Obfuscation and Trust:

Experimental Evidence on Insurance Demand With Multiple Distribution Channels

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Please do not quote. Very preliminary and incomplete draft.

Abstract

This paper aims at shedding light on the dilemma of the insurance consumer: be self-confident facing an important set of insurance policies or rather trust an intermediary who assists her decision making, according to different decision designs based on different distribution channels with different information frames. The results show that trust level is the main determinant of distribution channel choices while the obfuscation of information, supported by intermediaries, is a main inefficiency source of the decision making particularly determinant on the insurance characteristics of contracts chosen by consumers.

Keywords: behavioral economics, distribution channels, insurance, intermediation, obfuscation, search costs, trust.

JEL Codes: C91, C92, D81, D83, G22

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1-Introduction

The non-life insurance offer is growing rapidly by multiplying distribution channels through brokers, cyber-brokers, tied-agents. This evolution is particularly true with the emergence of new players thanks to the democratization of buying behaviors on the internet. Therefore this relatively new context motivates us to investigate determinants of purchasing behavior of insurance policies including physical intermediaries but also new actors such cyber-brokers. While literature already offers an overview of main drivers and results of the generalization of the internet on business offers, we propose to focus our analysis on the drivers of purchasing behavior in retail insurance mass market. Consumers should take time to gather information about the set of market alternatives and purchase the adequate insurance policy at a reasonable price, including a suitable coverage of their risks. Nevertheless, comprehension of risks and comparison of offers are complex process and insurance market typically sheds light on the dilemma between search costs saving and expected utility maximization with respect to underwriting policies. Indeed, an important number of alternatives conducts to obfuscation effect. As reminder, obfuscation is a limited discernment of an agent caused by an excess of information or by introducing a lot of irrelevant information. Thus, insurance intermediaries should reduce this effect by offering comparison and advice services but delegation implies a minimum level of trust. Thus, we design an experiment of this trade-off based on existing intermediaries of non-life insurance mass markets. Through this way, we assess consuming behaviors revealed by subjects' search strategies.

Traditionally, brokers and exclusive agents remain the most important actors of insurance distribution process. The difference between the two consists in the nature of the relationship with insurance companies. While brokers can sell insurance products from different insurers,

exclusive agents are constrained by an exclusive contract to offer only one insurance brand. In opposition to these two types of "traditional" distribution channels, there exist relatively news channels of distribution. For instance, there are direct insurers which sell directly to consumers through phone or dedicated website but also new intermediaries such cyber-brokers offering comparison services. Thus, the diversity of retail insurance distribution allows us to better investigate the effect of search cost on the purchasing process.

As a reminder, search costs are defined as the time, energy and money expended by a consumer who is researching a product or service for purchase. Search costs include the opportunity cost of the time and energy spent on searching and perhaps the money spent to travel between stores examining different options, purchase research data or consult an expert for purchasing advice. Therefore, consumers willing to maximize their utilities by purchasing the most proper insurance policies as well as saving search costs. In retail insurance market, the problem is complexified since we talk about expected utilities depending on consumer's risk aversion. Indeed, consumers are exposed to uncertainty and risk-averse consumer will accept a bargain with more certain but a lower payoff. Thus, risk-aversion changes the weight put on the different element of the trade-off. In addition, one of the simplest ways to save search cost in a decision process is delegation, suggesting confidence.

In the French retail insurance mass market, all above-mentioned aspects are identified. Indeed, consumers can choose to delegate their market exploration to brokers in order to save search costs in exchange for a fee. Nevertheless and as is mentioned in Cummins and Doherty (2006), brokers are also financially incented by insurers to offer specifics policies. Therefore, brokers facilitate comparison of offers and provide some piece of advice but don't

necessarily maximize the expected utilities of consumers. Thus, brokers reduce search costs provided that the consumer is confident enough.

Another possibility to reduce search costs is the exploration through cyber-intermediaries/price-comparators. Indeed, cyber-brokers provide comparison services by ranking policies for free. Thereby, consumers acquire a large quantity of information in simple mouse-clicks. Nevertheless, ranking is generally based on commercial premium without taking into account others specificities as coverage or deductible. Even if some websites provide scoring there are generally non-transparent and difficult to interpret (Ellison and Ellison, 2009). In addition, cyber-intermediaries offer partial information of policies and consumers need to select a specific policy in order to get the overall information, which is increasing their search costs. Hence, its mechanism reveals the Diamond paradox (Diamond 1971). Indeed, when consumers select a specific policy they increase their search costs by visiting insurers' websites. If they want to fully compare two different policies they need to go back on the main page and select another policy, which increases their search costs again. Therefore, gatekeepers rise competition in price (Brynjolfsson and smith 2000, Brown and Golsbee 2002, Baye, Morgan & Scolten 2004) but don't necessary increase competition for policies characteristics (Ellison and Ellison, 2008).

Finally, consumers' third option consists in visiting insurance shops or websites as self-sequential research. In this case they incur for each visits a search cost. By visiting only one insurer, consumers can only explore policies offered a unique insurer. Nevertheless, they could request for advice from a tied-agent able to give them insight in term of relevance of coverage with respect to their risks. This request is also costly, for instance, they have to spend

more time in a shop or with a call-center interlocutor. This advice suggests a certain level of trust because of the financial incentives of insurers.

In addition to the search costs theory, the market exploration implies comprehension of offers. This is particularly true for insurance offers because of the complexity of products. Indeed, insurance market is not homogeneous and it is difficult to find same commercial premium related to same coverage. This is the reason why physical intermediation providing advice remains the main distribution channel of French insurance market. The current psychological theory suggests that the increase of available information and choices should improve quality of decision by allowing consumers to be aware of all possibilities. Nevertheless, Iyengar and Lepper (2000) perform different behavioral experiments in order to demonstrate that this assumption is not necessarily verified and the human desire for choice is not unlimited. This reasoning is also supported by the experimental analysis performed by Schram and Sonnemans (2011) to illustrate the individual choice of health insurance. They analyze the decision strategy of decision maker and found that when there are many alternatives, the subject considers a smallest part of the available information and uses a process of elimination based on limited characteristics. Therefore, a large quantity of information could artificially increase search cost of consumer by providing irrelevant information in order to complex the comparison process.

As expected, we find that trust level is a determinant of distribution channels choices and more confidant subjects tends to choose physical intermediaries as exploration market mode. We also find that risk aversion weakly impact exploration' strategies and doesn't impact contracts 'coverage rate of consumer's choices. Finally, and according to Iyengar & Lepper and Ellison & Ellison, we found that obfuscation is an entire part of purchasing process. Indeed, subjects tend to decrease their coverage rate with respect to the number of alternative

available. Thus we shed on light the focal point effect and find that more alternatives subjects had, more they focus their choose on commercial premium value.

The paper is constructed as following: Section 2 exposes the design of the experiment. In section 3, we then briefly detail its procedure. Finally, Section 4 summarizes the preliminary results of our work.

2- Experimental design

We designed this experiment to identified determinants of insurance choices including intermediaries and search costs (costs of exploration actions). Firstly, we want to understand the choice of distribution channel to access of market information and secondly we want to determine the impact of information quantity on consumers' choices. These questions are investigated in the main part of the experiment. Additionally, we also control for attitude towards risk since subjects face uncertain issues. We also implement a procedure in order to test their trust – honesty – level. Instructions of each part as well as screen shot of the interface can be found in the appendix. During all the experiment, subjects are divided into two groups: participants A and B. Groups remain the same during all the experimentation. There are a quarter of participants B.

2.1 Elicitation of trust level

In this first part, we design an original game in order to elicit level of trust for each subject as well as a general level of honesty.

Design of the trust game

Subjects receive a group, either A or B. They keep their group for the entire duration of the experimental session. This part involves a potential exchange of coins between a wallet and a padded envelope.

Before the session start, we put on the table of each participant a wallet which can contain:

- 10 coins of 0.50€ and a small cardboard showing the result of 10 independent draws. Each draw is performed between two balls: a green and red.
- nothing.

The content defines the group of participants. If the wallet is not empty, subject belongs to group B. We ask them to discretely apply the following rule:

- For each green ball draw on the small cardboard, they can collect 0.50€ in the wallet and put these 0.50€ in the padded envelope. Coins put on the envelope represent their gain for this part.
- Therefore, the remaining euros in the wallet should correspond to 0.50€ times the number of red balls.

Nevertheless, we inform them that no one in the room, including the other participants and us, are able to know if they have applied the rule or not. Indeed, wallets cannot be distinguished and they are put on a same bag at the end of this part.

If the wallet is not empty, subject belongs to group A. We display on their screen the different draws distributed to subjects B. They have to indicate for each of them how much, in euros, do they think that subject B have let in her wallet. To calculate their gain for this part, we randomly select one of these draws and they receive 5 euros minus their error of estimation.

Theoretical framework

Our trust game is largely inspired from Cohn, Marechal and Noll (2015). Similarly to Cohn & all, our game permits us to measure the general level of honesty of participant B by analyzing the remains coins of each wallet with respect to the distributed draw. It also allows us to identify deterring behavior with respect to different draws (i.e. more or less lucky). But, the main goal of this stage is to measure the level of trust of each subject A. This measure is essential for the rest of our analysis since it can determinate the delegation of a part of the purchasing process.

While traditional trust game implies coordination game and inequality aversion. With this game we try to avoid these effects by deleted interaction between groups. Indeed, this measure is used in order to explain one shot interaction between insurance intermediaries and consumers. We assume that there is no a counter part of intermediaries deterring since we want to analyze distribution channels choices without repetition. We thus exclude learning effect, brand effect and social effect (i.e. word of mouth, experiences…).

2.2 Elicitation of risk aversion

From this part, all gains are express in ECU (Experimental Currency Unit). ECUs are converted at the end of the session according to the following rate: 1€ = 50 ECU. Risk preferences have been measured for all subjects in the gain and loss domain. We use the method suggested in Holt and Laury (2002) and convert dollars in ECU.

Subjects have to make two series of 10 decisions between an alternative A and an alternative B. First 10 questions concerns risk attitude towards gain. For instance, they have to choose between receive 50 ECU with a probability of 10 % and receive 20 ECU with a probability of

90% (alternative A) or receive 85 ECU with a probability of 10 % and receive 5 ECU with a probability of 90%.

The next questions concern risk attitude towards loss. We attribute to each subject and for each question an initial endowment. Then, they have to choose one alternative more or less risky. For instance, they should choose between loss 50 ECU over their 100 ECU (i.e. initial endowment) with a probability of 10% and loss 80 ECU with a probability of 90% (alternative A) or loss 15 ECU over their 100 ECU with a probability of 10% and loss 80 ECU with a probability of 95%.

One could argue with the house-money effect (Thaler and Johnson (1990)), participants might be willing to take more risk. However Etchart-Vincent and l'Haridon (2011) have compared subjects' risk attitude in three payment conditions: a real loss condition based on a random lottery, a "losses-from-an-initial-endowment" and a hypothetical-losses condition. Their results suggest that there is no significant difference between the three payment conditions in the loss domain, comforting our procedure.

In addition, an in order to compare risk aversion in loss and gain domain we calibrate payoff such that the expected payoff for each level of question in the gain and loss are equal. In other words, if the alternative A of the first questionnaire is the following: win 10 ECU with a probability of 10% then alternative A of the second one is: over 100 ECU losses 90 ECU with a probability of 10%.

We measure risk aversion among participants with respect to the first switch from a safe option to a risky one, and thus for both series of questions. A subject who switch at question five is considered more risk averse than a subject switching at the second question.

2.3 Main game

In the main game, each participant keeps her previous type defined in the first part of the experimentation (A or B). In this part, participants A play the role of insurance customers while participants B play physical intermediaries. The game is repeated for height periods.

For a participant A, each period consists of selecting an insurance contract in order to be protected against a known loss. Each contract includes a fixed premium and a deductible that have to be paid in case of loss.

For a participant B, each period consists of giving advices to participants A. For each period, participants A can choose to call a physical intermediaries in order to get contracts' information. Therefore, one of participants B is randomly chosen to provide advices. We explain later what form this interaction takes.

Design of the exploration game

Participants A must select one contract for each period. They cannot remain uninsured. For each period, they have an initial wealth, a probability of loss, and an amount of loss. These elements can vary for each period. There are 8 different available contracts grouped into 4 menus of 2 contracts (A,B,C and D). Nevertheless, contracts are not viewable at the beginning of each period. To get information about contracts, participants A have to explore the market. For that, they also have an exploration credit which is equal and update at the beginning of each period. This credit is consumed for each exploration actions. The unconsumed exploration credit is part of their gain. Participants can explore the market by choosing:

- To explore one of the four menus. For that, A have to pay 12 ECU (debited to exploration credit). Once they access to the information of the 2 related contracts they can ask for a

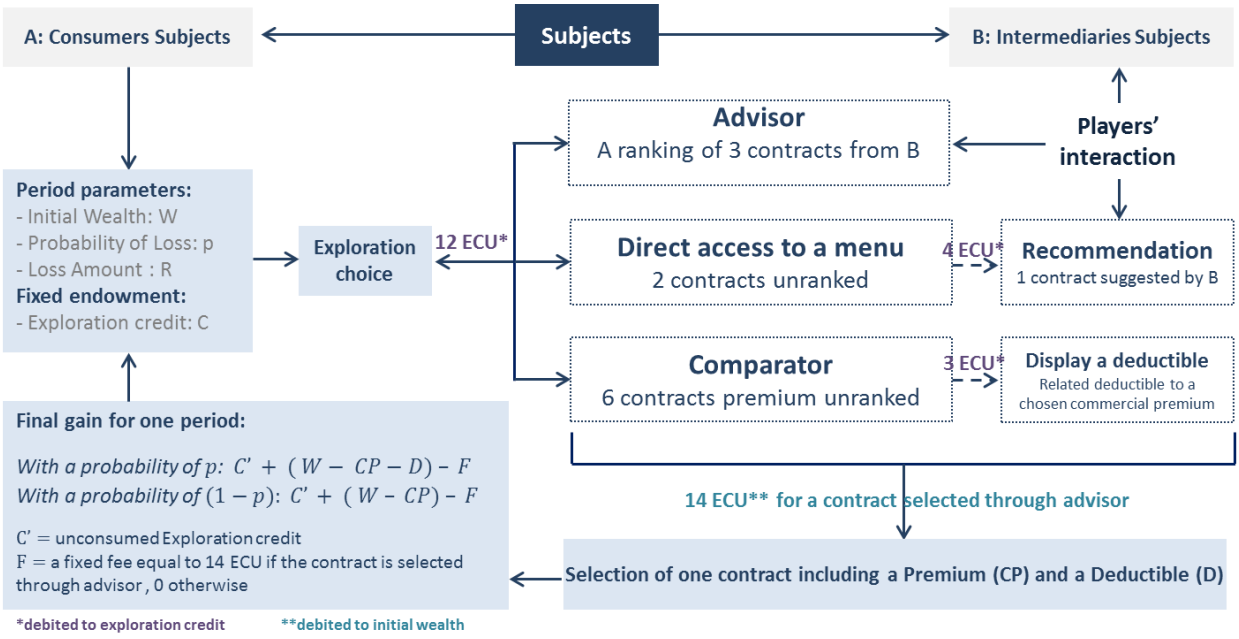
recommendation for 4 ECU (also debited to the exploration credit). In this case a participant B is selected. Subject B gets additional information about contracts. Indeed, we display on her screen a ranking of contracts depending on the subject A attitude toward risks. We explain later how we define this ranking. In addition, each contract is related to a bonus. This bonus is paid to B if and only if A underwrites this contract through B intermediation. Bonuses are not paid by A. B has to decide which contract she wants to suggest according to these information. These information remain unknown for participant A.

- To seek advisor (i.e. a B subject). For that, A has to pay 12 ECU (debited to exploration credit). A participant B is randomly selected. We display on B screen same information than detailed before, but this time the information is about 6 contracts (3 of the 4 available menus). This time, B has to suggests to participant A a ranking of 3 contracts. In addition to the potential gain of bonus, B receives a fixed fee of 14 ECU (debited to initial wealth).

- To explore through comparator. Access to comparator costs 12 ECU (debited to exploration credit). Then, 6 of the 8 possible contracts appear on A screen (3 of the 4 available menus). Nevertheless, only premium are viewable. To discover the associated deductible of one contract they have to pay 3 ECU (i.e. it is possible to underwrite a contract without knowing a deductible). They don't know the ranking of these contracts.

Exploration actions are not definitive and subjects can continue to explore as long as their exploration credit permit it. We explain after how search costs have been calibrated.

Figure 1: Exploration game



The final gain for this part of the experiment is equal to the gain of one over the last six periods; randomly chosen (i.e. the firsts two are training periods). We thus define a loss event or not according to probabilities. In addition to potential gains from players' interaction, participants B receive a fixed endowment for this part.

Since we want to control the impact of intermediaries as well as the impact of search cost on information revelation we add a short part at the end of this game. This part is played by all subjects (i.e. A and B) and consist of select an insurance contract in a list of a limited number of alternatives. The principle is the same than explained above. At the beginning of each period, subjects have an initial wealth, a probability of loss and an amount of loss. Nevertheless, this part doesn't include any search cost or intermediaries and all contracts are display in the same time for each period. However, each period includes different number of

choices (i.e. 2, 3, 5 and 8). It allows us to analyze the impact of the number of alternative in a controlled environment. The final gain is computed similarly than before. We randomly select one of the four periods.

Theoretical Framework

Definition of contracts:

For each period we generate 8 different contracts. Each contract contains a premium CP and a deductible D. Contracts are constructed according to Schlesinger (2013) such that:

$$CP = (1 + \lambda)\, p \times R \times \alpha$$

Where, λ is the loading factor of insurer, p the probability of loss, R is the amount of loss and α the coverage rate. In order to propose contract comparable to standard insurance contract we define a deductible D such:

$$\alpha = \frac{R - D}{R}$$

Thus,

$$D = R - \frac{CP}{(1 + \lambda) \times p}$$

We generate for each period a set of contract G_1 such that:

$$G_1 = \{\left(CP_{G_1} \in [0, W]; D_{G_1} = R - \frac{CP_{G_1}}{(1 + \lambda) \times p}\ , \lambda \in [0.8,2]\right)\}$$

For simplicity, we round each element to the nearest integer. We then define a new subset G_2 such that a contract is unique. In addition we eliminate non possible contract define such:

$$W - CP - W - 14 < 0$$

Indeed, we cannot propose contract that can lead to a negative final gain for a given period. For simplicity, we also eliminate contracts that are strictly dominated to simplify future analyze. Indeed, information about dominated contract can affect insurance choices of consumers. In addition, insurance markets provide heterogeneous contracts that could not be simply defined as dominated.

Contract i is dominated by contract j, if and only if:

$$CP_i > CP_j \; and \; D_i > D_j$$

Definition of ranking:

In order to include the advice role of intermediaries in insurance market, we decide to provide private information to participant B, materialized as a ranking of contracts. Contracts are ranked according to the expected utility theory. Indeed, for each subjects A we have defined previously a measure of their attitudes towards risks. This measure is now transformed as a coefficient in order to compute the expected utility of each participant A for each contract.

We assume that consumers' utility function is a CRRA function (Constant Relative Risk Aversion). Therefore we assume that consumers display same risk for any risk-wealth ratio. Thus:

$$U(x) = \begin{cases} \dfrac{x^{1-r}}{1-r} \; if \; r \neq 1 \\ \ln(x) \;\; if \; r = 1 \end{cases}$$

Hence, r is the coefficient of CRRA, $r = 0$ corresponds to Risk Neutral, $r > 0$ to Risk Averse and $r < 0$ to Risk Loving subjects.

Because of the difference of risk aversion in the gain and loss domain (Kahneman and Tversky (1981)) and because insurance consumers face risks in the domain of loss, we decide to use answers of the Holt & Laury (2002) modified test in the loss domain. We define an r coefficient for each possible path. Paths are defined according to the first switch from a safe to a risky option. We thus use the mean of Holt & Laury intervals.

Table 1: Risk aversion parameters

Question of first switch from Safe to Risky Choice	Range of Relative Risk Aversion	Risk Preference Classification	Parameters used
0-1	r < -0.95	highly risk loving	-0.95
2	-0.95 < r < -0.49	very risk loving	-0.72
3	-0.49 < r < -0.15	risk loving	-0.32
4	-0.15 < r < 0.15	risk neutral	0
5	0.15 < r < 0.41	slightly risk averse	0.28
6	0.41 < r < 0.68	risk averse	0.55
7	0.68 < r < 0.97	very risk averse	0.83
8	0.97 < r < 1.37	highly risk averse	1.17
9-10	1.37 < r	stay in bed	1.37

One could argue that our definition of the utility function is a strength assumption that could biases our analysis. Nevertheless, we do not affirm to participants that our knowledge of their optimal policy is perfect. According to reality, intermediaries provide pieces of advices with respect to their own interpretation of the risk. Therefore potential errors are integral part of the distribution process.

<u>Definition of search cost and fixed fee:</u>

In order to take into account search cost in purchasing process, we include search cost defined as the cost of each exploration actions. To encourage consumers to reveal their exploration preferences, in other words their distribution channels preferences, we include a fixed search cost of x ECU to access to every decision design. Decision designs are constructed in order to represent the real possibility of exploration in an insurance market.

Thus, we add an additional search cost u for ask for a recommendation within a specific menu. This cost represent the time spends with a tied- agent in a traditional insurance context as well as the time spend at phone for direct insurer. We also add an additional search cost y for any revelation of deductible on the comparator. Indeed, in real life price comparators display rapidly a rank of contract mainly depending on commercial premium. Nevertheless, consumers have to click on a specific contract to learn about all specific conditions, which is not costless in term of search cost. Finally, consumers have to pay an additional fixed fee k to underwrite a contract suggested by the advisor. This cost represents fees paid to broker in exchange for their services. Therefore, this cost is not a search cost and is directly debited to the initial wealth.

Costs mentioned above are constraint in to different ways. Firstly, one channel should not be definitively optimal with respect to another. For instance, imagine that it is more expensive to seek advisor and underwrite through her than discover sequentially four menus as well as ask for a recommendation for each of them. This disequilibrium can totally upset our results because of the presence of optimal exploration strategy, and thus whatever subjects' characteristics.

Hence, we assume that the expected costs to underwrite the optimal contract available in the market are equal for each intermediary. Of course, we assume that there is no problem of

obfuscation (identification of optimal contracts) and trust. We thus define the expected matching cost (EMC) for each decision design:

- $EMC(Advisor) = k + \frac{8}{6}x$ (1)
- $EMC(Comparator) = \frac{8}{6}\left(x + y + \frac{5}{6}y + \frac{4}{6}y + \frac{3}{6}y + \frac{2}{6}y + \frac{1}{6}y\right)$ (2)
- $EMC(\text{Menus}) = \text{x} + \frac{3}{4}\text{x} + \frac{2}{4}\text{x} + \frac{1}{4}\text{x}$ (3)

Using equations (1), (2) and (3), we have:

$$EMC(Advisor) = EMC(Comparator) = EMC(Comparator) \Leftrightarrow \frac{4}{3}x + k = 4x$$

$$= \frac{4}{3}(x + 6y)$$

In addition, we don't want to limit subjects in their exploration and let them explore the entire market. We assume that there always exist a possibility to be totally informed but it supposed that consumers do not take benefit from any saving time. Thus, we should have:

$$C = 7x + 6y + 4u$$

Where C is the exploration credit.

Definition of bonus:

To be more realistic and because of trust problem in purchasing choice including intermediation, we introduce bonuses. These bonuses stand for commission paid by insurer to their physical intermediaries (broker or tied agents) in order to motivate them to build a high profitable portfolio. In our game, we randomly define bonuses such that:

$$B_i = \max(\left(CP_i - p \times (R - D_i)\right) \times U(0.2\,;0.4), 0)$$

Therefore, a bonus is proportional to the profit generate by its related contract. Nevertheless, the bonus rate is defined as a uniform random variable. The reason is that most profitable contract should not be the most incentivized. Indeed, insurer can incentivize under profitable contract for different reason as loyalty goal, brand image… Nevertheless, we assume that a non-profitable contract is never incentivized.

3. Procedure

A web interface and a server database was design specifically for this experiment. The interface was developed with HTML and JavaScript, the backend with Java and PostgreSQL as database. Subjects were students from the University of Lyon 1 – Claude Bernard. 48 subjects participated in the experiment, 29 in each session.

The trust game was firstly played. At first all subjects received identical instructions regarding to elicitation of trust – honesty – level, including comprehension questions. Subjects were assigned to a group for the rest of the session. Then, they made their decision for this part. Afterwards, subjects received written instructions for the risk elicitation task and made their choices. In a third step, they receive instruction for the main part of the experiment as well as an understanding questionnaire that we corrected with them. Finally, they received the instruction of the control par of the main game. Before leaving the room to privately receive their payments, we asked them to answer some general questions about age, gender and degree. The different periods of the exploration game and its control part were displayed randomly for each session. All treatments were framed in a neutral manner.

We decided to play the trust game at the beginning of the session to avoid learning effect from possible interaction of the main part of the experiment. The risk elicitation task was played just before the main game in order to use information about risk attitude of subjects A. Finally, the control part was played by all subjects after the exploration game to control potential impact of previous exploration decisions. Indeed, only subject A are submit to exploration choices.

The payoffs in the different tasks were revealed at the end of the entire experiment. The sessions lasted about 105 minutes. The average payoff was about 16 euros including a show up fee of 3 €.

4- Results

In our empirical analysis we look at first the behavior of consumers, in particular the choice of distribution channel. We then investigate the impact of the quantity of information on contracts choice in terms of coverage.

4.1 Distribution channel choices

Table 2 displays the mean and standard deviation of the number of contracts underwritten through the different distribution channels (advisor, menus and comparators).

Table2 final distribution channel choice

Final Distribution Channel	Average Number of Subjects A per period	Percentage
Advisor	6.58 (1.41)	27.4%
Comparator	10.92 (3.41)	45.5%
Menu	6.50 (3.08)	27.1%

80.3% of subjects explore only one channel. While 30% of subjects seeking advisor also explore others channels, only 14.4% (resp. 18.3%) of subjects choosing comparators (resp. menus) explore alternative channels. These first results confirm that first channel choice is determinant in the entire purchasing process.

In addition, subjects choosing to explore market through menus visit, in average, 2.4 different menus (1.2 of st.d.). Only 41.9% of them do not change menu and only 6% ask for recommendation. 83% of menu visitors choose to select a contract through this channel. Ask for recommendation doesn't impact this ratio, while subjects seeking advisor are 73% to finally choose advisor channel for their final purchase.

These preliminary results motivate us to deeply analyze determinants of channels' choices. We thus, propose to perform multinomial regression. Table 3 summarizes our different regressions.

We estimate the probability that subjects choose to underwrite a contract on each specific channel. We used Menu as referent level. Firstly (Model 1), we analyze impacts of standard parameters of periods (i.e. initial wealth, loss and probability) as well as risk aversion level. While main theoretical works take into account these parameters as main drivers of consumer behavior in insurance, we found that a majority of them have a weak or not impact at all on this part of the purchasing process. However, probability of loss seems to be a determinant of choices since the probability of choosing the comparator instead of advisor (brokers) or menu (insurers) is decreasing according to it (significant at 5%). In addition risk aversion level increases the probability of choosing a contract through menu (also significant at 5%).

Nevertheless, the most important determinant of channels' choices is the level of trust of subjects. We define this level for each subject A. This variable is equal to the mean ratio

between the amount that subject A have reported in the trust game of part 1 of the experiment and the amount that it should be let according to our rule. Therefore, the more important this variable is the less trusty subjects A are. We found that four each channels, the level of trust is significantly determinant (<1%). As expected, the probability of choosing the advisor is decreasing with the trust level.

One could argue that a potential correlation between trust level and risk aversion can explain both previous results. Indeed, a high correlation could be catch by the trust variables and can conducts to a weak significance of risk aversion level. However, and as Eckel and Wilson (2004) we didn't found correlation between both variables, the Pearson coefficient is equal to -0.05 (same results with Spearson and Kendall correlation test).

In addition and according to our previous results, we decide to include in our regression the first choice variables. These variables correspond to the channel of the first exploration actions. As expected, this variable is highly significant and consumers tend to keep same channels for exploration and subscription when first choice concern Menu or Comparator. Nevertheless, this result is not true for Advisor. Indeed, we see in Model 1 that subjects choosing at first to seek advisor has a higher probability to finally underwrite through comparator. This result is in fact highly trust dependent.

We thus decide to add an interaction variable (Model 2) in order to investigate this part. Indeed, trust level significantly explains final choices, it is then reasonable to think that it should also explains first choice. Therefore, by crossing first choice channel and trust level we show that trusty subjects tend to choose advisor in first step and remain on it for their final choice while non-trusty subjects prefer to firstly visit comparator but chose finally an alternative channel for their subscription.

Finally, we control for age and gender effects and we add a fixed session effect (Model 3). Results are not significantly different across sessions. Age is not a determinant of channels' choices. However, gender is weakly significant (<10%) and men select comparator more frequently.

While classical insurance theory argues that consumers' choices are mainly driven by risk aversion, risk nature and wealth, we found that trust levels of consumers are also an important determinant of choices. Access to information contacts is conditional to exploration choice. The quantity of information available for each subject is, by definition, dependent of channels' choices. Therefore, we want to understand how consumers make their choice facing to different number of alternative.

Dependant variables: Final Distribution Channel Choices							
Referent level dependant variables: MENU		**Model (1)**		**Model (2)**		**Model (3)**	
Independant Variables	**Description**	**COMPARATOR**	**ADVISOR**	**COMPARATOR**	**ADVISOR**	**COMPARATOR**	**ADVISOR**
Initial_wealth	Initial wealth of period	0.001(.001)	-0.001(.001)	0.001(.001)	-0.001(.001)	0.001(.001)	-0.001(.001)
Loss	Loss amount of period	0.001(.001)	0.001(.001)	0.001(.001)	0.001(.001)	0.001(.001)	0.001(.001)
Probability	Probability of loss	-2.217**(.9091)	-0.984(.961)	-2.227**(.977)	-1.007(.973)	-2.349**(.699)	-1.162*(0.686)
First_choice	First exploration action of period; referent level: First_choice_MENU						
First_choice_COMPARATOR		5.883***(.429)	1.383**(.663)	12.614***(.708)	1.441***(0.363)	12.593***(.748)	1.276**(.015)
First_choice_ADVISOR		3.871***(.422)	3.608***(.559)	4.952***(.541)	11.108***(.604)	4.805***(.572)	0.868***(.737)
Trust_level	Mean of ratio: rule condition over subject estimation	-1.711***(.587)	-2.735***(.481)	4.381***(.677)	-2.097***(.483)	4.265***(.742)	-2.162***(.842)
Riskaversion	Question # of first switch from safe to risky option	-0.145(.113)	-0.216**(.099)	-0.147(.114)	-0.229**(.107)	-0.139(.120)	-0.203*(.110)
First_choice x Trust_level							
First_choice_COMPARATOR x Trust_level				-6.646***(.607)	-1.343*(0.473)	-6.014***(.503)	0.069(.503)
First_choice_ADVISOR x Trust_Level				-6.177***(.745)	-0.043***(.425)	-6.181***(.743)	-1.217***(.549)
Constant		-0.886* (.476)	1.963*** (.491)	-7.155***(.668)	1.434**(.591)	-9.547***(.566)	-0.982*(.578)
Gender	Men=1; Women=0					0.777*(.482)	0.409(.484)
Age	From 0 to 99					0.075(.055)	0.095(.061)
Session	Sessions fixed effect					-0.427(.448)	0.007(.468)
Observation		288		288		288	
AIC		393.997		399.838		406.2922	
Residual deviance		361.997		359.838		354.2922	

Significance levels: * p<.1; ** p<.05; *** p<0.01.

4.2 Effects of information quantity on insurance purchasing choices

We show previously that access to information market in insurance is an important part of the purchasing process. While subjects seeking advisor have an limited access to contracts, subjects exploring though comparator get more information about commercial premium level and displayed, in average, 3.4 deductible (1.7 of st.d.). In addition, 72% of subjects displayed deductibles belongs to cheapest contract.

Hence, these firsts results support the fact that choices of distribution channels play an important role for future purchasing choices. We thus decide to analyze characteristics of chosen contracts depending on the information quantity available.

To do that, we compute, for each subject, the number of alternative viewable at the choice moment. We want to explain how consumers choose the coverage rate of an insurance contract. By construction, coverage is highly depend of period parameters such risk nature, initial wealth. Therefore, we construct a dependent variable called relative coverage. This variable is equal to the coverage of chosen contract over the minimal coverage viewable at the choice moment. Therefore more this variable is more subjects decide to be covered against risks.

At contrary to standard insurance theory, we found that the aversion level doesn't explain the level of coverage. Similarly, probability of loss is not a significant. In opposite and counterintuitively, we found that the amount of loss is negatively correlated to the relative coverage. Subjects are hence ready to pay higher deductible in case of loss and prefer to choose smaller commercial premium.

We also see that contrary to channels' distribution choices trust level does not have impact on chosen coverage level as well as first exploration action. We thus want to understand if the quantity of information is a determinant of choices. Thus we define a variable representing the number of alternative at the choice moment. We don't take into account contracts partially explored. For instance, subjects have the possibility to underwritten contracts through comparator without complete information about at least one contract. Thus, we exclude them for our analysis.

Finally, we show that the number of alternatives viewable is determinant. Indeed, when the number of alternative is increasing, subjects decrease their relative coverage. This result conforts the fact that when quantity of information increased, subjects tend to use a focal point to make their choice. In this case they prefer to select contract with a lower commercial premium. This focal point effect is also revealed by our interaction variable.

We include into our model the relative commercial premium defined as the commercial premium of the chosen contact over the maximum commercial premium viewable.More the number of alternative is and more the commercial premium of the contract is, more subjects increase their coverage. This result suggests that consumer choosing to be well covered tends to take the highest coverage if they get an important quantity of information about commercial premium.

Table 4: Results of linear regression

Dependant variables: Relative coverage*		
		Model
Independant Variables	**Description**	**Parameters**
Initial_wealth	Initial wealth of period	0.002***(.0003)
Loss	Loss amount of period	-0.0 1***(.0001)
Probability	Probability of loss	-0.026(.374)
First_choice	First exploration action of period; referent level: First_choice_MENU	
First_choice_COMPARATOR		-0.021(.0.91)
First_choice_ADVISOR		0.046(.095)
Trust_level	Mean of ratio: rule condition over subject estimation	-0.024(.113)
Riskaversion	Question # of first switch from safe to risky option	0.021(.016)
Alternative	# of alternative	-0.179***(0.048)
Margin	Insurer loading factor of chosen contract	0.289*(.149)
Relative Commercial premium	Contract commercial premium over maximum commercial premium visible	-0.175(.254)
Interaction	# of visible alternative x Relative Commercial premium	0.224***(.047)
Constant		1.388***(.304)
Gender	Men=1; Women=0	
Age	From 0 to 99	
Session	Sessions fixed effect	
Observation		274
AIC		406.76
Residual deviance		64.295

Significance levels: * p<.1; ** p<.05; *** p<0.01.

Bibliography:

Michael R. Baye, John Morgan, and Patrick Scholten. Price dispersion in the small and in the large: Evidence from an internet price comparison site. The Journal of Industrial Economics, 52(4):463–496, 2004. ISSN 1467-6451.

Jeffrey R. Brown and Austan Goolsbee. Does the Internet Make Markets More Competitive? Evidence from the Life Insurance Industry. Journal of Political Economy, 110(3):481–507,June 2002.

Erik Brynjolfsson and Michael D. Smith. Frictionless commerce? a comparison of internet and conventional retailers. Management Science, 46:563–585, 2000.

Alain Cohn, Michel André Maréchal, and Thomas Noll. Bad boys: How criminal identity salience affects rule violation, working paper 2015.

J. David Cummins and Neil A. Doherty. The economics of insurance intermediaries. Journal of Risk and Insurance, 73(3):359 – 396, 2006. ISSN 00224367.

Peter A. Diamond. A model of price adjustment. Journal of Economic Theory, 3(2):156–168, June 1971.

Catherine Eckel and Rick K. Wilson. Is trust a risky decision? Journal of Economic Behavior and Organization, 55(4):447–465, 2004.

Glenn Ellison and Sara Fisher Ellison. Search, obfuscation, and price elasticities on the internet. Econometrica, 77(2):427–452, 2009. ISSN 1468-0262.

Etchart-Vincent, N., and l'Haridon O. (2011) 'Monetary incentives in the loss domain and behavior toward risk: An experimental comparison of three reward schemes including real losses,' *Journal of Risk and Uncertainty*, 42:61–83

Charles A. Holt and Susan K. Laury. Risk aversion and incentive effects. American Economic Review, 92(5):1644–1655, 2002.

S. S. Iyengar and M. R. Lepper. When choice is demotivating: can one desire too much of a good thing? Journal of personality and social psychology, 79(6):995–1006, December 2000.

D. Kahneman and A. Tversky. The framing of decisions and the psychology of choice. Science, 211: 453–458, 1981.

Thaler, R. H., & Johnson, E. J. (1990) 'Gambling with the house money and trying to break even: The effects of prior outcomes on risky choice' Management science, 36(6), 643-660.

Harris Schlesinger. Handbook of Insurance, chapter The Theory of Insurance Demand, pages 167–184. Springer New York, 2013.

Arthur Schram and Joep Sonnemans. How individuals choose health insurance: An experimental analysis. European Economic Review, 55(6):799–819, August 2011.

APPENDIX

INSTRUCTIONS

You take part in experimentation in the context of **SAF** (Sciences Actuarielle et Financières) research program of l'**ISFA** (Institut de Science Financière et d'Assurances) of the University of Claude Bernard Lyon 1.

If you carefully read these instructions you can earn a substantial amount of money. Your final gain will depend on your decision and decisions of others participants of this session. In any case, you will receive a fixed remuneration of remunerate 3€ for your participation. Please note that the average final gain is well above this amount. Once the experimentation is finished, we give you an attestation of payment that you must sign in exchange of your gain paid directly and privately in cash.

This experimental session consists of **four independent parts**:

- The first part involves a potential exchange of coins between a **wallet** and a **padded envelope (empty),** already on your table.
- The second part consists of 20 questions.
- The third part includes 8 successive and independents rounds. For each round, you have to select an insurance contract in order to be protected against a known risk.
- The fourth part involves choosing a contract through short choices series.

Thus, you final gain in Euros is the sum of 5 amounts:

- 3 euros for your attendance.
- The sum of your gains in each of the four parts.

Communication is forbidden during all the experimental session. If you don't respect this rule, we shall cancel this session and you will not receive remuneration. For any question, please raise your hand.

You receive an instruction sheet and a questionnaire of understanding (if necessary) at the beginning of each parts of this experimental session.

A login of three letters was placed on your table. Please enter your login in order to access the experimental interface.

First part:

During this first part, you receive a type, either A or B. You keep this type for the entire duration of this experimental session. This type defines your role for the different parts.

There are a wallet and a padded envelope (empty) on the table of each participant. Please wait our signal to discover its contents.

The wallet can:

- Either be **empty.**
- or contain **10 coins of 50 cents** (5 euros in total) and **a small cardboard** showing the result of 10 independent draws. Each draw is performed between two balls: a green and red.

<u>If your wallet is NOT EMPTY you are a participant of type B :</u>

For this part, **we ask you to apply the following rule:**

- **For each green ball, you can collect 0.50€ in the wallet and put these 0.50€ in the padded envelope.**
- The remaining euros in the wallet therefore correspond to **0.50€ times the number of red balls**.

Nevertheless, the experimenter and the others participants will not be able to know if you have applied the rule. You are not monitored and all wallets are put without distinction in the same bag at the end of this part.

For this part, your gain corresponds to the amount that you have put in the padded envelope.

PLEASE LET THE SMALL CARDBOARD IN THE WALLET

Example : If your small cardboard is the following : 

By applying the rule, you:

- collect 6 coins of 0.50€,
- let 4 coins of 0.50€ in the wallet.

<u>If your wallet is EMPTY you are a participant of type A:</u>

For this part, the different draws distributed to participants B appear on your screen. You have to indicate for each of them: **How much, in euros, do you think that participant B have let in his wallet?**
To calculate your gain for this part, we select randomly one of these draws and you receive:

5 € - |your error of estimation|

Example : If the draw selected is the following : 

B have let 1€ (2 coins of 0.50€) and you have estimated that he had let 2€ (4 coins of 0.50€).

Therefore, you earn : 5€ - |your error of estimation| = 5€ - |2€ - 1€| = 5€ - 1€ = 4€

Second part:

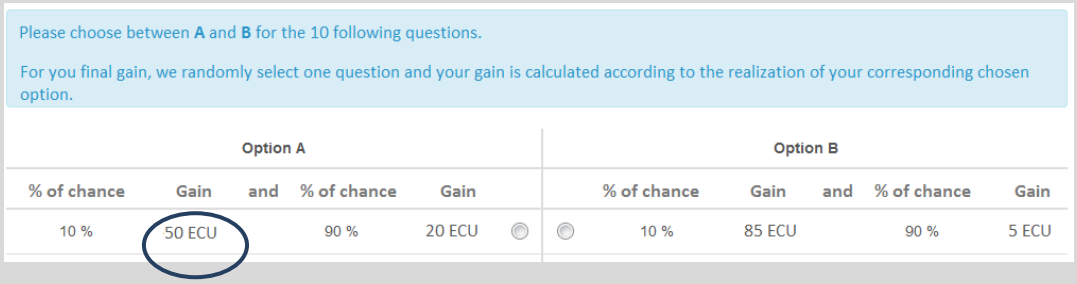
From this second part, we talk in ECU (*Experimental Currency Unit*). This unit of account is converted in Euro at the end of the session according to the following rate: **1 ECU = 0.02 €, 1€ = 50 ECU.**

In this second part, **whatever your type,** you have to answer **two series of 10 questions.** For each questions, you should **choose one option (A and B).**

For this part, we randomly select one question and your gain is calculated according to the realization of your corresponding chosen option.

Example :

1st possible case : <u>in the case of a Gain</u>


Please choose between **A** and **B** for the 10 following questions.

For you final gain, we randomly select one question and your gain is calculated according to the realization of your corresponding chosen option.

Option A					Option B				
% of chance	Gain	and	% of chance	Gain	% of chance	Gain	and	% of chance	Gain
10 %	50 ECU		90 %	20 ECU	10 %	85 ECU		90 %	5 ECU

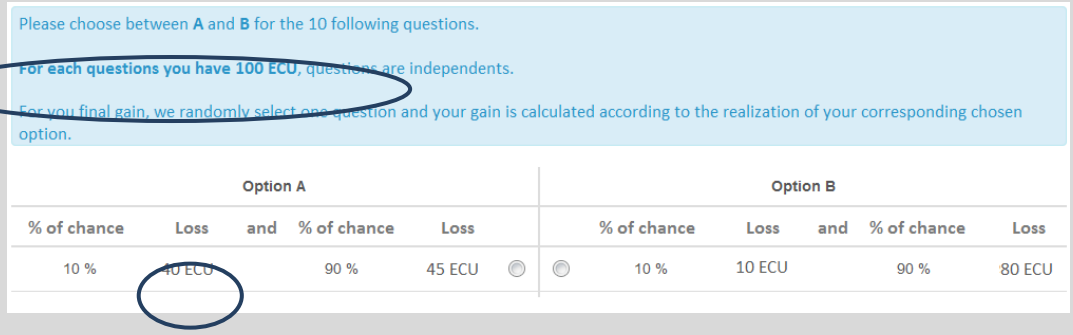
You should indicate if :

You prefer a **10-in-100 chances of winning 50 ECU** and **90-in-100 chances of winning 20 ECU** (Option A)

or

You prefer a **10-in-100 chances of winning 85 ECU** and **90-in-100 chances of winning 5 ECU** (Option B)

2nd possible case: <u>in the case of a Loss</u>


Please choose between **A** and **B** for the 10 following questions.

For each questions you have 100 ECU, questions are independents.

For you final gain, we randomly select one question and your gain is calculated according to the realization of your corresponding chosen option.

Option A					Option B				
% of chance	Loss	and	% of chance	Loss	% of chance	Loss	and	% of chance	Loss
10 %	40 ECU		90 %	45 ECU	10 %	10 ECU		90 %	80 ECU

You should indicate if, over **100 ECU** :

You prefer a **10-in-100 chances of losing 40 ECU** and **90-in-100 chances of losing 45 ECU** (Option A)

or

You prefer a **10-in-100 chances of losing 10 ECU** and **90-in-100 chances of losing 80 ECU** (Option A)

Third part:

This part consists of 8 successive and independents rounds. The two firsts rounds are trials rounds without consequences for your gain. Whatever your type, your remuneration for this part corresponds to your gain for one of the six remaining rounds, selected randomly.

You are type A:

For each round, you have an **initial wealth**, a **probability of loss**, an **amount of loss**. You have to select one contract in order to be protected against the loss. **It is compulsory to underwrite a contract**.

Each contract contains:

- a fixed **premium** (this is the price of the contract)
- a **deductible** that you have to pay in case of loss.

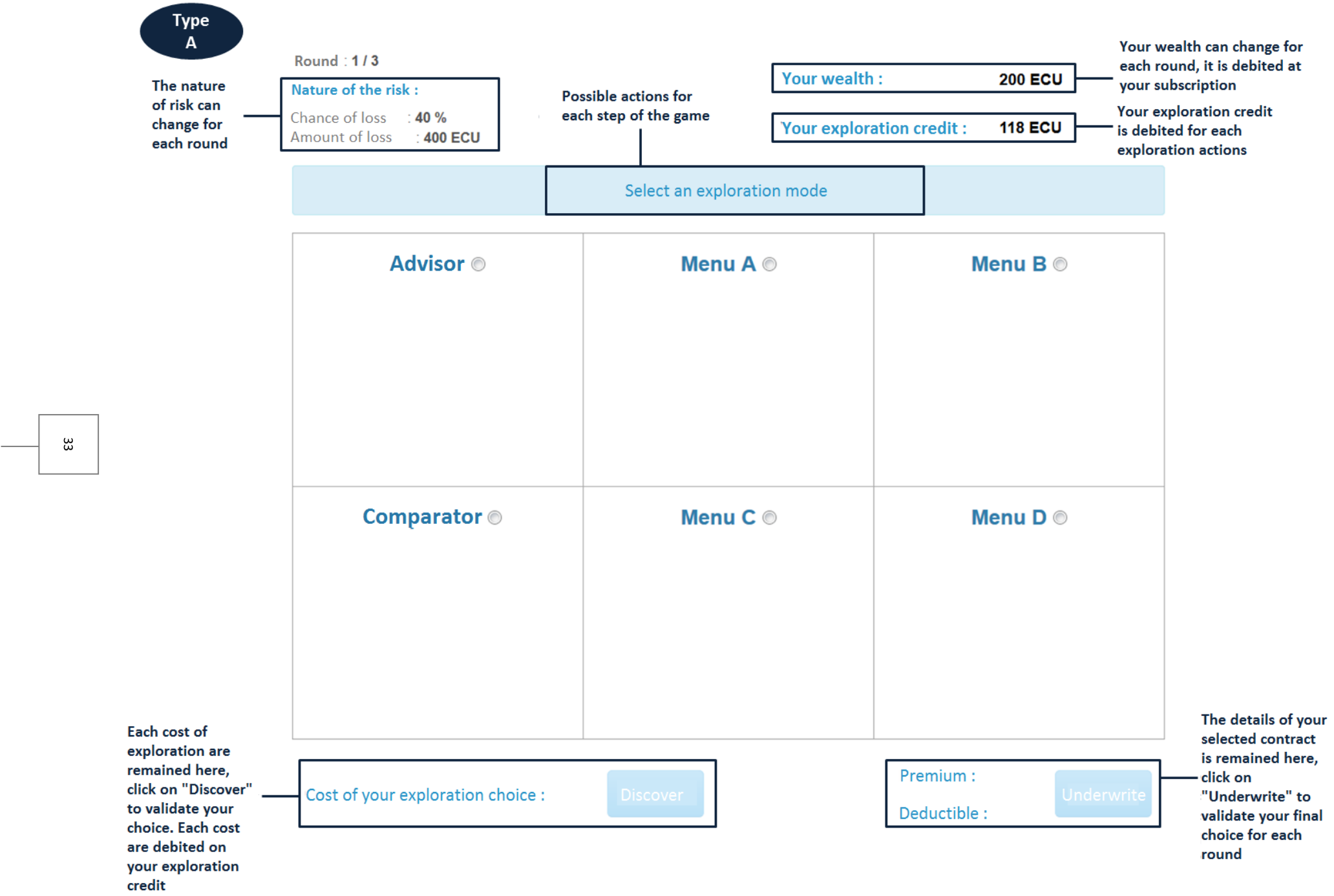
Example : The loss risk is equal to 1000 ECU with a probability of realization equal to 17% and an initial wealth of 180 ECU, If you select the following contract: a premium of 70 ECU and deductible of 25 ECU.

- If the loss happen (with a probability of 17%), you win : 180 – 70 = 110 ECU
- If the loss doesn't happen (with a probability of 83%), you win : 180 – 70 – 25 = 85 ECU

There are **8 different possible contracts**. Nevertheless, contracts are not viewable at the beginning of the round. They are going to partly or entirely appear on your screen as you choose exploration actions. For that, you also have an **exploration credit.** This credit is consumes according to the different exploration mode chosen. The non-consumed exploration credit is part of your gain.

To discover the possible contracts, you can:

- **Explore one of the 4 menus (A, B, C, D)**. Each menu consists of 2 contracts. To discover contracts of one particular menu you have to pay **12 ECU** (debited to your exploration credit). Once you access to a menu, you can ask for a recommendation from a type B participant. Ask for a recommendation cost **4 ECU** (debited to your exploration credit). Participants of type B are aware of contracts ranking according to your own attitudes towards risks. In addition, they also know the bonus associated to each contract. Type B receives the bonus associated to one contract if you underwrite the contract that he recommended you. These both information remain unknown for type A participants.
- **Seek advisor** (i.e. a type B participant). This action cost **12 ECU** (debited to your exploration credit). A participant of type B is randomly selected. He has the ranking of 6 different possible contracts (including contracts of 3 of the 4 possible menus). The ranking is based on your own attitude towards risks. This participant is the only one to know the bonus associated to each contract. Therefore, he has to suggests to participant A a ranking of 3 contracts. If you choose to underwrite a contract through the advisor, you pay him **14 ECU** (debited to your initial wealth).
- **Explore through comparator.** Access to comparator costs you **12 ECU** (debited to your exploration credit). Then, 6 of the 8 possible contracts appear on your screen (3 of the 4 possible menus). Nevertheless, only premium are viewable. To discover the associated deductible of one contract you have to pay **3 ECU**. You don't know the ranking of these contracts.


Type A
Round : 1 / 3
The nature of risk can change for each round
Nature of the risk :
Chance of loss : 40 %
Amount of loss : 400 ECU
Possible actions for each step of the game
Your wealth : 200 ECU
Your wealth can change for each round, it is debited at your subscription
Your exploration credit : 118 ECU
Your exploration credit is debited for each exploration actions
Select an exploration mode
Advisor
Menu A
Menu B
Comparator
Menu C
Menu D
Each cost of exploration are remained here, click on "Discover" to validate your choice. Each cost are debited on your exploration credit
Cost of your exploration choice :
Discover
Premium :
Deductible :
Underwrite
The details of your selected contract is remained here, click on "Underwrite" to validate your final choice for each round

You are type B:

You can be called by a participant of type A by two different ways:

- **If a type A seeks an advisor.** It appears on the screen of one selected participant B a ranking of **six different contracts** (belonging to 3 of the 4 menu available) and **an associated bonus to each contract**. **This ranking depends on the level of premium, the level of deductible and the profile of the participant of type A with respect to the risk.**

  If you are called in this case you should **define and suggest a ranking of 3 contracts** to type A. If and only if type A participant chooses one of the suggested contract, you earn a **fixed fee of 14 ECU**, paid by type A, and the associated bonus of the underwritten contract.

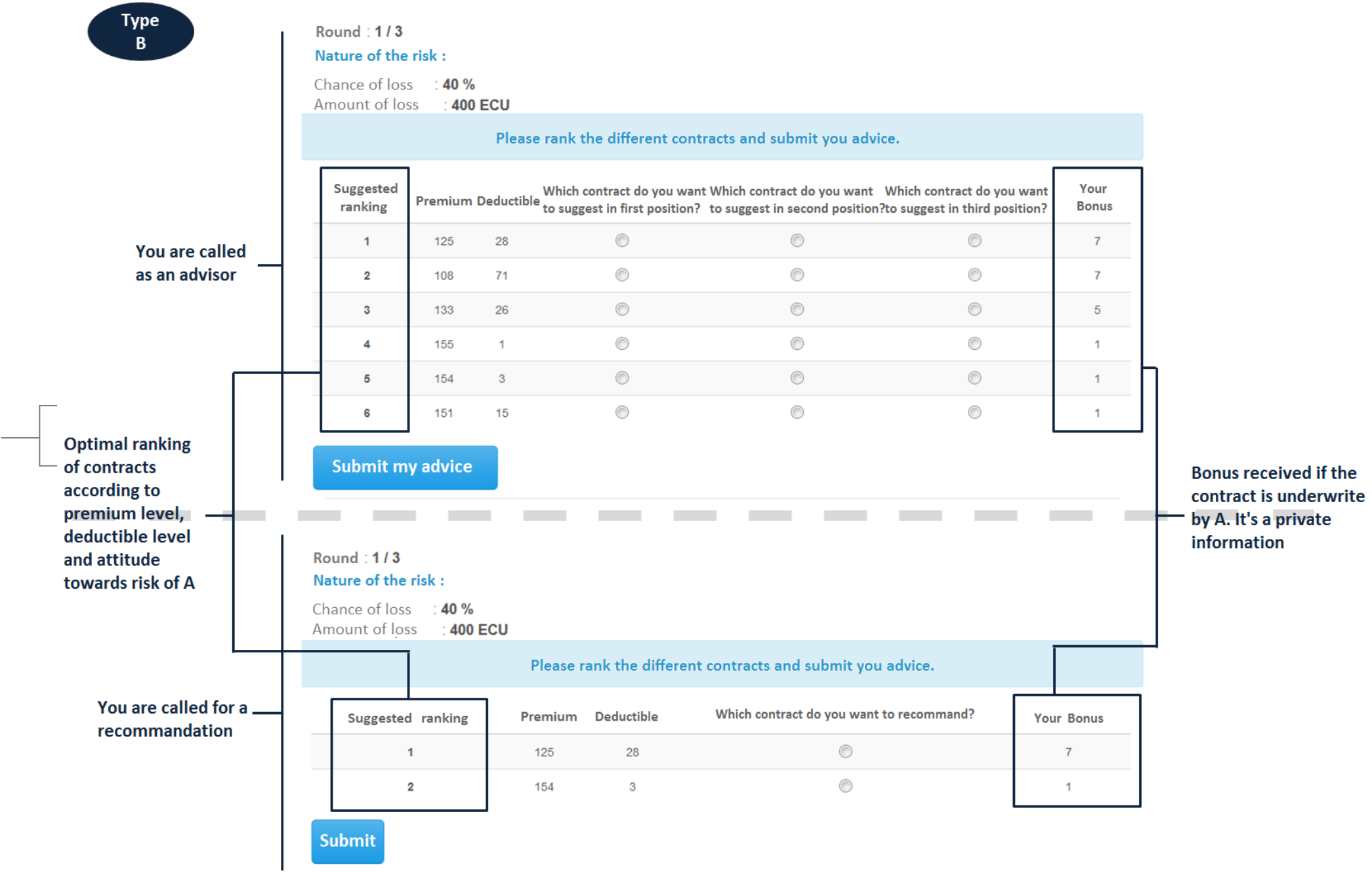
- **If participant A asks for a recommandation**. It appears on the screen of one selected type B participant **a ranking of two contracts** and **an associated bonus to each contract.**

  If you are called in this case you should **recommend only one contract**. If and only if the type A chooses one of these contracts, you earn the associated bonus.

Participant A doesn't pay bonus. There is a transfer from A to B if and only if A underwrite through the advisor (a fixed fee of 14 ECU).

For each call of A participants, only one B is randomly selected. Therefore, it is possible for B to be designated one time, several times or never during a round.

For each round, your **gain is equal to a fixed remuneration of 120 ECU and the potential additional gains resulting from the different interaction with A participants**. For this part, your final gain is equal to the gain of one of the six rounds, randomly chosen.


Type B
Round : 1 / 3
Nature of the risk :
Chance of loss : 40 %
Amount of loss : 400 ECU
Please rank the different contracts and submit you advice.
Suggested ranking
Premium
Deductible
Which contract do you want to suggest in first position?
Which contract do you want to suggest in second position?
Which contract do you want to suggest in third position?
Your Bonus
1 125 28 7
2 108 71 7
3 133 26 5
4 155 1 1
5 154 3 1
6 151 15 1
Submit my advice
You are called as an advisor
Optimal ranking of contracts according to premium level, deductible level and attitude towards risk of A
Bonus received if the contract is underwrite by A. It's a private information
Round : 1 / 3
Nature of the risk :
Chance of loss : 40 %
Amount of loss : 400 ECU
Please rank the different contracts and submit you advice.
Suggested ranking
Premium
Deductible
Which contract do you want to recommand?
Your Bonus
1 125 28 7
2 154 3 1
Submit
You are called for a recommandation

Fourth part:

In this last part, **participants A and B** have to successively **take four decisions**. Each decision consists of **select one contract** for a given **level of wealth** and **a risk of loss**. The risk of loss is defined by an **amount of loss** and a **probability of loss**.

All available contracts appear simultaneously on the screen and for each of them you can see:

- a fixed **premium** (this is the price of the contract)
- a **deductible** that you have to pay in case of loss.

Example : The loss risk is equal to 1000 ECU with a probability of realization equal to 17% and an initial wealth of 180 ECU,

If you select the following contract: a premium of 70 ECU and deductible of 25 ECU.

- If the loss happen (with a probability of 17%), you win : 180 – 70 = 110 ECU
- If the loss doesn't happen (with a probability of 83%), you win : 180 – 70 – 25 = 85 ECU

You final gain for this part is equal to the realization of one of the four decisions, randomly chosen.

Before leaving the room to receive your payment, please inform the final questionnaire. Then, please click on "Validate".

Before leaving your table, please:

- Take your three letters login.
- Take all sheets of instruction.

Thanks for your participation

Questionnaire of understanding – Part 1:

We are going to correct the questionnaire in few minutes.

If you are A:

Your wallet contains 5 euros :	VRAI ☐	FAUX ☐
For each draw, you should indicated the amount in euros that B have to let in the wallet :	VRAI ☐	FAUX ☐
For each draw, you should indicate your estimation of the amount that B have let on the wallet :	VRAI ☐	FAUX ☐
Your gain only depends on your estimation :	VRAI ☐	FAUX ☐

If you are B:

Your wallet only contains 5 euros :	VRAI ☐	FAUX ☐
You are obliged to let in the wallet 0.50€ for each red balls :	VRAI ☐	FAUX ☐
The experimenter or A know the amount let in the amount that you let in the wallet :	VRAI ☐	FAUX ☐
No one know the amount that you take in the wallet :	VRAI ☐	FAUX ☐

Questionnaire of understanding – Part 3 :

We are going to correct the questionnaire in few minutes.

If you are A :

It is possible to go back on an exploration design if you have enough exploration credit :	VRAI ☐	FAUX ☐
Your final gain for this part can depend on the firsts two rounds :	VRAI ☐	FAUX ☐
The comparator display premium and deductible of each contract for free :	VRAI ☐	FAUX ☐
Your initial wealth, the amount of loss, the probability of loss and the exploration credit can change through rounds :	VRAI ☐	FAUX ☐
It is possible to underwrite a contract without knowing its associated deductible :	VRAI ☐	FAUX ☐
It is possible to underwrite a contract suggested by the advisor without paying a the fixed fee :	VRAI ☐	FAUX ☐
When you select a contract suggested by the advisor, the fixed fee is debited to your exploration credit :	VRAI ☐	FAUX ☐
If you don't spend your exploration credit, this one is added to your gain :	VRAI ☐	FAUX ☐

If you are B :

It is possible to never be called during a round :	VRAI ☐	FAUX ☐
You have to rank contracts in the same order than displayed :	VRAI ☐	FAUX ☐
The ranking displaying in your screen only depends on the bonus :	VRAI ☐	FAUX ☐
Bonus are paid by A :	VRAI ☐	FAUX ☐