whether a seller is being dishonest. The result is shown in ⟨Table 8⟩.

Table 8. Regression of Price on Sellers' Dishonesty

(# obs. = 435)	Coefficient	Standard Errors	t-stat.	p-value
Constant	4.416	5.430	0.81	0.420
True Value	0.575	0.045	12.82	0.000
Dishonesty	33.074	4.449	7.43	0.000

From this result, we can see that both true value of a product and whether a seller is being dishonest significantly affect sellers' pricing decisions (p=0.000). More specifically, when the true value is higher or a seller is being dishonest, a seller suggests higher price to their buyers. This finding provides us with some important understandings on the impact of dishonesty

in markets, which we will discuss in a following section.

We also find another important aspect of a seller's pricing decision. We check whether the degree of seller's dishonesty is also related with a seller's pricing decision when sellers are dishonest, and run a regression of suggested price again as in ⟨Table 9⟩.

Table 9. Regression of Price on the Degree of Sellers' Dishonesty

(# obs. = 273)	Coefficient	Standard Errors	t-stat.	p-value
Constant	2.386	3.487	0.68	0.497
True Value	0.780	0.047	16.58	0.000
Degree of Dishonesty	0.453	0.082	5.55	0.000

This result shows that how much sellers are overstating product quality is positively related with sellers' suggested prices when sellers are being dishonest. In other words, as sellers more seriously lie about their product quality, they also tend to suggest higher prices to buyers (p=0.000). We will investigate more about this relationship between the seller's dishonesty and pricing decision in a following section.

1.6. Seller's honesty and claimed value

In section 1.1, we have found that sellers' profit is positively related with sellers' claimed value, meaning that higher claimed value brings higher profit for sellers, even though those value claims are simple cheap talks in this market under information asymmetry. However, we should note that this analysis has included the cases of both honest and dishonest sellers at the same time. Therefore, in order to better understand how sellers' claimed value affects seller profit, we re-analyze seller profit by separating honest seller and dishonest seller cases.

First, we investigate the effect of seller claimed value when a seller is being honest, and the result is shown in ⟨Table 10⟩.

Table 10. Regression of Honest Sellers' Profit

(# obs. = 162)	Coefficient	Standard Errors	t-stat.	p-value
Constant	6.144	4.611	1.33	0.189
Claimed Value	0.155	0.066	2.36	0.023
Suggested Price	0.033	0.088	0.38	0.709

As is shown in this result, while seller's suggested price is not significant (p=0.709), the effect of seller claimed value on profit is positive and significant (p=0.023) when a seller is being honest. Therefore, if a seller is being honest about the product quality, higher claimed quality leads to higher profit for sellers.

Second, we investigate the effect of seller claimed value when a seller is being dishonest, and the result is shown in ⟨Table 11⟩.

Table 11. Regression of Dishonest Sellers' Profit

(# obs. = 273)	Coefficient	Standard Errors	t-stat.	p-value
Constant	22.119	4.430	4.99	0.000
Claimed Value	0.051	0.057	0.89	0.379
Suggested Price	-0.006	0.087	-0.07	0.948

This result is somewhat different from the result from honest seller case. Neither the suggested price (p=0.948) nor claimed value (p=0.379) has significant impact on seller profit. Therefore, when a seller is being dishonest about quality claim, seller's quality claim actually does not affect seller profit.

As shown in 〈Table 1〉, we have originally found that sellers' quality claim is positively related with seller profit. However, according to our analysis in this section, this impact varies depending on whether a seller is being honest or not. More specifically, the seller profit increases with higher claimed quality only when a seller is being honest. Does this mean buyers can figure out whether a seller is overstating the quality, even in a market under information asymmetry? How can buyers be that smart? We examine the logic behind this interesting phenomenon in a following section.

1.7. True value of a product

So far, we have examined several effects of sellers' dishonesty on various market outcomes. Using our experimental data, we can also investigate which factors then are affecting a seller's decision to become dishonest. For this analysis, we select one possible factor that might affect seller's decision to be dishonest: the true value of a product. As only true value of the product is given to sellers during the experiment, none other variables can affect sellers' decision in our experiment, suggesting that a seller might be more likely to overstate the quality when the true quality is lower. Therefore, we run a logistic regression of sellers' dishonesty on the true value of product.

Table 12. Regression of Sellers' Dishonesty

(# obs. = 435)	Coefficient	Standard Errors	z-stat.	p-value
Constant	2.627	0.275	9.55	0.000
True Value	-0.021	0.002	-9.03	0.000

As shown in 〈Table 12〉, the true value of a product has a significant effect on a seller's decision to be dishonest to customers (p=0.000). In other words, when a true value is lower, a seller is more likely to overstate the quality to buyers.

2. Discussion

2.1. Summary of results

So far, our analysis of experimental data about buyer-seller interaction under information asymmetry has presented some important knowledge about sellers' dishonesty, which provides

us with deeper understandings about information disclosure in markets. The findings can be summarized in following categories: seller profit, buyer profit, market welfare, pricing, and other factors.

First, a seller's dishonesty does not lead to the seller's profit. Although there is a positive relationship between seller profit and whether a seller is being dishonest, this relationship is not significant. Moreover, when sellers are being dishonest, the degree of dishonesty does not affect seller profit either. Therefore, although a seller might hide negative aspects of the product and overstate its quality with the expectation of higher profit, this overstated quality does not affect seller profit, no matter how high one exaggerates its quality claim.

Second, buyer profit is negatively affected by sellers' lies. In other words, whether a seller overstates its quality negatively affects buyer profit. Therefore, if a seller is not being honest about the quality claim, the buyer's profit decreases in that transaction. Moreover, the degree of this dishonesty also has a strong impact on buyer profit, and accordingly, the more a seller overstates the product quality, the more the buyer's profit gets damaged.

Third, sellers' dishonesty has overall negative impact on entire market's welfare, if we define market welfare as the sum of seller profit and buyer profit. Therefore, if a seller lies about the product quality, the entire market gets hurt with lower market welfare. In addition, the more a seller lies about the quality of the product, the more market welfare gets damaged.

Fourth, both sellers' dishonesty and the degree of dishonesty are related with pricing decision. Therefore, if a seller decides to lie about the product quality, he or she also charges higher price for the product. Moreover, the more a seller overstates the product quality, the higher price that the seller charges to the buyer. We have also found that a higher price significantly harms buyers' purchase decision, leading to lower purchase likelihood.

Fifth, although the seller's claimed value is positively related with the seller's profit and higher claimed value thus leads to higher profit for sellers, this relationship depends on whether a seller is being honest or not. More specifically, the seller's claimed value only affects seller profit when the seller is being honest about the product quality. When a seller is not being honest, the relationship between claimed value and seller profit is not significant.

Finally, we have found that the true value of a product affects a seller's decision to be dishonest. According to our analysis, a seller becomes more likely to be dishonest about the quality of the products as true value of the product gets lower.

In ⟨Table 13⟩, we also provide the correlation matrix of main variables analyzed in this study.

Table 13. Correlation Matrix

	Mean	SD	1	2	3	4	5	6	7
1. Seller Profit	26.55	38.43	1						
2. Buyer Profit	6.02	30.9	0.088	1					
3. True Value	90.41	54.6	0.02	0.421**	1				
4. Claimed Value	111.7	46.23	0.117*	0.045	0.563**	1			
5. Suggested Price	77.12	41.92	0.082	-0.155**	0.568**	0.701**	1		
6. Dishonesty	0.63	0.48	0.035	-0.374**	-0.473**	0.122*	0.028	1	
7. Degree of Dishonesty	21.29	47.69	0.091	-0.438**	-0.599**	0.324**	0.03	0.66**	1

Notes: 1. * indicates significance at the 5% level.
     2. ** indicates significance at the 1% level.

2.2. Analysis of results

Reviewing these results, we can find several meaningful implications about a seller's lie in the market. As is shown above, while a seller's dishonesty hurts the buyer's profit and market welfare, it does not increase the seller's profit. Therefore, a seller's effort to hide negative aspects of products and overstate its quality can be regarded as doing good to nobody in the market.

Our results also explain why the seller's overstated quality claim does not help sellers. We believe the main reason behind this phenomenon can be found from the buyer's purchase intention. Our finding shows that a buyer's purchase intention is strongly affected by a seller's suggested price but not by claimed value. This first shows that buyers do not evaluate the seller's value claim seriously and consider it as a cheap talk, when there is high information asymmetry in the market. Our result shows that, a buyer instead reviews a seller's suggested price for making the purchase decision. Moreover, our finding also shows that dishonest sellers tend to charge higher price, possibly due to their intention of achieving more profit out of higher claimed value. Unfortunately, this effort actually works in the opposite direction, as higher price only leads to lower purchase probability and lower sales in reality.

Therefore, the reason why seller claimed value only increases seller profit when a seller is being honest is not because buyers are super smart and can figure out whether seller is lying or not, but because dishonest sellers tend to charge higher price and lead to lower purchase probability. The seller claimed value thus cannot affect the seller profit if a buyer does not purchase the item. On the other hand, honest sellers charge relatively lower price, leading to higher purchase probability. If a buyer purchases the item, then higher claimed value naturally leads to higher profit.

For a robustness check, we look at potential learning effects of buyers to see whether buyers adapt their behaviors after observing past behavioral outcomes and if their tactics evolve as their experience accumulates. In order to test learning effects of buyers, we focus on two buyer-side variables – purchase probability and buyer profit – and compare them between first five periods and last five periods, as each subject participated in 15 experimental periods in total. The results are as follows. First, there is no significant difference in buyers' purchase probability between first periods and last periods. The average purchase probability in first 5 periods is 0.428 while it is 0.421 in last 5 periods, and their difference is not statistically significant ($p=0.91$). Second, buyer profit does not differ between these two stages either. The average profit of buyers from first 5 periods is 4.48 while it is 6.1 in the last 5 periods. However, the difference is not statistically significant ($p=0.6$), showing that buyer profit has not improved over the process of the experiment. As these results show, the buyer behaviors from early experimental periods is not different from those from late experimental periods, and buyer learning thus did not happen at least during our experimental sessions. Therefore, we can conclude that the results from this study have not been affected by any potential buyer learning.

Ⅳ. Conclusion

This study analyzes the interesting question of sellers' dishonesty in the market, as the effect of sellers' dishonesty might be double-edged. First, dishonesty may help sellers because they

can conceal negative aspects of their products. Second, dishonesty may hurt sellers since buyers may perceive risk of purchase and become less likely to purchase the product, when a seller is not honest about the quality claim. While this subject of a seller's dishonesty is important, it has not been a popular topic in the literature so far mostly because it is very hard to observe and evaluate a seller's dishonesty. Therefore, this study attempts to precisely measure a seller's dishonesty and its impact on various market outcomes, through examining buyer-seller interactions in an incentive-based economic experiment.

The findings from this study are expected to contribute to the literature with some counter-intuitive understandings about sellers' dishonesty. More specifically, we have investigated the following questions with our experimental data. First, is seller's dishonesty helpful for sellers? According to our analysis, sellers' lies do not affect seller profit even when they are very intensive. We can thus say that sellers' dishonesty does not help sellers, contrary to common belief. Second, does a seller's dishonesty hurt buyers? Our result shows that, when a seller overstates product quality, the buyer's profit decreases. Therefore, a seller's dishonesty obviously damages buyers. Moreover, the result also verifies that a seller's dishonesty not only negatively affects buyer profit, but also hurts the entire market welfare. Third, why does sellers' profit not increase with sellers' dishonesty? We have found that a seller's quality claim affects the seller profit only when a seller is being honest. When a seller is not being honest, the seller tends to charge higher price, leading to lower purchase probability. On the other hand, when a seller is being honest, the seller charges lower price and makes buyers more likely to purchase the product. Therefore, a seller's quality claim only affects the seller profit when the seller is being honest. In summary, sellers' dishonesty does no good to anyone in the market, even including sellers themselves, and the main reason of this Pareto inefficiency is because dishonest sellers charge higher price to buyers and decrease sales.

This paper may contribute not only to the academia but also to managers and policy makers. For researchers, as this is one of a few studies that precisely examine the effect of seller's dishonesty, it may provide important implications regarding information disclosure in a market with information asymmetry. As this study looks at a very general market setting even without specifying a product category, we hope that following empirical works may examine the effect of seller's dishonesty in diverse market environments to provide more structured understandings about the information asymmetry in markets. This study might also encourage the managers in the field to consider more straightforward marketing communications with customers, as it shows that hiding negative aspects do not really increase profit in a market under information asymmetry. Moreover, according to the findings of this study, policy makers should be more serious about regulating sellers' overstated quality claim, as a seller's dishonesty is found to damage both buyer profit and the entire market welfare. In the end, honesty might be the best policy for the market under information asymmetry.

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