To Insure or Not to Insure?
Promoting Trust and Cooperation with Insurance Advice in Markets

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Abstract: We design and test a novel insurance advice mechanism aimed at promoting trust and cooperation in markets with asymmetric information. In a buyer-seller game, sellers are given the option to advise buyers on whether to purchase third-party insurance against the potential losses from the opportunistic behavior of strategic sellers. The theoretical model suggests that both cooperative and strategic sellers will advise buyers not to purchase the insurance. Once this advice has been given, strategic sellers are less likely to pursue self-interest due to the associated psychological costs. We conduct a controlled laboratory experiment and show that the insurance advice mechanism significantly increases market efficiency, with sellers being more likely to cooperate with buyers and buyers being more likely to purchase from the seller. Furthermore, we find that the insurance advice mechanism is more effective when sellers can observe buyers' insurance purchase decisions.

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1. Introduction

Asymmetric information is ubiquitous in economic transactions. Consumers are often unable to verify the sellers' credibility before purchasing a product. In this case, if the consumer does not trust the seller, they may refrain from the transaction entirely. Many mechanisms have been designed to solve this asymmetric information problem and facilitate efficient transactions. Among them, insurance (or warranties) is a common practice. In particular, the buyer can purchase insurance or warranties from a third-party provider that allows him to protect his purchase. For example, online markets such as eBay offer the option to purchase warranties from the third-party provider Squaretrade. Buyers can purchase the warranty either at the time of buying the product on eBay or directly from Squaretrade's website after the purchase of the product (Steiner, 2012). The insurance provided by a third party offers additional or extended coverage to the existing manufacture warranties or protection when consumers purchase (second-hand) products where the manufacture warranty is often not honored. However, such insurances are often costly and come with exclusions and limitations. If buyers are not willing to pay the cost of insurance or are discouraged by the complicated exclusion clauses, the inclusion of insurance may not generate more transactions. Moreover, insurances provided by a third party may not change the incentives for the sellers or manufacturers to cooperate, and therefore they have a limited impact on improving consumers' willingness to trade. In this paper, we propose and test a novel insurance advice mechanism that can promote trust and cooperation in markets with asymmetric information.

The key to our proposed mechanism is to allow the seller (the party who has more information) to advise the buyer whether or not he should purchase insurance[1]. In general, insurances often address two different types of risks: 1) risks about the seller's cooperative type, such as the seller's intention to deliver the product on time or her intention to produce a high-quality product as advertised; and 2) natural risks that are out of the seller's control, such as bad weather that causes the delay of the shipment. As our focus is on the asymmetric information problem, the proposed advice mechanism is related to insurances against the first type of risk. As a first step, we test the mechanism built on insurance provided by a third party instead of the seller. This feature avoids potential confounds due to the additional profit incentives of selling insurance.

[1] For simplicity, we will use "she" to refer to the seller and "he" to refer to the buyer.

Our hypothesis is that advising not to purchase the insurance introduces a psychological cost of defecting. Firstly, giving advice may lead the seller to feel more accountable for the buyer's payoffs as she now plays a more active role in the buyer's decision (Tetlock, 1985; Lerner & Tetlock, 1994; 1999). Secondly, if the seller is subject to omission bias (Ritov & Baron, 1992), she may judge defection—after advising the buyer not to protect himself from the risk— as morally worse than when she does not exert any influence on the buyer's decision. Thirdly, if the advice not to purchase the insurance is taken as a statement that the seller will cooperate, subsequent defection may render the advice to a lie and inflict psychological costs due to lying aversion (Cressey, 1986; Mazar et al., 2008; Gneezy et al., 2013; Abeler et al., 2014; Abeler et al., 2019). Lastly, if advising the buyer not to purchase the insurance increases the buyer's expectation that the seller will cooperate, the seller may be averse to disappointing the buyer (Charness & Dufwenberg, 2006; Battigalli & Dufwenberg, 2007; Balafoutas & Sutter, 2017; Cartwright, 2019). When such psychological costs are sufficiently high, the advice mechanism leads sellers to cooperate with buyers. We show theoretically that, at equilibrium, buyers follow sellers' advice of not buying the insurance, and sellers ship the product, provided psychological costs are not too low. Thus, the insurance advice mechanism can facilitate more transactions and increase market efficiency.

We conduct a controlled laboratory experiment to examine the effectiveness of the mechanism empirically. In particular, we address two main research questions. Does the insurance advice mechanism increase the number of buyers who enter transactions with sellers? Are sellers more likely to cooperate with buyers under the insurance advice mechanism?

While in online marketplaces such as Amazon and eBay, the insurance purchase decision can be easily made available to sellers, we take into account the fact that sellers do not always observe the buyers' insurance purchase decision when the insurance is provided by a third party. Theoretically, the insurance advice mechanism can help build trust and improve efficiency even if the seller does not observe the buyer's actual insurance purchase decision. This is the case because the seller expects a psychological cost to be associated with not shipping the product and becomes more likely to ship the product when she anticipates that the buyer may buy the product without buying insurance. In turn, knowing that the seller may ship the product, the buyer is also willing to follow the advice with some non-zero probability. The improvement, however, is not as effective compared to when the insurance

purchase decisions are perfectly observed by sellers. We test empirically whether the effectiveness of the mechanism varies on the observability of the buyer's insurance purchase.

The experiment consists of three treatments. The control treatment is a buyer-seller game with insurance. The buyer decides whether to purchase a product, and the seller decides whether to ship the product upon receiving the payment. If the buyer purchases the product, he can also purchase insurance against the risk that the seller might not ship the product after receiving the payment. We design an insurance advice mechanism in which the seller has to advise the buyer whether to purchase the insurance before starting the buyer-seller game. Upon receiving the advice, the buyer decides whether to buy the product and, if so, whether to purchase the insurance. We test the mechanism in two treatments: the Insurance Advice (IA) treatment and the Insurance Advice with Hidden Information (IA_HI) treatment. In the IA treatment, if the buyer purchases the product, the seller is also informed of the buyer's insurance purchase decision before deciding whether to ship the product. In the IA_HI treatment, sellers never learn the buyer's insurance purchase decision. This is the only difference between the two treatments. We use shipping as a simple way to introduce defection in the game. If the proposed mechanism works in this setting, it should also effectively reduce other types of defection, such as selling faulty products.

Our findings are consistent with our hypotheses. In the IA treatment, sellers advise buyers not to purchase insurance 81% of the time. Compared with the control treatment, the rate of product purchase increases by approximately 33% in the IA treatment. While buyers purchase the product 74% of the time when sellers advise no insurance, it is only 35% when the advice is to purchase insurance. The number of sellers who cooperate with buyers (i.e., ship the product) also increases by almost 50%. This increases the proportion of efficient trades and the average profit for both buyers and sellers. The mechanism remains effective in the IA_HI treatment. About 71% of sellers advise buyers not to purchase the insurance. Compared to the control, the product purchase rate increases by 33%, and the shipping rate increases by approximately 22% in the IA_HI treatment, resulting in an increase in market efficiency. However, as the theory predicts, compared to the IA treatment, the IA_HI treatment is less efficient because buyers are less likely to follow the advice not to purchase the insurance, and sellers are slightly less likely to ship the product.

This paper mainly contributes to two strands of literature. One is the research on market design aimed at solving market failures due to information asymmetry. A number of innovative solutions have been proposed and tested, including the widely studied mechanism of reputation (for review, see Chen et al., 2020). Research has been carried out to examine

how to improve the reliability of the reputation mechanisms that are subject to problems such as missing information (Resnick & Zeckhauser, 2002; Bolton et al., 2004; Dellarocas & Wood, 2008; Cabral & Hortacsu, 2010; Li & Xiao, 2014, Bolton et al., 2018; Bolton et al., 2019;) and manipulating reviews (Mayzlin et al., 2014).

The simple mechanism we propose here complements this literature by pointing out a new direction for solutions. For example, on eBay, buyers are able to purchase extended warranties using Squaretrade or xcover.com. To implement the insurance advice mechanism, eBay could allow sellers to make a recommendation to the buyer as to whether he should purchase the extended warranty or not. The advice mechanism can be especially beneficial for new sellers before they are able to establish a positive reputation via a feedback mechanism. The mechanism can also work in offline markets such as the used car market. For instance, the original car owner may suggest whether the potential buyer should purchase an extended warranty from a third party.

This paper also contributes to the recent behavioral findings that communication can promote cooperation (Ellingsen & Johannesson, 2004; Binmore, 2006; Charness & Dufwenberg 2006; Bicchieri & Lev-On, 2007; Vanberg, 2008; Sanchez-Pages & Vorsatz, 2009; Erat & Gneezy, 2012; Battigalli et al., 2013; López-Pérez & Spiegelman, 2013). For example, it has been shown that promises can enforce trust and cooperation due to guilt aversion or the cost of lying (Charness & Dufwenberg, 2006; Vanberg, 2008; Serra-Garcia et al., 2013). In our case, when the seller advises the buyer not to purchase the insurance, the buyer may interpret this message as a promise to ship the product. On the other hand, bare promises, such as a message that simply states, "I promise to cooperate," have been shown to be less effective in changing behavior (Charness & Dufwenberg, 2010). The significant effect of a plain message on whether to purchase the insurance suggests that additional mechanisms, such as accountability and/or omission bias, may play a role in the advice effect. Our study thus points to another channel where communication can affect cooperation outcomes. More generally, our work shows that giving advice on the principal's payoff-relevant action, as a specific form of communication, can hold the agent more accountable and thereby reduce the opportunistic behavior of the agent.

2. Experiment

2.1 Experimental design

Our experiment is based on a buyer-seller game (modified from Bolton et al., 2004; Li & Xiao, 2014). At the beginning of each treatment, subjects are randomly assigned to the role of

either buyer or seller. Following Li & Xiao (2014), each treatment consists of 10 rounds. Repeated games allow us to obtain a larger number of observations and also provide participants opportunities to learn to converge to equilibrium. Both buyers and sellers receive a full history of their decisions, updated and provided at the end of every round (see Appendix A for the screenshots of the decision-making stage). To minimize the potential reputation effect, we randomly match each buyer with a seller at the beginning of each round. At the end of the experiment, one round is randomly selected as the payment round, such that the earnings outcome in one round is unlikely to have any income effect on the decisions in later rounds. The instructions are provided in Appendix B.

In the control treatment (illustrated in Figure 1), at the beginning of each round, buyers and sellers are endowed with 35E$ (experimental dollars), and the buyer can choose to: purchase a product with insurance; purchase a product without insurance; or not purchase the product. The buyer values the product at 40E$, and it costs them 25E$ to purchase the product. If the buyer decides not to purchase the product, the round ends, and each participant's earnings remain at the 35E$ endowment. If the buyer decides to purchase the product (with or without insurance), the seller receives the payment of 25E$ from the buyer and then decides whether to ship the product[2]. Shipping the product costs the seller 10E$. Thus, if the seller ships the product, her earnings for that round is 50E$; and if she does not ship the product, her earnings will be 60E$.

The insurance costs the buyer 8E$. In the event that the buyer purchases the product but the seller does not ship the product, the insurance will cover the loss of the 25E$ that the buyer has paid to the seller. Once the buyer decides to purchase the insurance, he will pay the cost of 8E$ regardless of whether the seller ships the product or not. All these factors are common knowledge.

The payoff structure is designed so that the buyer's decision (whether that be to purchase the product without insurance, purchase the product with insurance or not purchase the product) will differ depending on his belief in the likelihood that the seller will ship the product. This is discussed in more detail in Section 3.

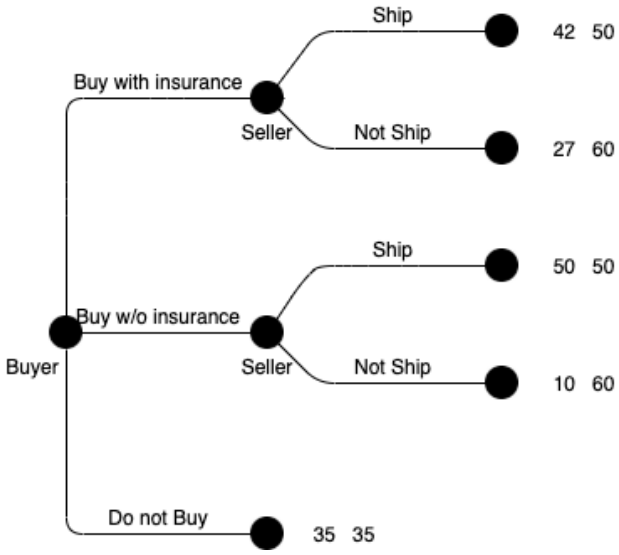
The *Insurance Advice (IA)* treatment—the timing of the game is described in Figure C1 in Appendix C—is the same as the control treatment except that we add an additional stage before the buyer makes the product and insurance purchase decisions. In this stage, the

[2] Although we use the shipping context (also see Bolton et al., 2004; Li & Xiao, 2014), the nature of the decision making, however, can also extend to other settings such as the choice of the quality of the products or the speed of shipping.

seller must advise the buyer whether to purchase the insurance. The buyer then makes his decision after seeing the seller's advice. The seller is informed of the buyer's insurance purchase decision before making the shipping decision. All these are common knowledge. The rest of the game is the same as the control treatment.

The *Insurance Advice with Hidden Information (IA_HI)* treatment has the same structure as the IA treatment, except that the seller never knows whether the buyer decides to buy the insurance or not throughout the experiment.

Figure 1: Buyer-seller game with insurance (control treatment)



2.2 Experimental procedure

The experiment was conducted at the Monash Laboratory for Experimental Economics (MonLEE) using z-tree (Fishbacher, 2007). The instructions were read aloud by the experimenter, and subjects completed a comprehension quiz (see Appendix D) to ensure they understood the task and the payoffs associated with each decision.

We ran 24 sessions in total—8 sessions per treatment—and we recruited on average 14 subjects in each session. Each session lasted less than one hour. Subjects were randomly assigned the role of either buyer or seller and maintained this role for the entirety of the experiment. In each round, a buyer was randomly and anonymously rematched with a seller. At the end of the experiment, one round was randomly selected as the payment round. Each subject was paid $4 AUD for participating, adding to the earnings from the games. The exchange rate was 1E$= $0.4 AUD. Subjects were paid privately, earning about $20 AUD on average.

3. Theoretical framework and hypotheses

In this section, we present a theoretical framework to derive predictions for both sellers' and buyers' decisions in each treatment. We start with the comparison between the control and the IA treatment. Later, we discuss the IA_HI treatment.

Consider the bilateral transaction between a buyer and a seller. The buyer demands one unit of the products that the seller produces and attaches a value ($v > 0$) to it. The seller attaches zero value to the product and can produce it at zero cost. We assume both parties are risk-neutral. The product price is exogenously given by $p \in (0, v)$.[3] If the buyer purchases the product, the seller can ship the product at the cost of $d \in (0, p)$. Following the standard approach to modelling seller reputation in an asymmetric information environment with both moral hazard and adverse selection problem (Bar-Isaac and Tadelis, 2008), we assume that there are two types of sellers: a good type (g) who always ships the product; and a strategic type (s) who maximizes her own utility, including potentially a psychological cost which we explain below. Only the seller knows whether she is the good type or the strategic type. The buyer does not know the seller's type, but he does know that the probability of encountering a good type is $p_g \in (0,1)$ and the probability of encountering a strategic type is $p_s = 1 - p_g$.

Along with purchasing the product, the buyer has the option to buy insurance at price w, which allows the buyer to recoup p in case the product is not shipped.[4] We assume that the insurance is not too expensive, i.e., $w \leq p(1 - \frac{p}{v})$.[5] The IA treatment has a special feature in that the seller can advise the buyer whether to buy the insurance before any purchase decision is made. We denote the advice $a \in \{Y, N\}$, where Y means "buy the insurance" and N means "do not buy the insurance". In contrast to the control treatment, where sellers cannot have any influence on the buyer's decisions, by advising whether to buy the insurance, the seller can change the buyer's expectation of the likelihood of receiving the product and thereby become more accountable to the buyer's payoffs. While this would not affect a type-g seller who always ships the product, a type-s seller will incur a psychological cost ($\alpha > 0$) for not shipping the product if (i) she advises N and (ii) the buyer does not insure. The seller may experience psychological costs even if the buyer purchases the insurance. We assume

[3] We set the prices of both the product and the insurance as fixed in the experiment to simplify the setting in order to test the effect of the insurance advice. In the field, sellers can also use price to signal her type and affect the purchase decisions.

[4] We assume sellers do not receive commissions from selling third-party insurances. If they do, the advice of not to buy the insurance should serve as an even stronger signal of being cooperative in the shipping stage.

[5] This condition is satisfied in our experiment with w=8, p=25 and v=40.

that these costs will be higher if the buyer follows the advice and does not purchase the insurance. In this sense, α can be understood as the difference in the psychological cost between the two cases. Also note that, for simplicity, we assume type-s sellers do not incur any psychological cost associated with the buyers' insurance purchase decisions when they do not give insurance advice in the control treatment. This is because such a cost, if any, should be the same as in the IA treatment. The simplicity allows us to focus on the effect of the advice mechanism. Thus, while the type-s seller will never ship the product in the control treatment, she will ship the product if she advises N and the buyer does not insure, provided that the shipping cost is smaller than the psychological cost ($d < \alpha$). On the other hand, the type-s seller will not ship the product if she advises Y, as there is no psychological cost constraining the opportunistic behavior.

The timing of the game in the IA treatment is as follows. First, the seller advises whether to buy the insurance. Next, the buyer receives the advice and decides whether to purchase the product and, if so, whether to buy the insurance. The seller observes the buyer's product purchase and insurance purchase decisions, and she decides whether to ship the product if the buyer purchases the product. The equilibrium concept is the Weak Perfect Bayesian Equilibrium (WPBE).

In the control treatment, without the stage of pre-purchase advice, the buyer's purchase decision relies on the prior belief about the seller's type, p_g. The type-g seller always ships the product, while the type-s seller never ships the product. Given our assumption that $w \leq p\left(1-\frac{p}{v}\right)$, it is straightforward to show that the buyer's optimal decision is as follows (see Appendix E for the details):

$$\begin{cases} \text{purchase the product without insurance,} & \text{if } p_g \geq 1-\frac{w}{p} \\ \text{purchase the product with insurance,} & \text{if } \frac{w}{v-p} \leq p_g < 1-\frac{w}{p} \\ \text{do not purchase the product,} & \text{if } p_g < \frac{w}{v-p} \end{cases} \quad (1)$$

That is, the buyer: purchases the product without insurance when p_g is relatively high; purchases the product with insurance if p_g is at some intermediate level; and does not purchase the product if p_g is very low.

Now consider the IA treatment. It is straightforward to show that in this case, there is no separating equilibrium. If the type-s seller's separating-equilibrium advice is Y, the

buyer's optimal choice is not to purchase the product as he anticipates that the type-s seller will not ship the product. Thus, the type-s seller will advise *N* instead. If the type-s seller's separating-equilibrium advice is *N*, she will again be better off by instead advising *Y,* in which case she will get the full amount of payment p by not delivering, without incurring any psychological cost.

In the IA treatment, there exists a unique Pareto-dominating pooling equilibrium. Given that type-g seller advises *N* in equilibrium, type-s sellers are better off by pooling with them and advising *N*. When the psychological cost is relatively large ($d \leq \alpha$), type-s sellers' optimal choice after advising *N* is to ship the product and incur the shipping cost. Thus, in this case, buyers purchase the product without insurance upon receiving advice N and both types of sellers advise *N* and subsequently deliver the product. When $d > \alpha$, the sellers and the buyers behave the same as in the control treatment.

The above analysis focuses on the IA treatment where the seller observes whether the buyer purchases the insurance or not before shipping the product. In the IA_HI treatment, the seller does not know the buyer's insurance purchase decision. As in the IA treatment, the equilibrium outcome remains the same as in the control when $d > \alpha$. The more interesting case arises when $d \leq \alpha$. Firstly, recall that if the prior (p_g) is relatively high (i.e., $p_g \geq 1 - \frac{w}{p}$), buyers will buy the product and not the insurance in the control treatment. Thus, even though the seller is not informed of the buyer's insurance purchase decision, she would anticipate that the buyer does not purchase the insurance. As a result, in the IA_HI treatment, buyers and sellers will behave the same as in the IA treatment: both types of sellers advise *N*, all buyers purchase the product without insurance, and both types of sellers ship the product.

Now consider when the prior (p_g) is relatively low (i.e., $p_g < 1 - \frac{w}{p}$). In this case, there can be multiple equilibria.[6] We select the symmetric mixed-strategy equilibrium in which all type-s sellers and buyers choose the same strategy. The greatest advantage of selecting this equilibrium is that the proportion of each strategy realization is endogenously determined and can be used to make comparisons with other treatments using the data from the experiment. In this equilibrium, both types of sellers advise *N*. In contrast, other equilibria which replicate either the control or the IA outcome require extreme forms of participants'

[6] If sellers are optimistic and believe that buyers will follow the advice *N*, there exists an equilibrium such that when $d \leq \alpha$ all sellers advise *N*, buyers purchase the product without purchasing insurances, and all sellers ship the product. Similarly, if sellers are pessimistic and believe that buyers will not follow the advice *N*, there exists another equilibrium such that when $d \leq \alpha$ all participants behave as in the control treatment despite all sellers advising *N*. These equilibria are less convincing as they rely on sellers holding extreme beliefs.

(mis-) coordination. Buyers mix between "purchasing the product without insurance" and "purchasing the product with insurance," while type-s sellers mix between "ship" and "not ship." Specifically, buyers will buy the product without insurance with the probability of d/α. Type-s sellers will ship the product with probability of $1-w/(p(1-p_g))$.

By comparing the equilibrium in all three treatments, we derive the following hypotheses. The details of the equilibrium analysis can be found in Appendix E.

Hypothesis 1: In both the IA and the IA_HI treatments, sellers will advise *N*.

As long as α is sufficiently large (α >d) for some sellers:

Hypothesis 2: The product purchase rate Pr(*BuyProd*):
Pr(*BuyProd*|*Control*) < Pr(*BuyProd* |*IA_HI*) = Pr(*BuyProd*|*IA*).

Hypothesis 3: The rate of purchasing the product without insurance Pr(*BuyProd&NoIns*):
Pr(*BuyProd&NoIns*|*Control*)< Pr(*BuyProd&NoIns*|*IA_HI*)< Pr(*BuyProd&NoIns*|*IA*).

Hypothesis 4: The seller shipping rate Pr(Ship):
Pr(*Ship*|*Control*)< Pr(*Ship*|*IA_HI*)< Pr(*Ship*|*IA*).

An implication of these hypotheses is that the insurance advice mechanism can improve market efficiency. We can measure market efficiency by the frequency of efficient trades. In our setup, there are two types of efficient trades. One is characterized by the buyer purchasing the product (regardless of the insurance purchase decisions) and the seller shipping the product. The other is characterized by the buyer purchasing the product without insurance and the seller shipping the product. When considering the total welfare of buyers and sellers, this latter definition of efficiency is a Pareto improvement over the first definition, as the buyer's earnings increase while the seller's earnings do not change. [7] Both buyers and sellers earn the highest amount. To differentiate these two definitions of efficiency, we refer to the first type as *standard efficient trades* and to the second type as *optimal efficient trades*. According to Hypotheses 2, 3 and 4, we expect the frequency of

[7] Here we only consider the total welfare of buyers and sellers, since the insurance is exogenously provided by the experimenter. In a natural setting, if the insurance market is very competitive or insurers serve a large number of markets, a reduced number of insurance purchases in one market only leads to a negligible efficiency loss.

efficient trades to be highest in the IA and lowest in the control condition. Consequently, the insurance advice mechanism is most effective in the IA condition, especially when considering the proportion of optimal efficient trades.

Hypothesis 5: The proportion of standard and optimal efficient trades Pr(*Eff*): Pr(*Eff*|*Control*)< Pr(*Eff*|*IA_HI*)< Pr(*Eff*|*IA*).

4. Results

We first report what advice sellers gave buyers in the two advice treatments. Then, we compare buyers' purchase decisions. Next, we examine how the insurance advice affects sellers' shipping decisions and whether the shipping frequency differs between the treatments. Lastly, we report the treatment effect on market efficiency. Table 1 summarizes the main descriptive results in each treatment.

Table 1: Descriptive summary of decisions

Treatment (# of participants)	Sellers advise No insurance (%)	Buyers purchase product (%)	Buyers purchase product without insurance (%)	Sellers ship the product (%)	Standard efficient trades (%)	Optimal efficient trades (%)
Control (108)	-	51.1 (4.3)	20.2 (3.5)	43.9 (5.2)	22.4 (2.9)	9.1 (2.1)
IA (116)	81.2 (3.2)	66.9 (3.7)	48.3 (4.1)	61.4 (5.0)	42.1 (3.2)	33.3 (3.4)
IA_HI (108)	71.1 (4.7)	67.8 (4.3)	35.6 (4.2)	53.5 (5.3)	37.8 (3.3)	22.8 (3.4)

Note: the number in each parenthesis is the standard error. Standard errors are calculated at the individual level, where each individual is an independent observation.

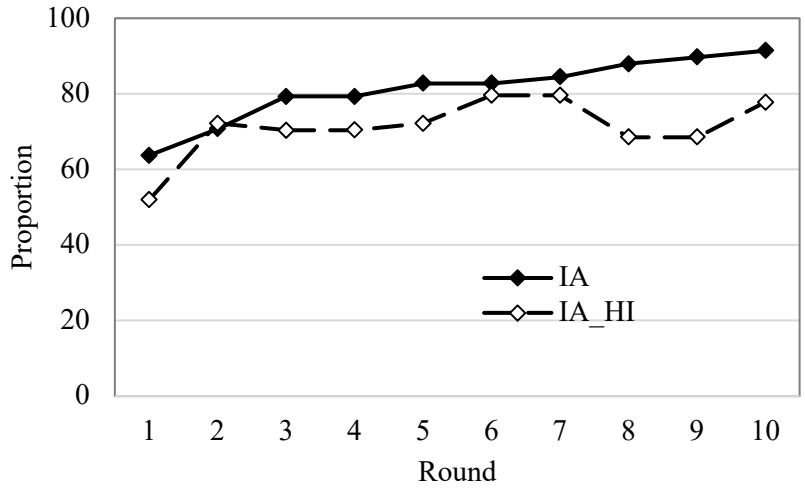
4.1 Insurance advice

Supporting Hypothesis 1, over the 10 rounds, we observe on average 81.2% of sellers advise the buyer not to purchase the insurance in the IA. The proportion of sellers advising no insurance remains to be high in the IA_HI treatment (71.1%). Although the frequency is slightly lower in the IA_HI than the IA treatment, this difference is not significant (Mann-

Whitney test, p=0.157) [8]. In both treatments, the proportion is higher than a strategy randomizing the advice given with 50%, suggesting that sellers prefer to advise no insurance (81.2% vs. 50%, Binomial test, p<0.000; 71.1% vs. 50%, Binomial test, p<0.000).

Figure 2 plots the proportion of sellers who advise buyers not to purchase the insurance in each round. In both treatments, the frequency of advising no insurance is relatively lower in the first round and increases over time.[9] By the end of the experiment, the frequency of choosing the advice of "no insurance" is approximately 50% higher as compared to the first round in both treatments (91.4% vs. 63.7% in IA, Wilcoxon signed-rank test, p<0.001; 77.8% vs. 51.9% in IA_HI, Wilcoxon signed-rank test, p<0.001). We report below that a buyer is more likely to purchase the product when he receives the advice of no insurance compared to when he receives the advice of buying the insurance. The increasing rate of advising no insurance suggests that sellers gain experience and learn to advise buyers not to purchase the insurance over time.

Figure 2: Proportion of sellers who advise no insurance



Note: # of obs. IA: 58; IA_HI: 54.

[8] In all the non-parametric tests, we calculate the average at the individual level and treat each individual as an independent observation. In this case, for the proportion of sellers advising no insurance, it would be $\sum^{10}_{t=1}$Advice_No$_{i,t}$/10 for each participant.

[9] In round 8 and 9, the frequency of advising no insurance drops in the IA_HI and, as a result, it is significantly lower than in the IA than the IA_HI treatment (round 8: 68.5% vs. 87.9%, Mann-Whitney test, p=0.013; round 9: 68.5% vs. 89.7% , Mann-Whitney test, p=0.006). In the last round, the frequency of advising no insurance in the IA_HI treatment increases again to about the same level as in round 7 which decreases the differences between the IA and IA_HI treatments although the difference is still significant (91.4 vs. 77.8%, Mann-Whitney test, p=0.046).

Result 1: *In both IA and IA_HI treatments, the majority of sellers advise buyers not to purchase the insurance. The frequency of advising no insurance increases over time in both treatments.*

4.2 Purchase decision

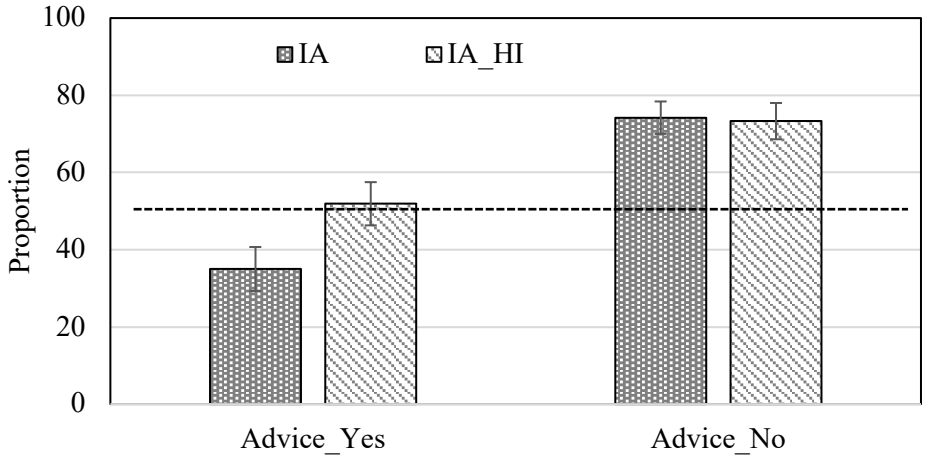
Supporting Hypothesis 2, buyers are significantly more likely to purchase the product in the IA and IA_HI treatments compared to the control treatment (IA vs. Control: 66.9% vs. 51.1%, Mann-Whitney test, p=0.009; IA_HI vs. Control: 67.8% vs. 51.1%, Mann-Whitney test, p<0.000). The purchase rate is not significantly different between the two advice treatments (66.9% vs. 67.8%, Mann-Whitney test, p=0.857).

Figure 3 plots the product purchase decision conditional on the advice that buyers receive. Since buyers do not receive any advice in the control treatment, we use the dotted line to mark the average product purchase rate in the control. Compared with the control, buyers in the two advice treatments are significantly more likely to purchase the product when the sellers advise no insurance[10]. (IA vs. Control: 74.2% vs. 51.1%, Mann-Whitney test, p=0.002; IA_HI vs. Control: 73.3% vs. 51.1%, Mann-Whitney test, p<0.000). In contrast, when buyers receive advice to purchase the insurance, the purchase rate in the IA treatment is significantly lower than in the control (35.0% vs. 51.1%, Mann-Whitney test, p=0.008). In the IA_HI treatment, there is no difference in the purchase rate to the control treatment when the advice is to purchase insurance (51.9% vs. 51.1%, Mann-Whitney test, p=0.931). These results suggest that the increase in the product purchase rate in the IA and IA_HI treatments is mainly driven by buyers who receive advice not to purchase the insurance. When the seller advises the buyer not to purchase the insurance, the buyer's expectations of the seller shipping the product increase and consequently he is more likely to purchase the product. On the other hand, the advice to purchase the insurance may significantly reduce the buyer's expectation that the seller will ship the product. We also observe that in the IA treatment, the proportion of buyers who purchase the product when receiving the advice to buy the insurance is relatively higher in the earlier rounds: 47.2% in the first 5 rounds and13.5% in the last 5 rounds, with no buyers (0 %) choosing to purchase the product in the final round. This result suggests that buyers learn not to purchase the product when they receive advice to purchase insurance as the rounds progress.

[10] For each buyer, we calculate the average purchase rate over the rounds where he received the advice not to purchase insurance and those where the advice is to purchase insurance, respectively. We treat each of these as an independent observation.

Result 2: *Buyers are more likely to purchase the product in the IA and the IA_HI treatments than the control treatment. The increased purchase rate is mainly driven by the advice of no insurance.*

Figure 3: Product purchase rate conditional on advice



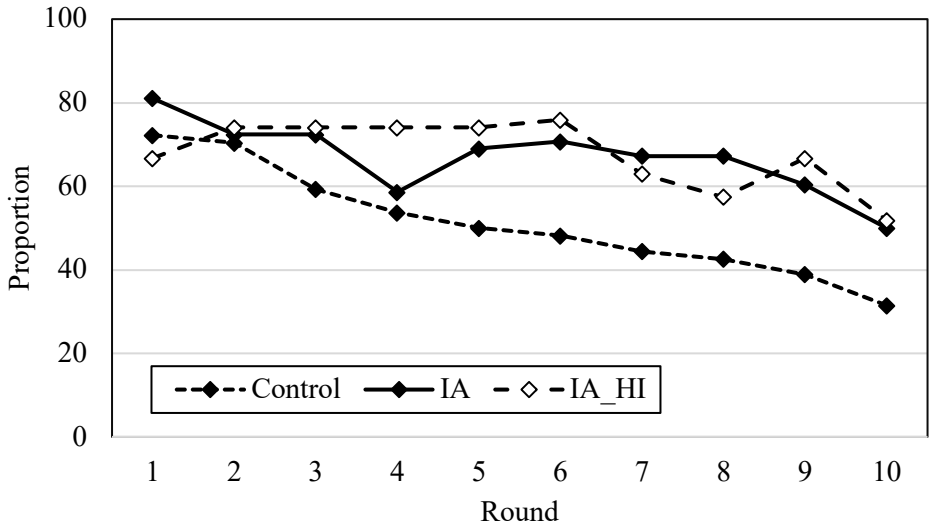
Note: The dotted line marks the purchase rate (51.1%) in the control treatment. Error bars are standard errors. # of obs. Advice_Yes (IA: 49; IA_HI: 54; Control: 54); Advice_No (IA: 58; IA_HI: 54; Control: 54)

We further compare the dynamics of the product purchase decisions in each treatment. Figure 4 plots the proportion of product purchases over 10 rounds. While we observe a rapid decay in the purchase proportion in the control treatment, this does not occur at the same rate in the IA and IA_HI treatments. To provide statistical evidence, we analyze the buyer's product purchase decisions using a random effects linear probability model with standard errors clustered at the session level.[11] The dependent variable is whether the buyer purchases the product in each round. The independent variables include treatment dummies, round, and the interaction between the treatments and round. Table 2 reports the regression results. The coefficient of "Round" is significantly negative, which suggests that there is significant decay in the product purchase rate over time in the control treatment. There is also significant decay in the IA treatment ($\beta_3 + \beta_4$) and in the IA_HI treatment ($\beta_3 + \beta_5$). However, the coefficients of IA*Round and IA_HI*Round are both significantly positive, which suggests that the decay is significantly slower in the two advice treatments than in the

[11] We also conducted a probit regression and the results are robust. This regression is reported in Appendix F1

control. Lastly, we find no significant difference between the decay rate in the IA treatment compared to the IA_HI treatment (β_4 vs. β_5, p=0.756).

Figure 4: Proportion of buyers who purchase the product per round



Note: # of obs.: IA: 58; IA_HI:54; Control: 54.

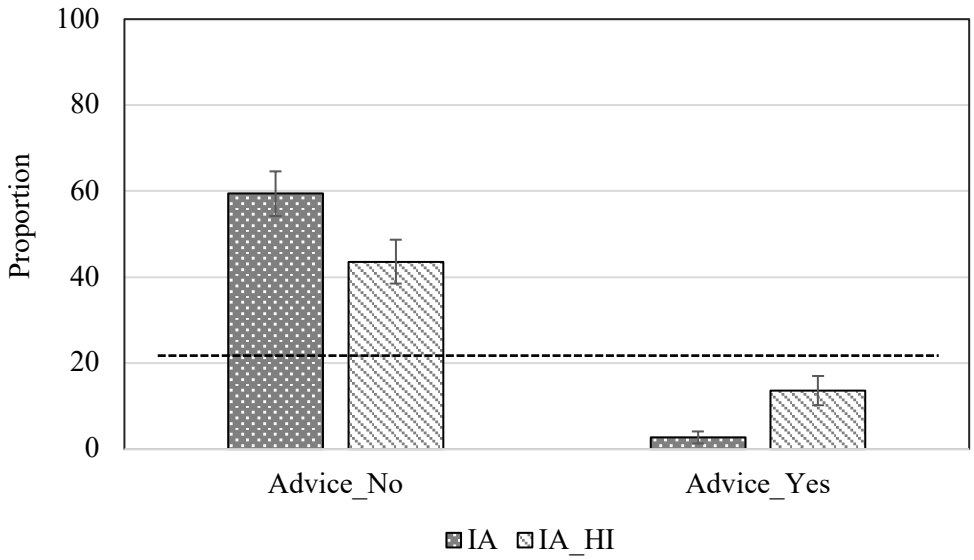
Table 2: Regression analysis of product purchase decisions

Independent variables	Dependent variable: $Buy_{i,t}$ =1, if buyer *i* purchase product in round *t* =0, *o.w.*
β_1: IA	0.045 (0.081)
β_2: IA_HI	0.033 (0.088)
β_3: Round	-0.042***(0.007)
β_4: IA*Round	0.021*(0.012)
β_5: IA_HI*Round	0.024**(0.010)
Constant	0.744***(0.068)
H0: $\beta_3 + \beta_4=0$	p=0.024
H0: $\beta_3 + \beta_5=0$	p=0.011
H0: $\beta_4 = \beta_5$	p=0.756
N	1,660

Note: Robust standard errors clustered at the session level are reported in the parentheses, *** p<0.01, ** p<0.05, * p<0.1.

We next test Hypothesis 3 by comparing the proportion of buyers purchasing the product without insurance across treatments. Assuming that the sellers ship the product, buyers achieve the highest earnings in this scenario. Supporting Hypothesis 3, the proportion of buyers purchasing the product without insurance is highest in the IA treatment, and lowest in the control treatment. The order is significant (IA: 48.3%; IA_HI: 35.6%; Control: 20.2%; Jonckheree-Terpstra test, $p<0.001$). We report the dynamics of this proportion over the 10 rounds in each treatment in Figure G1 in Appendix G. As shown there, the order is very similar over the 10 rounds. This result suggests that one benefit of the IA mechanism is that buyers save expenses on insurance (without increasing the probability of not receiving the product as reported below).

Figure 5: Proportion of buyers purchasing the product without insurance conditional on advice



Note: The dotted line marks the purchase rate (20.2%) in the control treatment (no advice is given in the control). Error bars are standard errors. # of obs.: Advice_Yes (IA: 49; IA_HI: 54; Control: 54); Advice_No (IA: 58; IA_HI: 54; Control: 54).[12]

Figure 5 further shows the proportion of buyers purchasing the product without insurance, conditional on the advice received. Since there is no advice in the control treatment, we calculate the average proportion of product purchases without insurance

[12] Note that in both the IA and IA_HI treatments, no buyers receive advice to purchase the insurance in every round. However, in the IA treatment 9 buyers (out of 58) receive advice not to purchase the product in each round. This is why we only have 49 independent observations for buyers in the IA treatment in Advice_Yes.

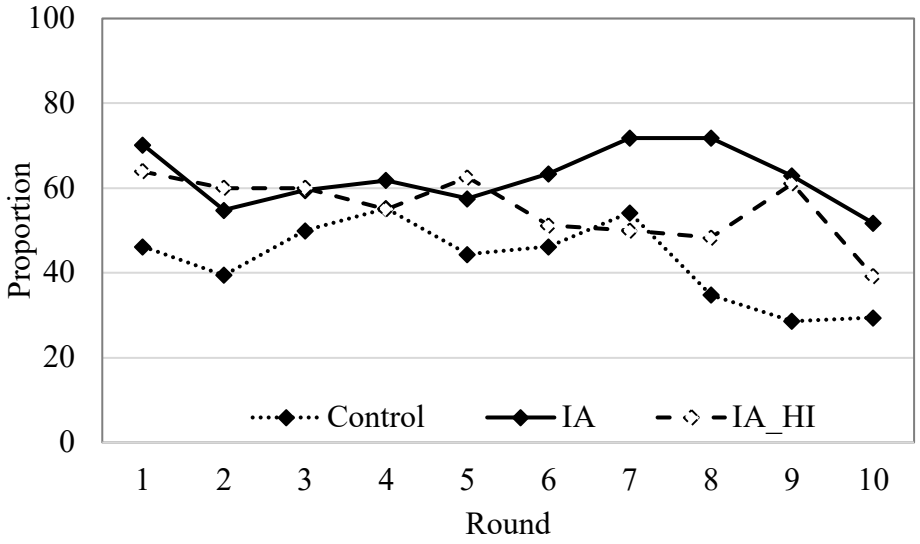
(marked by the dotted line in Figure5). As shown in Figure 5, in both the IA and IA_HI treatment, the proportion of purchasing the product without insurance when receiving advice of no insurance is significantly higher than in the control treatment (59.4% vs. 20.2%, Mann-Whitney test, $p<0.001$; 43.6% vs. 20.2%, Mann-Whitney test, $p=0.002$). In contrast, when receiving advice to purchase the insurance, significantly fewer buyers purchase the product without insurance compared to the Control (3.7% vs. 20.2%, Mann-Whitney test, $p<0.001$; 13.6% vs. 20.2%, Mann-Whitney test, $p=0.011$). These results show that the lower insurance purchase rate in the IA and IA_HI treatments reported above is due to buyers receiving the advice not to purchase the insurance.

Result 3: *Buyers are more likely to purchase the product without insurance in the two advice treatments than in the control treatment. The increase is mainly driven by the effect of advising no insurance.*

4.3 Shipping decision

Supporting Hypothesis 4, the overall shipping rate is highest in the IA and lowest in the control treatment (IA: 61.4%; IA_HI: 53.5%; Control: 43.8%, Jonckheree-Terpstra test, $p<0.007$). Figure 6 plots the shipping rate over the 10 rounds. It shows that the shipping rate is highest in the IA and lowest in the control treatment in almost every round. This order is particularly salient in the later rounds.

Figure 6: Proportion of sellers who ship the product in each round



Note: # of obs: IA: 58; IA_HI: 54; Control: 54.

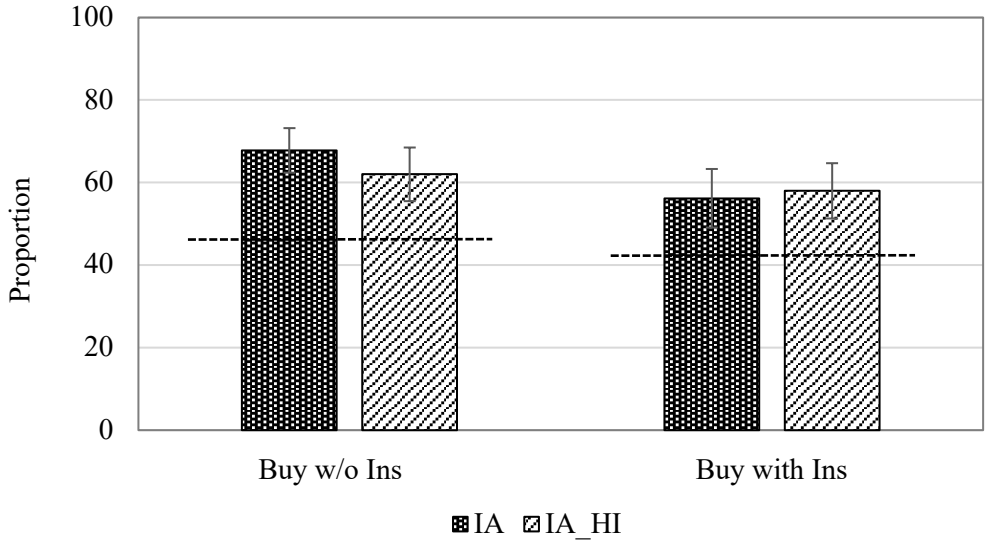
On average, the shipping rate is higher when sellers advise no insurance in both advice treatments, as compared to the control treatment (IA vs. Control: 64.2% vs. 43.9%, Mann-Whitney test, p=0.006; IA_HI vs. Control: 58.0% vs. 43.9%, Mann-Whitney test, p=0.069) but lower when sellers advise purchasing insurance (IA vs. Control: 25.0% vs. 43.9%, Mann-Whitney test, p=0.045; IA_HI vs. Control: 26.2% vs. 43.9%, Mann-Whitney test, p=0.053). These results are consistent with our theoretical framework where the seller incurs a psychological cost for not shipping the product after she advises no insurance.

We assume that the psychological cost is higher when the seller observes that the buyer follows her advice of no insurance, compared to when the buyer does not follow her advice. This assumption would predict that, in the IA treatment, sellers who advise no insurance are more likely to ship the product after observing the buyer purchasing the product without insurance, compared to purchasing the product with insurance. Such a difference should not be present in the IA_HI treatment as sellers never know the buyer's insurance purchase decision. Our data is consistent with this prediction. To see this, for the cases when sellers advise no insurance, we calculate the shipping rate separately when buyers purchase the product with as opposed to without insurance. Figure 7 reports the average shipping rates of sellers who advise no insurance in the IA and IA_HI treatments when buyers purchase the product with and without insurance, irrespectively. For comparisons, the dotted lines mark the average shipping rate when buyers purchase the product with and without insurance in the control treatment.

Figure 7 shows that the seller's shipping rate varies according to the buyer's insurance purchase decisions, mostly in the IA treatment and the difference is much smaller and not statistically significant in both the control and the IA_HI treatments. (IA: 67.8% vs. 56.2%, Wilcoxon sign rank test, p=0.032; IA_HI: 62.0% vs. 58.0%, Wilcoxon sign rank test, p=0.873; Control: 48.4% vs. 42.0%, Wilcoxon sign rank test, p=0.353)[13].

[13] We calculate the shipping rate in the IA and IA_HI treatments only when the advice was *No*.

Figure 7: Shipping rate when sellers advise no insurance



Note: The dotted line marks the shipping rate in the control treatment when the buyer does not purchase an insurance (48.4%, on the left) and when the buyer does purchase an insurance (42.0%, on the right). Error bars are standard errors. # of obs: Buy w/o Ins (IA: 58; IA_HI: 44; Control: 46); Buy with Ins (IA: 46; IA_HI: 44; Control: 52).

To provide statistical tests of the treatment effect on the relationship between sellers' shipping decisions and buyers' insurance purchase decisions, we conduct regression analysis of sellers' shipping behavior using a random effects linear probability model (see Table 3)[14]. The independent variable "Noinsure" =1 if the buyer did not purchase the insurance. We first run the regressions for each treatment separately (Column 1-3). Since very few buyers purchase the product when the advice is to purchase the insurance, we do not include observations from IA and IA_HI where the advice was *Yes*.

Consistent with the results reported above, Regressions (1) and (3) show that the coefficient β_3 is both economically and statistically insignificant, which suggests that the buyer not purchasing insurance has no significant effect on the seller's shipping behaviour in both the control and the IA_HI treatments. In contrast, regression (2) shows that in the IA treatment sellers are 16.9% more likely to ship the product if the buyer chooses not to purchase insurance after receiving advice not to purchase insurance. To test the treatment differences, we run the regression using the pooled data of the three treatments and allow treatment difference in the coefficient of Noinsure and the constant variable. This result is reported in column (4). We find the effect of "Noinsure" in the IA treatment is marginally

[14] We also conducted a probit regression and the results are robust. The probit regressions are reported in Appendix F2.

significantly higher as compared to the control treatment (β_4 is marginally significantly positive) and significantly higher than the IA_HI treatment (the null hypothesis that $\beta_4=\beta_5$ is rejected). In sum, our data suggest that for sellers, buyer insurance purchase decisions only matter when the insurance purchase is influenced by the seller's advice.

Table 3: Random individual effects LPM regression analysis of shipping decisions

Independent variables	Dependent variable: $Ship_{j,t}$=1, if the seller j ship the product in round t =0, o.w			
	(1) Control	(2 IA	(3) IA_HI	(4) All
β_1: IA				0.094 (0.066)
β_2: IA_HI				0.159**(0.077)
β_3: Noinsure	0.045 (0.058)	0.169***(0.028)	0.023 (0.023)	0.046 (0.059)
β_4: Noinsure*IA				0.122*(0.064)
β_5: Noinsure*IA_HI				-0.020 (0.063)
Constant	0.420***(0.050)	0.512*** (0.046)	0.578*** (0.063)	0.419***(0.049)
H0: $\beta_3+\beta_4=0$				p<0.001
H0: $\beta_3+\beta_5=0$				p=0.225
H0: $\beta_4=\beta_5$				p<0.001
N	276	349	282	907

Note: Noinsure =1 if the buyer did not purchase the insurance; =0, o.w.
Robust standard errors in parentheses clustered at the session level are reported in the parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Lastly, we explore individual differences in shipping behavior. For each seller, we calculate her frequency of shipping the product when the paired buyer decides to purchase the product. The distribution of the shipping rate in each treatment is shown in Appendix G (Figures G2 a-f). The two most common behavior profiles are to either never ship or always ship. Our theoretical framework predicts that type-s sellers who will never ship in the control treatment will always ship in the IA treatment, provided the psychological cost of not shipping is sufficiently large. In the IA_HI treatment, there is a mixed strategy equilibrium where some type-s sellers may always ship the product, but some type-s sellers may not. Thus, we expect to see a lower proportion of always shipping relative to in the IA treatment.

To test this prediction, we compare these two types of sellers in the two advice treatments with the control treatment. The results are summarized in Table 4.

Supporting the theoretical analysis, compared to the control treatment, the proportion of sellers who always ship is significantly higher in the IA treatment, especially when the sellers advise no insurance. We also find that the advice mechanism reduces the proportion of sellers who never ship in the IA treatment compared to the control. The frequency of sellers who always ship in the IA_HI treatment is slightly higher than in the control, however, the difference is not as large as in the IA treatment and is not statistically significant. Likewise, the frequency of sellers who never ship in the IA_HI treatment is slightly lower than in the control, but the difference is not as large as in the IA treatment, and is not statistically significant. Again, these results are consistent with our theoretical analysis that sellers in the IA_HI treatment play a mixed strategy, and thus the fraction of always shipping is relatively smaller than in the IA treatment.

Result 4: *Sellers are more likely to ship the product in the two advice treatments than the control. The increased shipping rate is mainly driven by those who advise buyers not to purchase the insurance.*

Result 5: *In the IA treatment, sellers who advise no insurance are more likely to ship the product when the buyer follows the advice than when he does not follow the advice.*

Table 4: Frequency of Sellers who either always or never ship the product

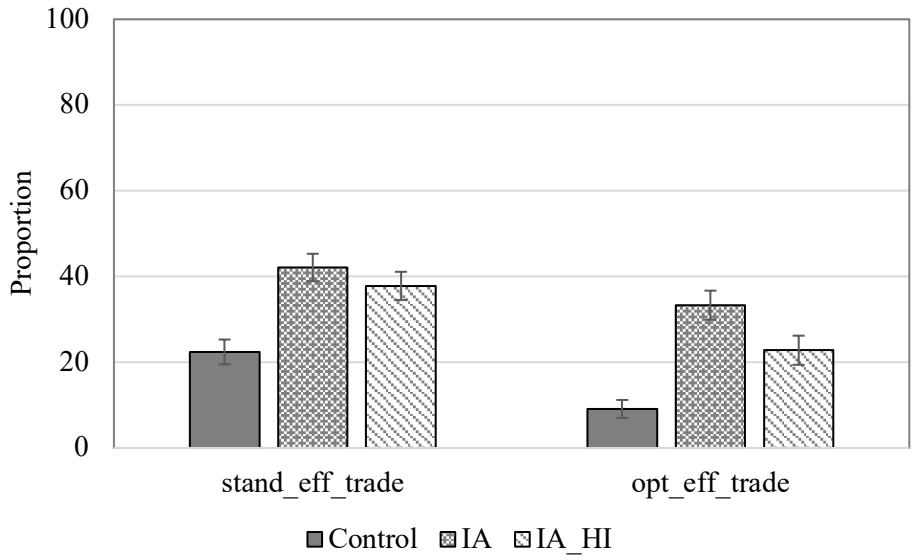
Treatment (# of obs.)	Always Ship (%)	vs. Control (p-value)	Never Ship (%)	vs. Control (p-value)
Control (54)	18.5	-	33.3	-
IA (58)	32.8	0.086	17.2	0.049
IA(Advice No) (58)	41.4	0.009	19.0	0.083
IA_HI (54)	24.1	0.481	24.1	0.288
IA_HI(Advice NO) (47)	34.0	0.075	27.7	0.539

Note: While there are 54 independent sellers in the IA_HI treatment, only 47 out of the 54 sellers gave the Advice not to purchase the insurance and had the buyer purchase the product at least once. The p-value is based on a chi-squared test.

4.4 Market Efficiency

Figure 8 plots the proportion of standard efficient trades and optimal efficient trades in each treatment. As defined in section 3, a standard efficient trade occurs when the product is bought and shipped, and an optimal efficient trade occurs when the product is bought without insurance and shipped. The pattern shown in Figure 8 supports Hypothesis 5 that the frequency of efficient trades is highest in the IA and lowest in the control treatment. (standard efficient trades: 22.4%<37.8%<42.1%, Jonckheree-Terpstra test, p<0.001; optimal efficient trades 9.1% <22.8%<33.3%, Jonckheree-Terpstra test, p<0.01).

Figure 8: Proportion of efficient trades by treatments



Note: Error bars are standard errors. # of obs.: IA: 58; IA_HI: 54; Control: 54.

While the difference in the frequency of standard efficient trades between the IA and IA_HI treatments is relatively small and not significant (42.1% vs. 37.8%, Mann-Whitney test, p=0.389), the IA treatment results in significantly more optimally efficient trades (33.3% vs. 22.8%, Mann-Whitney test, p=0.041). The lower frequency of optimal efficient trades in the IA_HI treatment is consistent with the results that the proportion of buyers purchasing the product without insurance is lower in the IA_HI than the IA treatment.

As the result of the increased number of efficient trades, both buyers and sellers make a higher profit in the two insurance advice treatments than in the control. The average earnings per round for the buyer increase by 11.9% in the IA treatment compared to the control (36.1 vs. 33.1, Mann-Whitney test, p<0.001). The average earnings per round for the seller increases by 4.4% in the IA treatment (47.5 vs. 45.5, Mann-Whitney test, p=0.011).

We observe similar results in the IA_HI treatment. Compared to the control, the average points per round for the buyers increase by 5.4% (34.9 vs. 33.1, Mann-Whitney test, p=0.006), and the average points per round for the seller increase by 6% (48.2 vs. 45.54, Mann-Whitney test, p=0.003) in the IA_HI treatment.

Result 6: *The advice mechanism significantly increases the frequency of efficient trades and the average profit of both buyers and sellers, especially when buyers' insurance purchase decisions are known to the sellers.*

5. Conclusion

We design and test a novel insurance advice mechanism aimed at promoting efficient trades in a market with asymmetric information. We show both theoretically and experimentally that under this mechanism, buyers purchase the product significantly more often, and sellers are also more likely to ship the product than in the control treatment. The insurance advice mechanism also has an indirect welfare effect on buyers via reducing the frequency of purchasing insurance. The comparison between the two advice treatments further suggests that the mechanism is most effective when sellers can observe buyers' insurance purchase decisions. This finding suggests that online marketplaces may want to make the buyers' insurance purchase decision salient to sellers, alongside the introduction of the insurance advice mechanism.

Our study points out a new direction for designing market mechanisms to overcome asymmetric information problems. Compared with other mechanisms, such as satisfaction guaranteed that often require costly legal enforcement (Andreoni, 2018), our mechanism can be applied at a relatively low cost. With the rapid growth of the digital economy, more insurance companies have emerged—such as Sqauretrade and xcover. com—to provide consumers protection against risks not covered by the manufacturer's warranty. These insurance products provide a natural opportunity to introduce the advice mechanism with minimal changes to the current market platforms. As a result, while the insurance advice mechanism on its own can increase market efficiency, it can also complement existing mechanisms such as reputation and satisfaction guaranteed in promoting market efficiency.

Future research can be valuable by considering other factors that may interact with the working of the mechanism. For example, in our experiment, there is no uncertainty associated with receiving the compensation under the insurance policy. However, asymmetric information problems are also common in the insurance market. In particular, consumers are

often unsure about the coverage. It would be valuable to examine the relationship between the effect of the advice mechanism and the trust in the insurance policy. While we force the sellers to provide advice in our experiment, it may be more feasible to introduce the mechanism if it is presented as an option or upon the request from the buyers. If it is done in such a way, sellers can choose to be silent. It would be fruitful to compare the effect of the advice mechanism when advising is mandatory as opposed to when it is optional. Finally, there are other mechanisms, such as reputational ratings systems and satisfaction guaranteed, already in place to try and increase efficiency in these markets. Future research could investigate how the insurance advice works in combination with these other mechanisms

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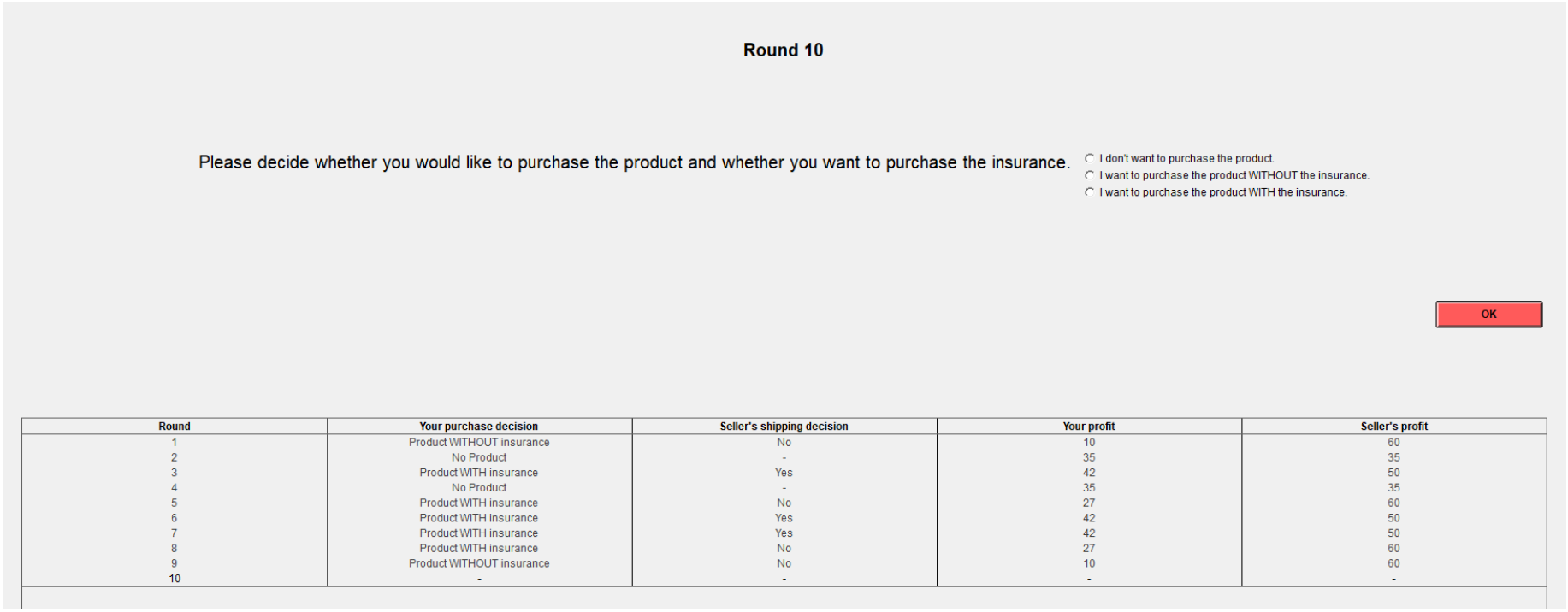
Appendix

Appendix A: Screenshots of the Z-tree program

Figure A1: Buyer's product purchase decision screen (control)



Round 10

Please decide whether you would like to purchase the product and whether you want to purchase the insurance.

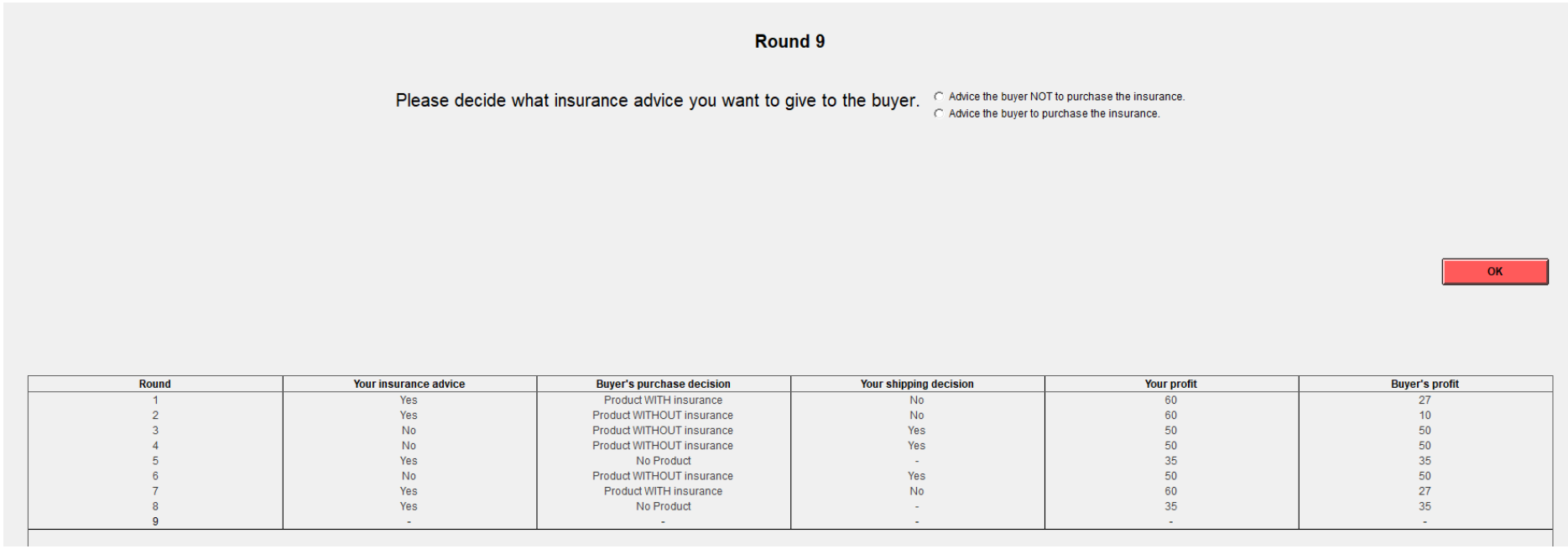
- I don't want to purchase the product.
- I want to purchase the product WITHOUT the insurance.
- I want to purchase the product WITH the insurance.

OK

Round	Your purchase decision	Seller's shipping decision	Your profit	Seller's profit
1	Product WITHOUT insurance	No	10	60
2	No Product	-	35	35
3	Product WITH insurance	Yes	42	50
4	No Product	-	35	35
5	Product WITH insurance	No	27	60
6	Product WITH insurance	Yes	42	50
7	Product WITH insurance	Yes	42	50
8	Product WITH insurance	No	27	60
9	Product WITHOUT insurance	No	10	60
10	-	-	-	-

Figure A2: Seller's shipping decision screen (control)

Figure A3: Seller's advice decision screen (IA treatment)



Round 9

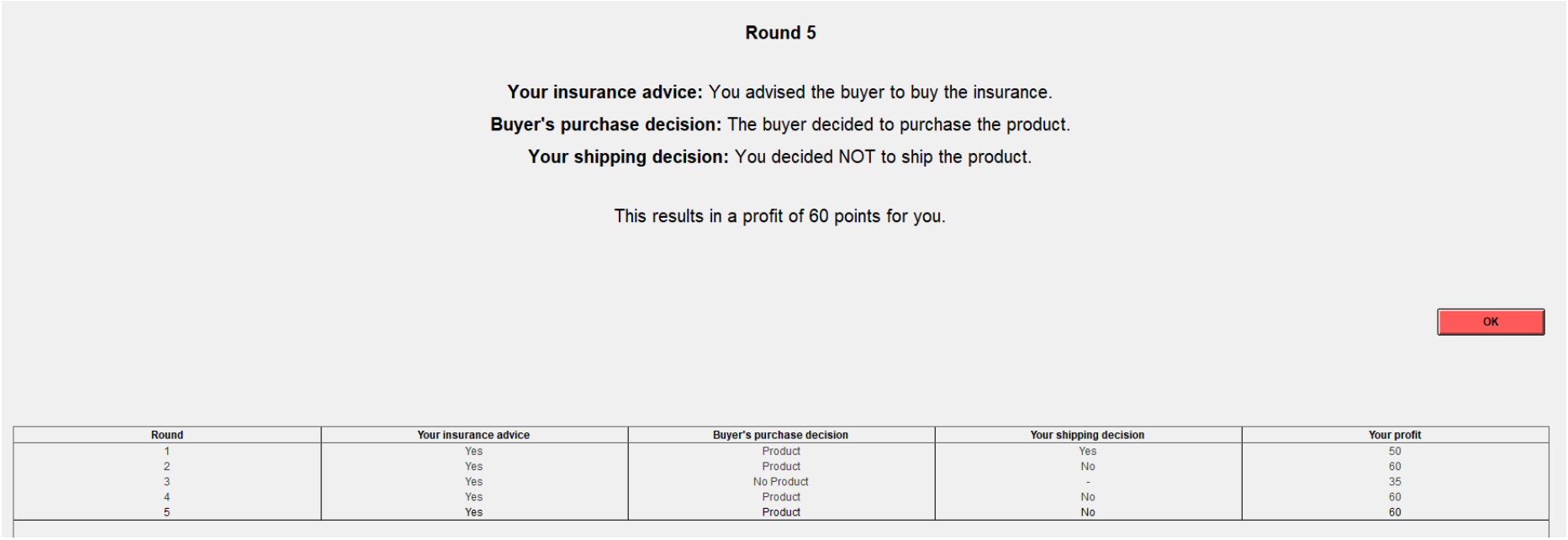
Please decide what insurance advice you want to give to the buyer.

- Advice the buyer NOT to purchase the insurance.
- Advice the buyer to purchase the insurance.

OK

Round	Your insurance advice	Buyer's purchase decision	Your shipping decision	Your profit	Buyer's profit
1	Yes	Product WITH insurance	No	60	27
2	Yes	Product WITHOUT insurance	No	60	10
3	No	Product WITHOUT insurance	Yes	50	50
4	No	Product WITHOUT insurance	Yes	50	50
5	Yes	No Product	-	35	35
6	No	Product WITHOUT insurance	Yes	50	50
7	Yes	Product WITH insurance	No	60	27
8	Yes	No Product	-	35	35
9	-	-	-	-	-

Figure A4: Seller's outcome summary screen after decisions (IA_HI treatment)



Round	Your insurance advice	Buyer's purchase decision	Your shipping decision	Your profit
1	Yes	Product	Yes	50
2	Yes	Product	No	60
3	Yes	No Product	-	35
4	Yes	Product	No	60
5	Yes	Product	No	60

Appendix B: Instructions

(All treatments)

GENERAL INSTRUCTIONS FOR PARTICIPANTS

You are taking part in an economic experiment in which you can earn money. Please read the following instructions carefully. Your earnings depend on your decisions and on the decisions of another participant. At the end of the experiment, the amount of money earned will be paid to you in cash. Additionally, you will receive a show-up fee of 4 AUD.

Throughout the experiment, monetary amounts are not quoted in AUD, but points. Eventually, the amount of money earned during the experiment will be converted into Euro, where:

1 Point = 0.4 AUD

In this experiment, there are two types of participants, **buyers and sellers**, who make different decisions. You will only get to know your type shortly before the start of the experiment. The types will be randomly assigned and kept throughout the experiment. Please read the instructions about the decisions of both types carefully. All participants receive the same instructions.

Talking is not permitted during the experiment. Failure to comply will result in exclusion from the experiment and the loss of all earnings. If you have any questions, please address them to us: raise your hand and an experimenter will come to you.

THE EXPERIMENT

The experiment consists of 10 rounds. At the beginning of each round participants are endowed with 35 points and randomly matched in **groups of two**. Each pair consists of one buyer and one seller. At the end of the experiment only one of the 10 rounds will be randomly chosen to determine the earnings from the experiment. All rounds are equally likely to be chosen.

Product Purchase

The buyer decides whether to purchase a product from the seller at a price of 25 points.

- If the buyer chooses not to purchase the product, the decision task is over. The buyer and the seller keep their 35 points endowment and do not make any further decisions.
- If the buyer chooses to purchase the product, the seller decides whether to ship the product. Receiving the product is worth 40 points to the buyer while not receiving the product does not yield any points to the buyer. Before the seller makes the shipping decision, the buyer can decide whether to purchase an insurance.

Insurance Purchase

The insurance makes sure that the buyer is refunded the price of 25 points in case the seller does not ship the product. If the seller ships the product, the buyer will not be compensated by the insurance as no monetary loss is incurred.

The costs for the insurance are 8 points. Irrespective of whether the seller ships the product, if the insurance is purchased, the buyer needs to pay the insurance fee of 8 points.

The buyer's earnings in each round are calculated as follows:

Without insurance:

If the product is shipped: 35 (endowment) + 40 (the product value) - 25 (the price paid to the Seller) = 50 points.

If the product is not shipped: 35 (endowment) + 0 (no product value) - 25 (the price paid to the Seller) = 10 points.

With insurance:

If the product is shipped: 35 (endowment) + 40 (the product value) - 25 (the price paid to the Seller) – 8 (the insurance fee) = 42 points.

If the product is not shipped: 35 (endowment) + 0 (no product value) - 25 (the price paid to the Seller)- 8 (the insurance fee) + 25 (the refund by the insurance) = 27 points.

(IA treatment & IA_HI treatments)

Insurance Advice

Before the buyer decides whether to purchase the product, the seller is asked to give insurance advice to the buyer. The seller can advise the buyer to either not purchase or purchase the insurance. The advice is transmitted to the buyer who subsequently makes the insurance and product purchase decision.

(IA_HI treatment)

Sellers, however, will NOT know whether the buyer decided to purchase the insurance or not during or after the experiment.

Product shipping

The seller's cost for shipping the product is 10 points. If the seller does not ship the product he/she does not incur any costs. The seller's earnings in each round are calculated as follows:

- If the seller chooses to ship the product: 35 (endowment) + 25 (price paid by the buyer) – 10 points (the cost of shipping the product) = 50 points
- If the seller chooses to not ship the product: 35 (endowment) + 25 (price paid by the buyer) – 0 points (no shipping costs) = 60 points

In each round, the decisions will be made in the following order:

You are randomly divided into buyer-seller pairs. Each round proceeds in the following order:

(Control treatment)

1. Buyer: You decide whether to purchase the product. If you choose to not purchase the product the respective round is over. If you choose to purchase the product you further decide whether you want to purchase the insurance.

2. Seller: You are informed about whether the buyer has chosen to purchase the product and if yes, whether the buyer has purchased the insurance. You then decide whether to ship the product.

3. Buyer: You are informed about the seller's shipping decision.

(IA treatment& IA_HI treatment)

1. Seller: You advise the buyer whether to purchase the insurance.

2. Buyer: You are informed about the seller's advice.

3. Buyer: You decide whether to purchase the product. If you choose to not purchase the product the respective round is over. If you choose to purchase the product you further decide whether you want to purchase the insurance.

(IA treatment)

1. Seller: You are informed about whether the buyer has chosen to purchase the product and if yes, whether the buyer has purchased the insurance. You then decide whether to ship the product.

2. Buyer: You are informed about the seller's shipping decision.

(IA_HI treatment)

1. Seller: You are informed about whether the buyer has chosen to purchase the product. You will NOT know whether the buyer has purchased the insurance. You then decide whether to ship the product.

2. Buyer: You are informed about the seller's shipping decision.

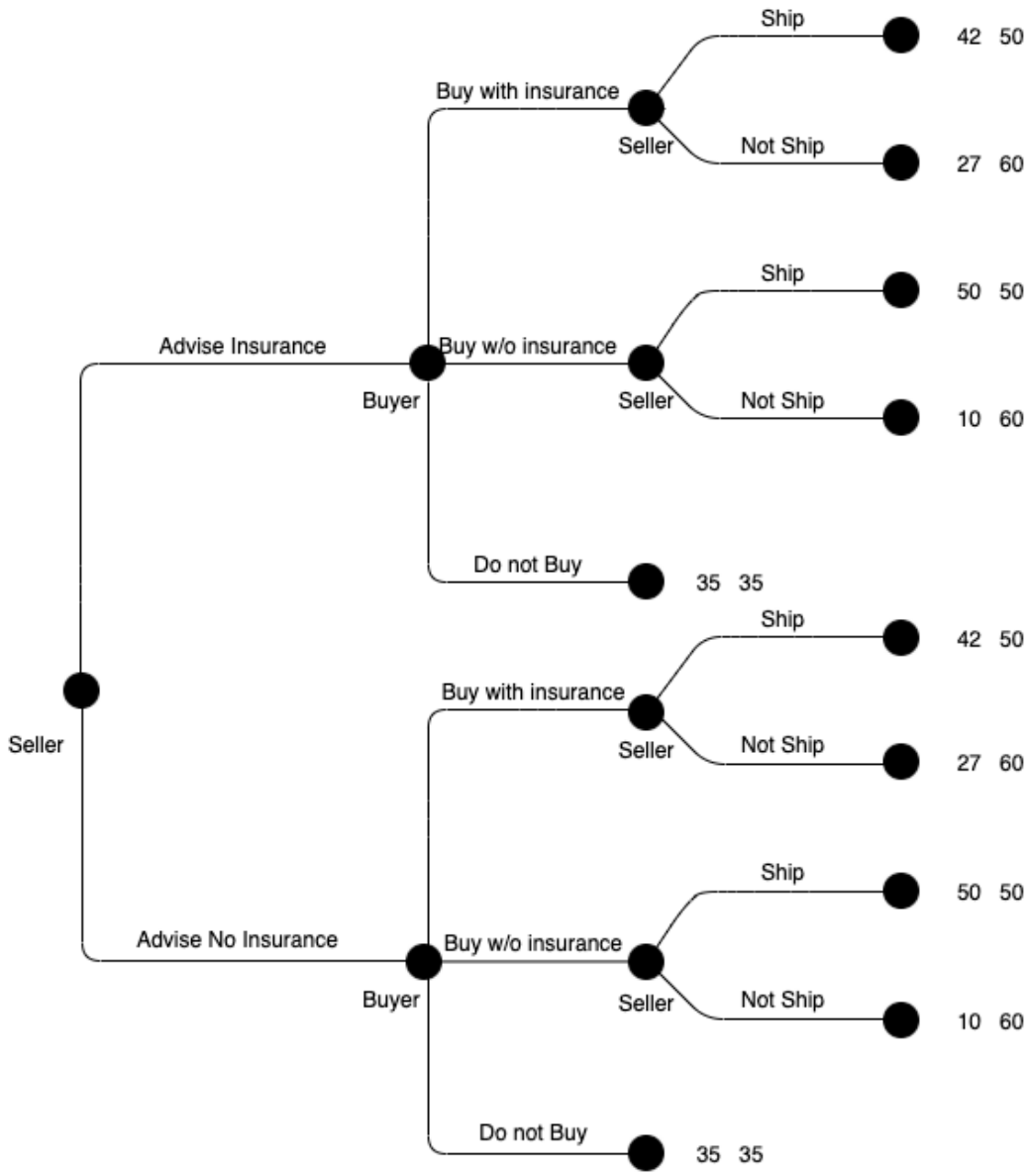
(All treatments)

After each round, buyers and sellers are randomly matched with another seller and buyer respectively. The procedure is repeated 10 times.

At the end of the experiment, participants will receive all earnings-information from all rounds of the experiment and get to know which round was randomly chosen to be relevant for payment. We kindly ask you to then remain seated until you are called.

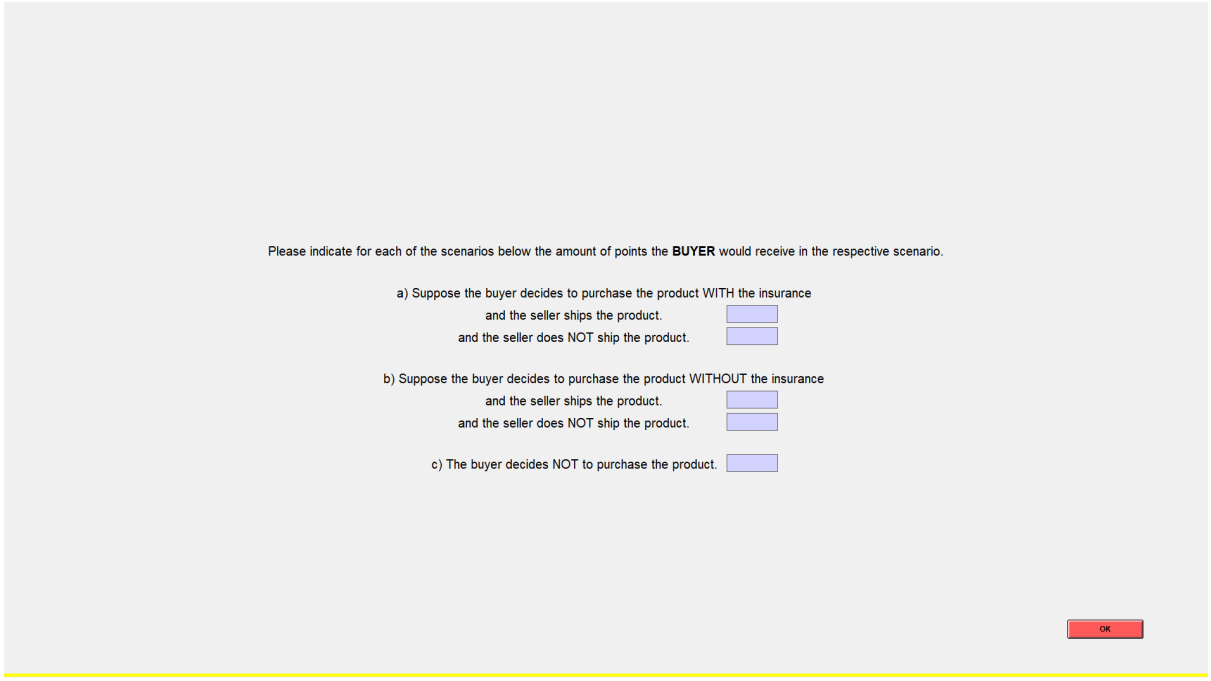
Appendix C: Buyer-Seller game with insurance advice

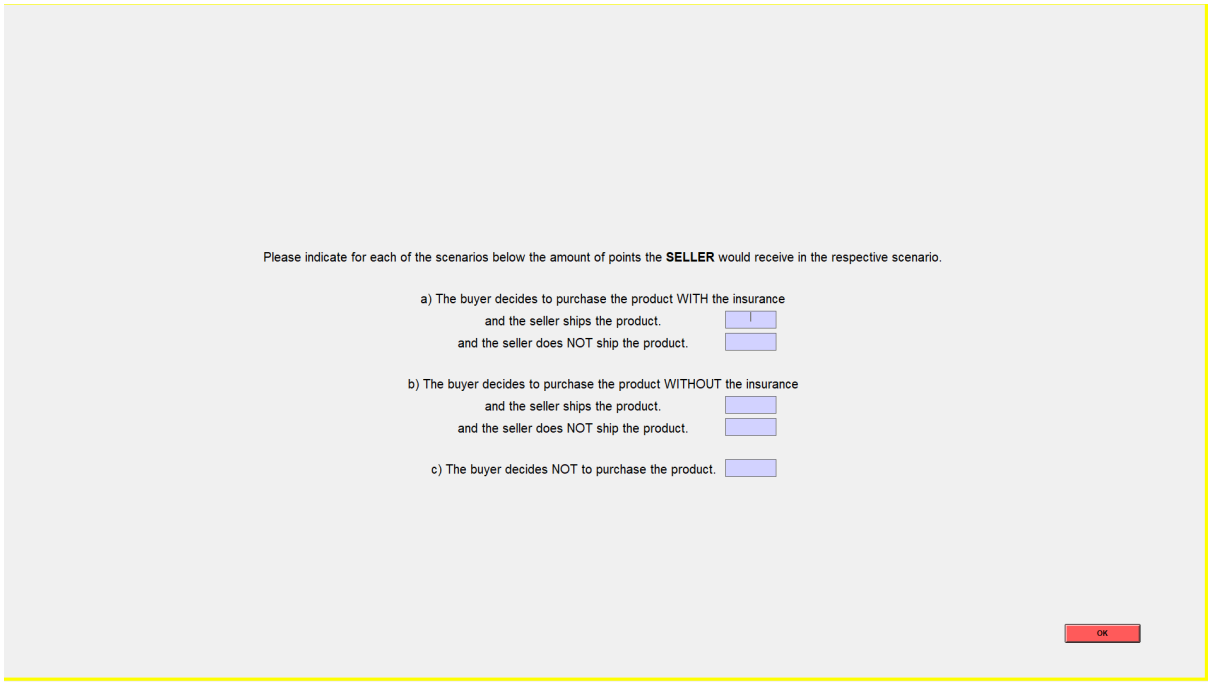
Figure C1: Buyer-Seller game with insurance advice



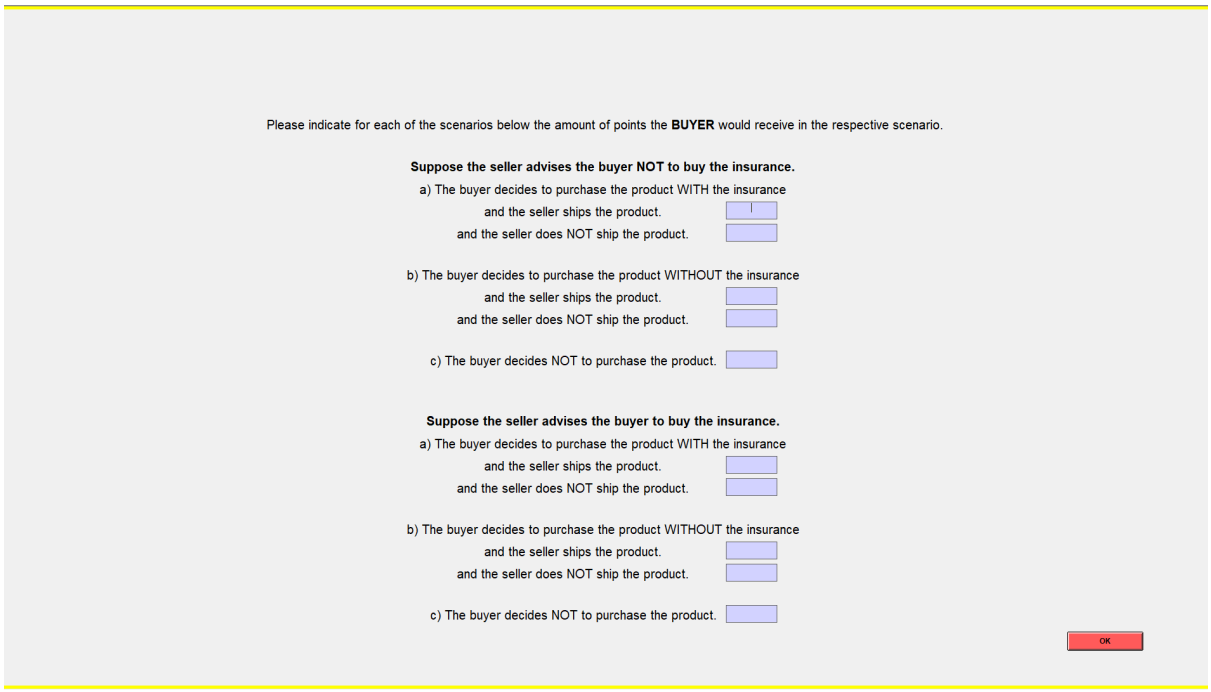
Appendix D: Comprehension Quiz Screenshots.

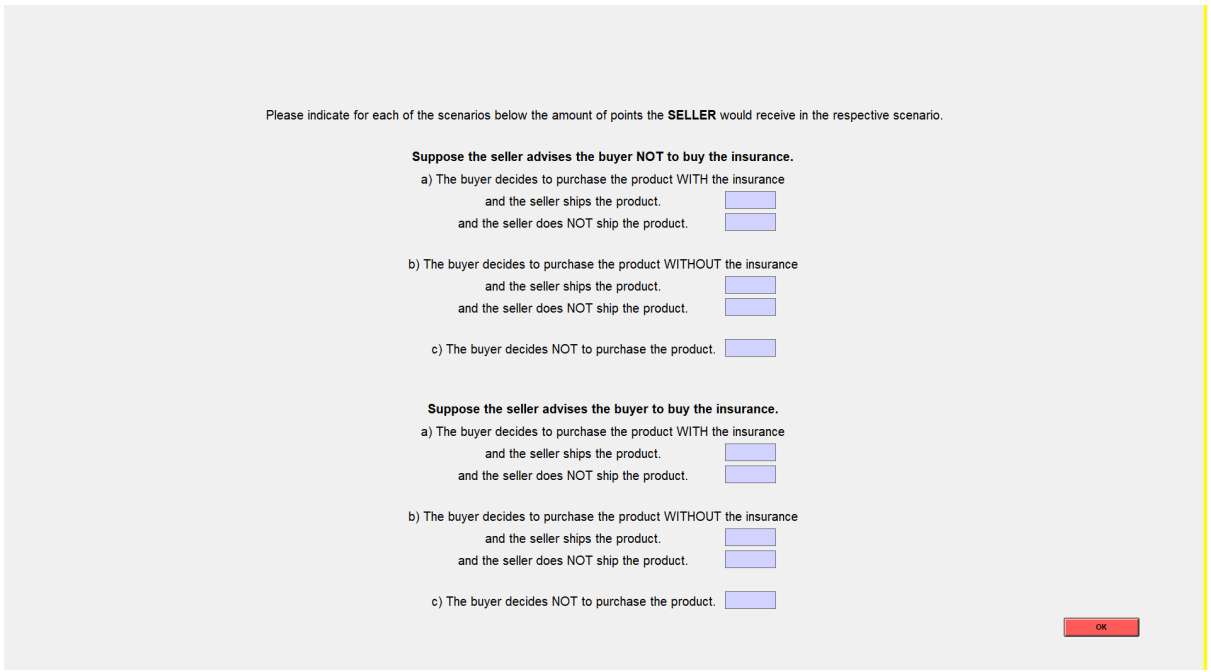
D1: Comprehension Questions Control



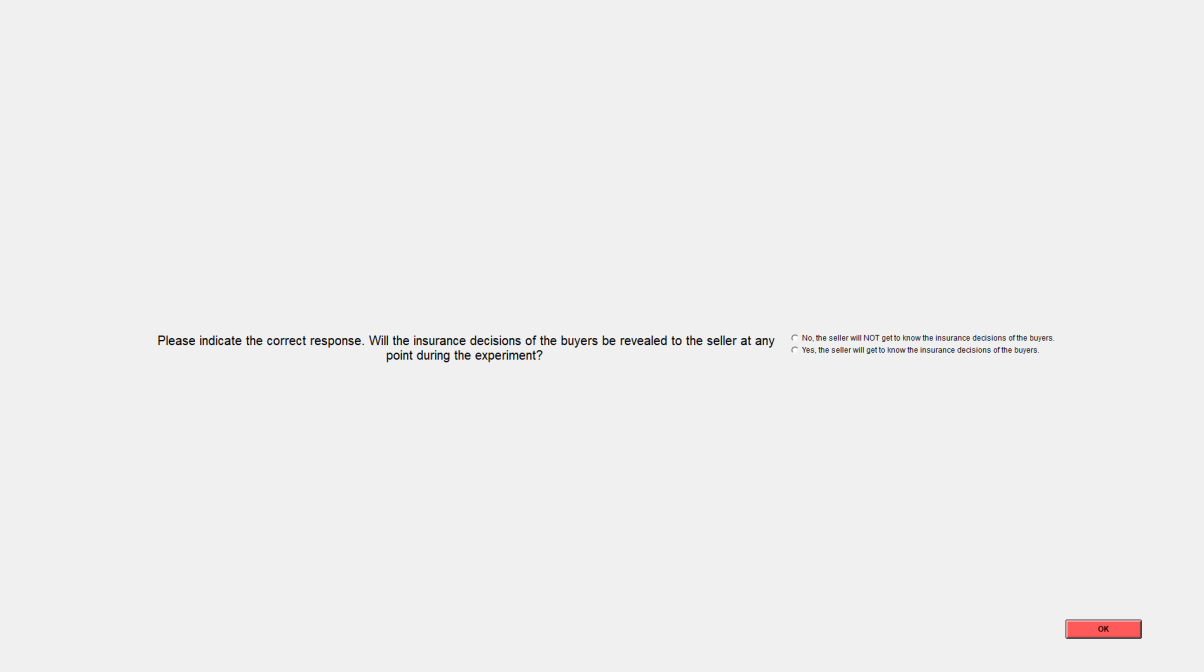


D2: Comprehension Questions IA and IA_HI treatments.





D3: Additional Comprehension Question IA_HI treatment.



Appendix E: Omitted details of the model

E1: Theoretical analysis of the control treatment

Consider the control treatment in which the seller cannot give insurance advice to the buyer before the purchase decision is made. A g-type seller always ships the product, while an s-type seller never ships the product, given that shipping does not increase revenue but is costly. The buyer's expected payoffs are $p_g v - p$ if purchasing the product without insurance, $p_g(v-p) - w$ if purchasing the product with the insurance, and 0 if not purchasing the product.

The buyer: buys the product only if $p_g \geq \max\left\{1 - \frac{w}{p}, \frac{p}{v}\right\}$; buys the product with insurance if $\frac{w}{v-p} \leq p_g < 1 - \frac{w}{p}$; and buys nothing if $p_g < \min\{\frac{p}{v}, \frac{w}{v-p}\}$. Under the assumption $w \leq p(1 - \frac{p}{v})$, we obtain the expression in (1).

E2: Theoretical analysis of IA treatment

Characterization of equilibrium in the IA treatment

Suppose the seller can advise the buyer to purchase or not purchase insurance before he decides whether to buy the product:

- When $d \leq \alpha$, both types of sellers advise *N* and ship the product. Buyers purchase the product without insurance when receiving advice *N*, and do not buy the product when receiving advice *Y*.
- When $> \alpha$, both types of seller advise *N*, type-g sellers ship the product, and type-s sellers do not ship the product. Buyers behave the same way as in the control treatment when receiving advice *N*, and do not buy the product when receiving advice *Y*.

Proof: Firstly, we show that the prescribed strategy profile above constitutes a pooling equilibrium. Both types of seller advise *N* on the equilibrium path. If the buyer follows the advice and purchases the product without insurance, the type-s seller will incur the psychological cost if he does not deliver. If he delivers the product, his profit is $p - d$. If he does not deliver the product, his profit is $p - \alpha$. He will deliver the product, provided $d \leq \alpha$. Knowing $d \leq \alpha$, the buyer will purchase the product without insurance when receiving advice *N*. If receiving advice *Y*, the buyer believes that the seller is a type-s seller and understands such a seller incurs no psychological cost after advising *Y*. So, the buyer will not purchase the product after receiving advice *Y*. Now suppose $d > \alpha$. That is, after advising *N*, the type-s seller still does not ship the product and will incur the psychological cost, which is lower than

the cost of shipping the product. Upon observing *N*, the buyer's belief is $\Pr[\theta = g \mid N] = p_g$. Given that type-s sellers never deliver the product when $d > \alpha$, the buyer's choice is the same as in the control treatment. Since the weak PBE imposes no restriction on the off-equilibrium path, we can easily assign beliefs to support the pooling equilibrium.

Secondly, we show there does not exist a separating equilibrium. Consider a separating equilibrium, in which on the equilibrium path a type-g buyer advises *N* and ships the product, while a type-s seller advises *Y*. Note that a type-s seller never incurs the psychological cost when advising *Y*, irrespective of what the buyer does. As a result, a type-s seller will never ship the product given that delivering is costly. Therefore, the buyer will not purchase the product upon receiving the advice *Y*. If she purchases the product without insurance, her payoff is $-p < 0$. If she purchases the product with insurance, her payoff is $-w < 0$. Anticipating that the buyer will not purchase the product, a type-s seller will want to deviate to advising *N* instead. Therefore, there does not exist a separating equilibrium in which a type-g seller advises *N* and a type-s seller advises *Y*. Moreover, there does not exist a separating equilibrium in which a type-g seller advises *Y* and a type-s seller advises *N*. Note that a type-s seller can be strictly better by deviating to advise *Y*. By doing so, the type-s seller pretends to be a type-g seller, thereby increasing the probability of making sales, but never incurring the psychological cost.

Thirdly, we show that there does not exist a semi-separating equilibrium. In a semi-separating equilibrium, the type-s seller advises *N* with probability β and advises *Y* with probability $1 - \beta$. Note that by advising *Y*, the type-s seller reveals his type and the buyer will not purchase the product. This implies the profit of advising *Y* is zero for the s-type seller. Since the type-s seller randomizes between *N* and *Y*, his expected profit from advising *N* must be also zero. We check if this can be the case.

If $d \leq \alpha$, the type-s seller will deliver after advising *N*. The buyer's payoff is $v - p > 0$ if she only purchases the product, $-w$ if she purchases the product with insurance, and zero if she does not purchase the product. So, the buyer will purchase the product only. The type-s seller's expected profit from advising *N* is $p - d > 0$. Therefore, there does not exist a semi-separating equilibrium when $d \leq \alpha$ as the type-s seller's profit from advising *N* is strictly positive and therefore will not randomize.

If $d > \alpha$, the type-s seller will not deliver the product no matter what the buyer does. The buyer's behavior will be the same as the control. If the buyer only purchases the product, her expected payoff is $p_g v - p$. If she purchases the product with insurance, her expected payoff is $p_g(v - p) - w$. The type-s seller's expected profit is either p (i.e., buyer buys the

insurance), $p - \alpha$ (i.e., buyer only buys the product), or 0 if the buyer does not buy the product. So, the type-s seller's profit is never equal to zero and therefore will not randomize.

Finally, there exists another pooling equilibrium in which both types of sellers advise *Y*, type-s sellers do not deliver, and buyers behave the same as in the control treatment. This equilibrium can however be eliminated by using a Pareto-dominance or a forward-induction argument. ■

Comparison between control and IA treatments

The proof is based on the comparison of equilibrium outcomes in the control treatment and in the IA treatment when $d \leq \alpha$. When $d > \alpha$, the equilibrium outcome remains the same as in control treatment. In IA treatment, sellers advise *N*. In the control treatment, only buyers with $p_g \geq \frac{w}{v-p}$ purchase the product. In the IA treatment, all buyers purchase the product. In the control treatment, type-s sellers never ship the product. In the IA treatment, all sellers ship the product. The predictions in Hypotheses 1 to 4 thus follow.

E3: Theoretical analysis of IA_HI treatment

Characterization of equilibrium in IA_HI treatment

- Suppose $d \leq \alpha$. If $p_g \geq 1 - \frac{w}{p}$, sellers and buyers behave as in the IA treatment. If $p_g < 1 - \frac{w}{p}$, both types of sellers advise *N*. Upon receiving *N*, buyers purchase the product without insurance with probability $\frac{d}{\alpha}$ and purchase the product with insurance with probability $1 - \frac{d}{\alpha}$. Type-g sellers ship the product, while type-s sellers ship the product with probability $1 - \frac{w}{p(1-p_g)}$ and do not ship the product with probability $\frac{w}{p(1-p_g)}$. Upon receiving advice *Y*, buyers do not purchase the product.
- Suppose $d > \alpha$. Both types of seller advise *N*, type-g sellers ship the product, and type-s sellers do not ship. Buyers behave the same way as in the control treatment when receiving advice *N*, and do not buy anything when receiving advice *Y*.

Proof: In the IA_HI treatment, the seller does not observe buyers' insurance purchase decisions and her shipping decisions cannot be based on that. Clearly, the insurance advice mechanism cannot work if the psychological cost that can be triggered is not sufficiently high, i.e., $\alpha < d$. Let us focus on the case when $\alpha \geq d$.

Firstly, consider the case when $p_g \geq 1 - \frac{w}{p}$. Note that for this range of parameters, buyers purchase the product without insurance in the control treatment. A types-s seller does not want to advise *Y* as that will reveal her type. Buyers continue to hold the same prior belief after observing *N* and purchase the product without insurance. The type-s seller is better off shipping the product as she will incur the psychological cost otherwise.

Secondly, consider the case when $p_g < 1 - \frac{w}{p}$. We denote γ as buyers' probability of buying without insurance and δ as type-s sellers' probability of shipping the product. A buyer's expected payoff is $[p_g + (1 - p_g)\delta]v - p$ if she follows the advice *N* and purchases the product without insurance, and $[p_g + (1 - p_g)\delta](v - p) - w$ if she does not follow the advice and purchases the product with insurance. The buyer chooses $\gamma \in (0,1)$ if she is indifferent between the choices, which implies $= 1 - \frac{w}{p(1-p_g)}$. A type-s seller's expected profit is $p - d$ if he ships the product and $p - \gamma\,\alpha$ if he does not ship. He randomizes between the choices only if he is indifferent, which implies $\gamma = \frac{d}{\alpha}$.

Note that there does not exist a mixed-strategy equilibrium in which buyers mix between "buy without insurance" and "buy nothing". This is because for this equilibrium to exist the type-s seller must randomize between "ship" and "not ship". However, the shipping decision is conditional on the purchasing of the product. If the product is not purchased, and given that the type-s seller can see that, the type-s seller will choose "ship" with zero probability. Consequently, this means the buyer cannot choose to "not purchase the product" with non-zero probability. For the same reason, buyers cannot randomize between "purchase the product with insurance" and "not purchase the product" in equilibrium. Also, this mixed-strategy equilibrium play only exists when the advice is *N*. If both *N* and *Y* can appear on the equilibrium path (i.e., type-s sellers randomize between *N* and *Y*), type-s sellers have no psychological cost following advising *Y*, which implies that she will choose "ship" with probability zero. This breaks the mixed-strategy equilibrium.

On the off-equilibrium path, i.e., if an advice *Y* is observed, the buyer is free to have any belief that supports the type-s seller's equilibrium strategy on the equilibrium path. Recall that the type-s seller's equilibrium profit is $p - d = p - \gamma\,\alpha$. So, any off-path belief that leads to buyers choosing "buy without insurance" with a probability lower than $\gamma = \frac{d}{\alpha}$ can work. ■

Comparison between control, IA and IA_HI treatments

The proof is based on the comparison of equilibrium outcomes in the IA treatment, in the IA_HI treatment, and in the control. In both the IA and IA_HI treatments, all buyers purchase the product. In the control, only buyers with $p_g \geq \frac{w}{v-p}$ purchase the product. In both the IA and IA_HI treatments, sellers advise *N*. In the IA treatment, all buyers purchase the product without insurance, while in IA_HI some buyers purchase the product with insurance as they are mixing between "purchase without insurance" and "purchase with insurance". In the IA treatment, all sellers ship the product, while in the IA_HI treatment, only some type-s sellers ship the product as she is mixing between "ship" and "not ship". In the control, however, no type-s sellers ship the product.

Appendix F: Probit Regressions:

F1: Probit regression of product purchase decisions

	Dependent variable: $Buy_{i,t}$ =1, if buyer *i* purchase product in round *t* =*0, o.w.*	
Independent variables	Coeff.	Marg. Eff.
β_1: IA	0.074 (0.3445)	0.018 (0.086)
β_2: IA_HI	0.901 (0.373)	0.023 (0.094)
β_3: Round	-1.61*** (0.027)	-0.040***(0.007)
β_4: IA*Round	0.078* (0.045)	0.020*(0.012)
β_5: IA_HI*Round	0.085** (0.374)	0.021**(0.009)
Constant	0.962***(0.298)	
H0: $\beta_3 + \beta_4=0$	p=0.027	
H0: $\beta_3 + \beta_5=0$	p=0.002	
H0: $\beta_4 = \beta_5$	p=0.883	
N	1,660	1,660

Note: Robust standard errors clustered at the session level are reported in the parentheses. *** p<0.01, ** p<0.05, * p<0.1.

F2: Random individual effects Probit regression analysis of shipping decisions

Independent variables	Dependent variable: $Ship_{j,t}$ =1, if the seller j ship the product in round t =0, o.w							
	(1) Control		(2) IA		(3) IA_HI		(4) All	
	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.	Coeff.	Marg. Eff.
β_1: IA							0.559	0.098
							(0.355)	(0.059)
β_2: IA_HI							0.836*	0.127**
							(0.445)	(0.074)
β_3: Noinsure	0.197	0.045	1.015***	0.152***	0.157	0.025	0.223	0.039
	(0.245)	(0.053)	(0.214)	(0.020)	(0.148)	(0.024)	(0.263)	(0.046)
β_4: Noinsure*IA							0.731*	0.123***
							(0.297)	(0.052)
β_5: Noinsure*IA_HI							-0.058	-0.010
							(0.297)	(0.052)
Constant	-0.384 (0.262)		0.146 (0.260)		0.398 (0.399)		-0.469*	
							(0.267)	
N	276		349		282		907	

Note: Noinsure =1 if the buyer did not purchase the insurance; =0, o.w. Robust standard errors clustered at the session level are reported in the parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Appendix G: Other Graphs

Figure G1: Proportion of buyers who purchase the product without insurance in each round

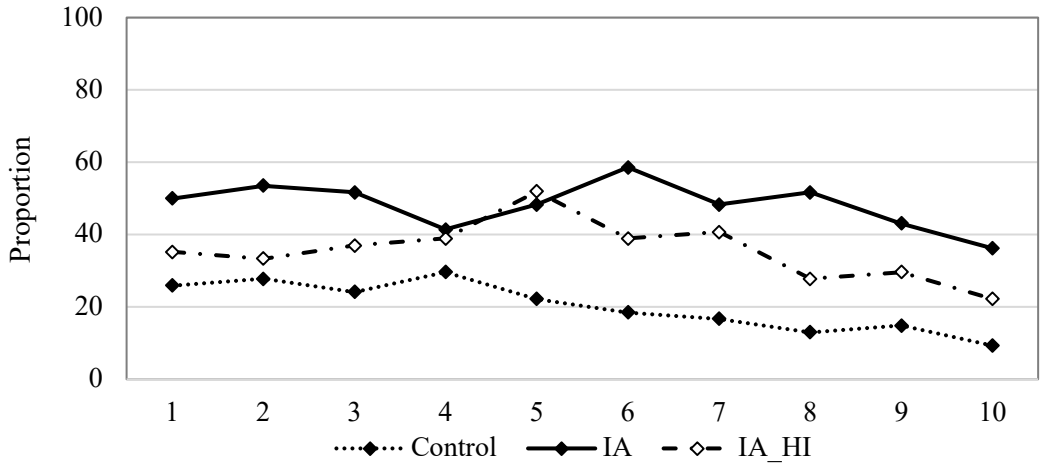
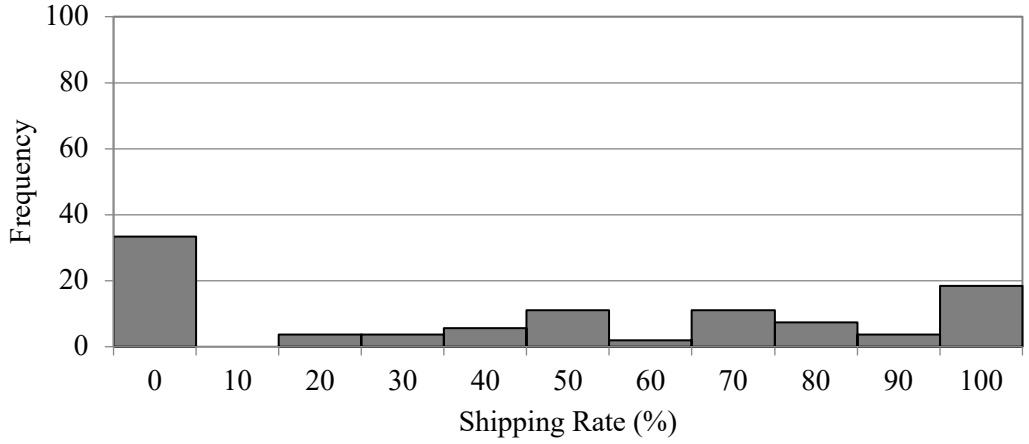
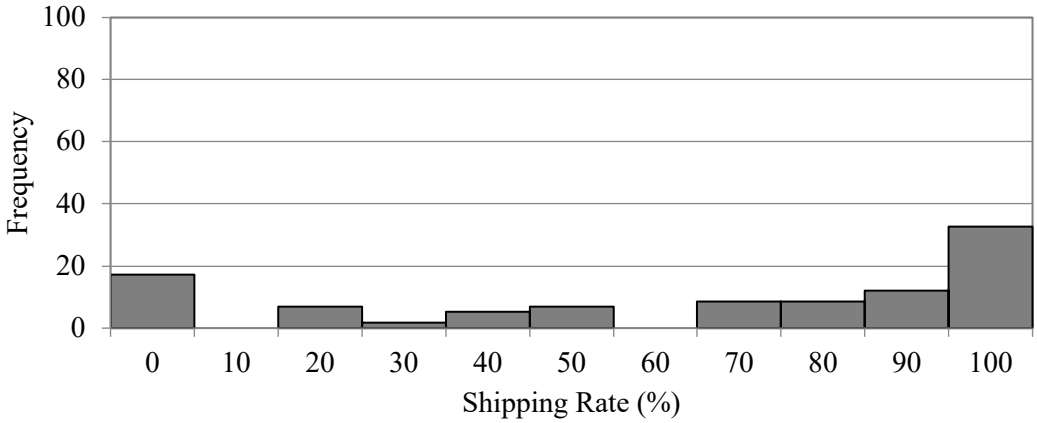


Figure G2: Distribution of shipping rate

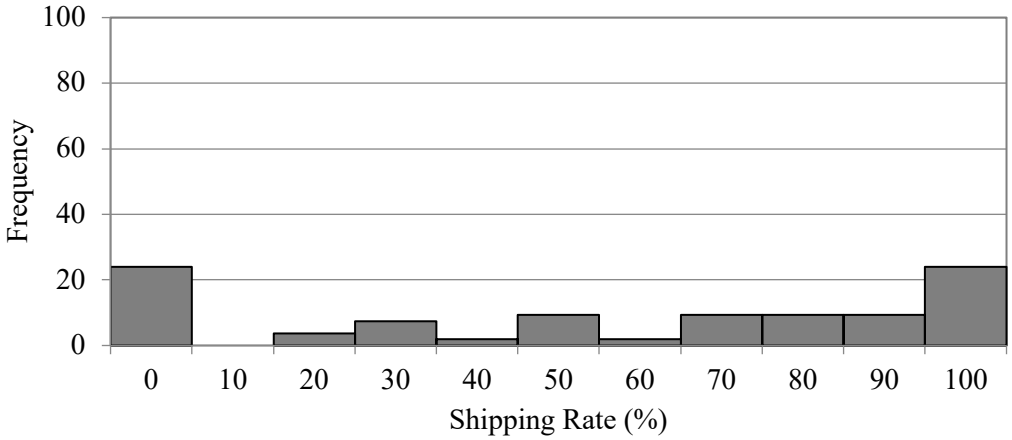
a) Control treatment



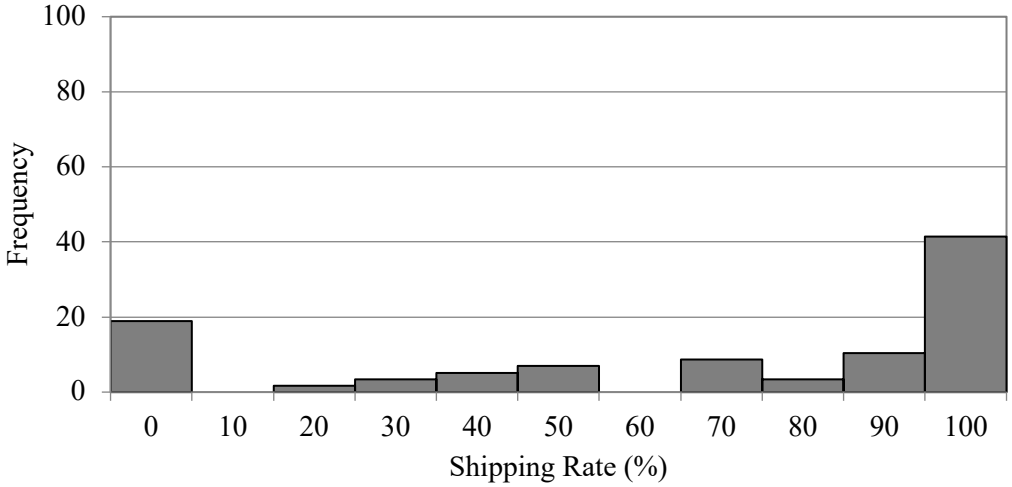
b) IA treatment



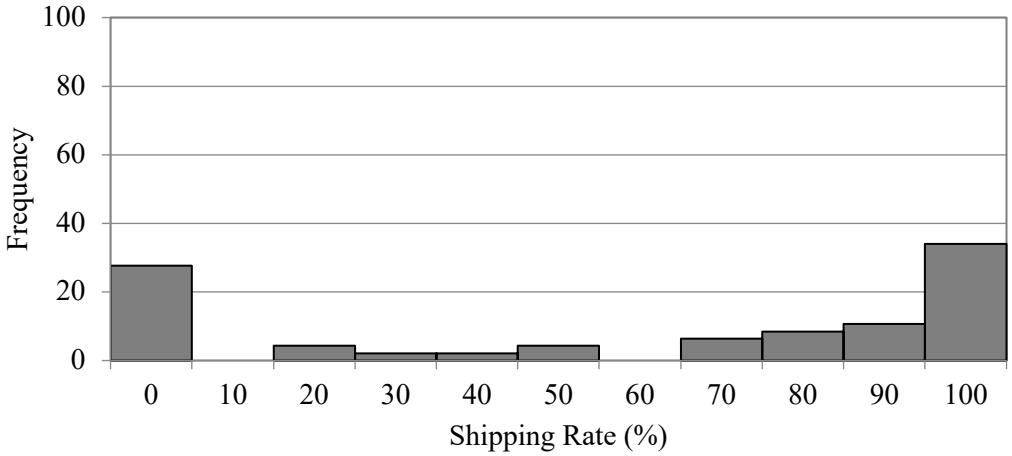
c) IA_HI treatment



d) IA treatment when sellers advise no insurance



e) IA_HI treatment when sellers advise no insurance



f) IA treatment when sellers advise no insurance and buyers purchase without insurance.