Obfuscation and Trust:
Experimental Evidence on Insurance Demand

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Standard models of individual decision suppose a perfect knowledge of alternatives set & utility function … but

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Limited discernment due to irrelevant information

Iyengar and Lepper (2000)

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Common ground: Search Costs literature (Ellison & Ellison (2009))

Design of the experiment

1st part: An original trust elicitation game

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2nd part: Elicitation of attitudes towards risky decision in the gain & loss domain (Holt & Laury 2005)

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2nd part: Elicitation of attitudes towards risky decision in the gain & loss domain (Holt & Laury 2005)

3rd part: A two step decision experiment including search costs:

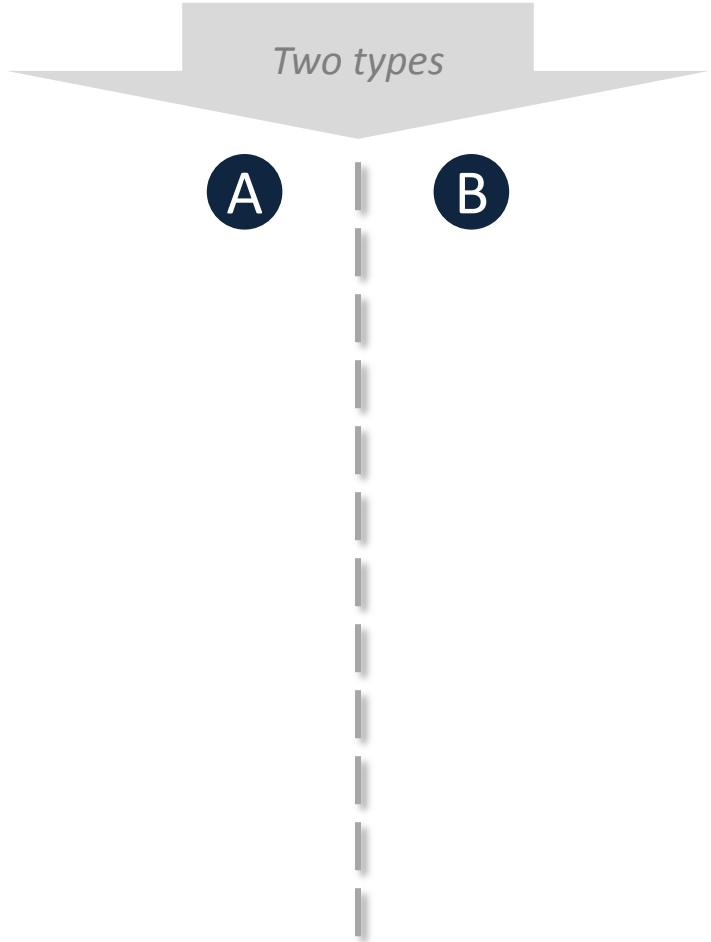
- Distribution channel decision
- Insurance contract decision

8 rounds incl. 2 trials periods

Procedure:

- Number of sessions: 8
- Number of participants: 217 (29+29+25+24+25+28+34+23)
- Average duration of session: 105'
- Mean payoff: 16 €
- Two fixed types: A & B (5 B/ session)
- Stranger protocol
- Experiment interface: developed with HTML and JavaScript, backend with Java and PostgreSQL
- Subjects are students from Claude Bernard University of Lyon 1 (SAF – Insurance and financial sciences)

Trust Elicitation Game



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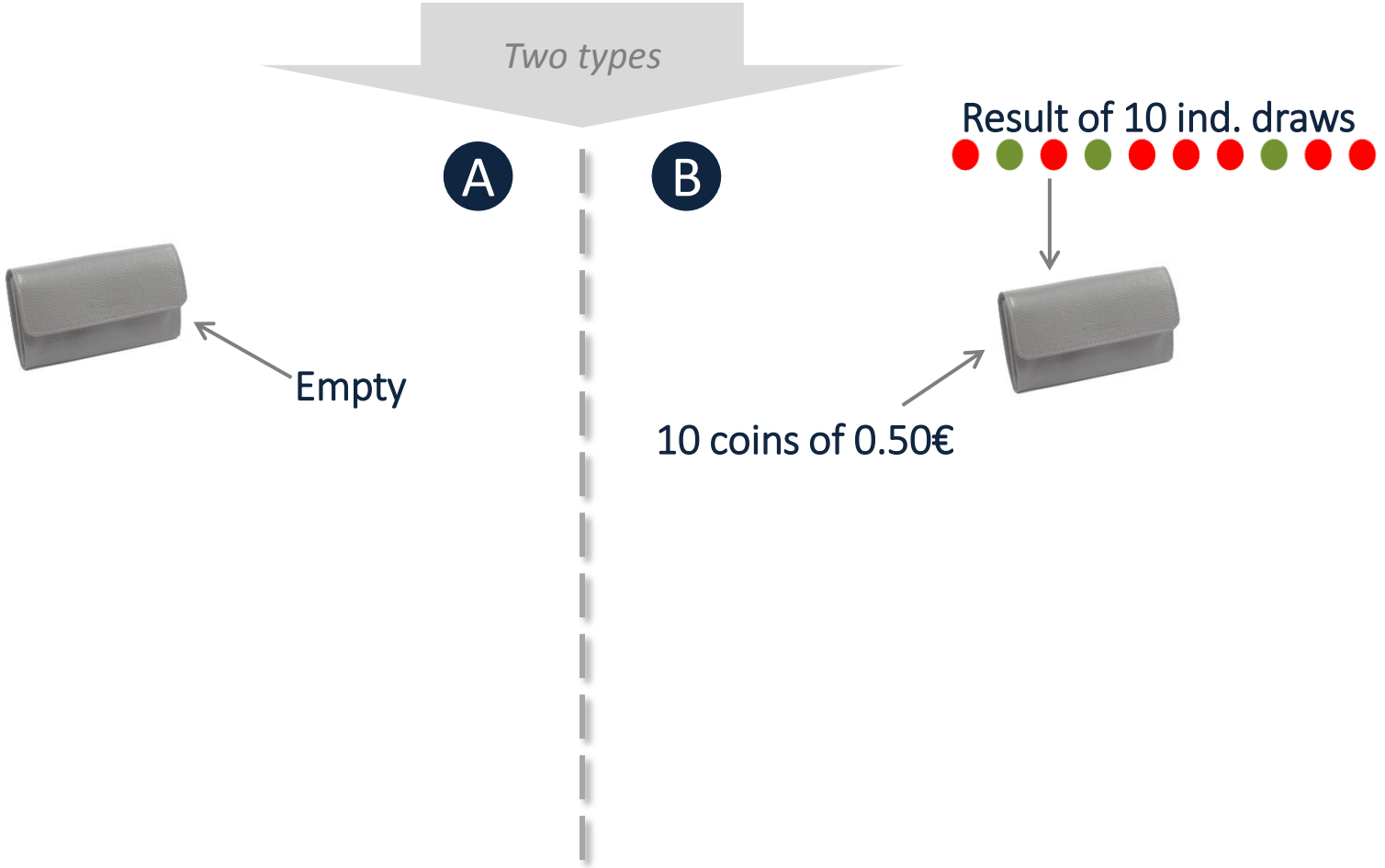

Trust Elicitation Game

Two types

A

Empty

B

Result of 10 ind. draws

10 coins of 0.50€

INSTRUCTION

If the wallet is NOT EMPTY :

- For each green ball you can take a coin;
- For each red ball you should leave a coin.

NO WAY TO IDENTIFY DEFECTION

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HOW MUCH DO YOU THINK THAT, TYPE B HAVE LEFT IN THE WALLET ?

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A's Payoff:

5€ - | estimation – let by B | for 1 draw

Trust measure :

(A 's estimation - should be let)

Holt & Laury 2005

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

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

For your 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 %	60 ECU		90 %	68 ECU	○	○ 10 %	23 ECU		90 %	98 ECU
20 %	60 ECU		80 %	68 ECU	○	○ 20 %	23 ECU		80 %	98 ECU
30 %	60 ECU		70 %	68 ECU	○	○ 30 %	23 ECU		70 %	98 ECU
40 %	60 ECU		60 %	68 ECU	○	○ 40 %	23 ECU		60 %	98 ECU
50 %	60 ECU		50 %	68 ECU	○	○ 50 %	23 ECU		50 %	98 ECU
60 %	60 ECU		40 %	68 ECU	○	○ 60 %	23 ECU		40 %	98 ECU
70 %	60 ECU		30 %	68 ECU	○	○ 70 %	23 ECU		30 %	98 ECU
80 %	60 ECU		20 %	68 ECU	○	○ 80 %	23 ECU		20 %	98 ECU
90 %	60 ECU		10 %	68 ECU	○	○ 90 %	23 ECU		10 %	98 ECU
100 %	60 ECU		0 %	68 ECU	○	○ 100 %	23 ECU		0 %	98 ECU

Valider

Two-step decision experiment with search costs

Rounds' parameters

- 4 Insurers offer 2 contracts each
- Each contract is composed of :
  - A *premium*: price of the contract
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- Insurance is compulsory

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For each round there are:

- An initial wealth: *W*
- A probability of loss: *p*
- An amount of loss: *L*
- A fixed Exploration Endowment: *C*
- Fixed search costs: *x, u, v ECU* *(calibrate under equivalent condition)*

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Market Structure of the Experiment

A subjects can explore the market through different channels

Distribution channels choice is costly *(x)* but shift is allowed as long as C is not saturated

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Broker

Displays **3 ranked contracts** selected by subject **B**

Potential fixed fee: *k*

B subjects can be called to provide advice, B get private information about:

- Contract optimality for A (according to A risk aversion previously controlled)
- Bonus related to a contract paid to B if A underwrites though her intermediation

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Recommendation is costly *(v)*

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Tied-Agent

Subject **B** suggests 1 contract

Distribution Channel Choices

Multinomial Logistic Regression including Panel specification

Dependant Variable:	**Rounds' Underwriting Channel**	
Referent Level: BROKER	Model 1	
Coefficients *Std. Error*	COMPARATOR	INSURANCE
Trust	-0.38*** *0.11*	0.16 *0.12*
Risk Aversion	0.11* *0.06*	-0.11 *0.08*
Initial Wealth	0.00 *0.00*	0.00 *0.00*
Loss	0.00 *0.00*	0.00 *0.00*
Probability	-3.23** *1.29*	-1.13 *1.35*
Round's First Choice - Comparator		
Round's First Choice - Insurer		
Constant	1.60*** *0.55*	1.27** *0.6*
Nb Obs	1062	
Nb Subjects	177	
R^2	0.264	
R^2 adjusted	0.254	

Signif. codes: p-value> 0.001: *** ; p-value> 0.05: **; p-value> 0.1: *

- Subjects prefer Broker w.r.t to comparator when probability of loss increase (non significant difference for broker and insurer)

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- Risk averse subjects prefer Comparator (no correlation between trust and risk aversion)
- Trusty subject underwrite through broker more than through Comparator

Distribution Channel Choices

Multinomial Logistic Regression including Panel specification

Dependant Variable:	**Rounds' Underwriting Channel**	
Referent Level: BROKER	Model 2	
Coefficients	COMPARATOR	INSURANCE
Std. Error		
Trust	0.01	0.06
	0.15	*0.15*
Risk Aversion	0.09	0.06
	0.09	*0.09*
Initial Wealth		
Loss		
Probability	0.94	0.83
	1.01	*1.08*
Round's First Choice - Comparator	5.48***	2.45***
	0.41	*0.42*
Round's First Choice - Insurer	2.42***	5.40***
	0.52	*0.49*
Constant	-2.20***	-2.31***
	0.66	*0.67*
Nb Obs	1062	
Nb Subjects	177	
R^2	0.501	
R^2 adjusted	0.494	

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OBJECTIVES:

Understand intra-period channel switches.

- Important intertia of choices

Is there common effect explaining switch?

Distribution Channel Choices

Multinomial Logistic Regression including Panel specification

Dependant Variable:	**Rounds' Underwriting Channel**		**Rounds' First Choice Channel**	
Referent Level: BROKER	Model 1		Model 3	
Coefficients *Std. Error*	COMPARATOR	INSURANCE	COMPARATOR	INSURANCE
Trust	-0.38*** *0.11*	0.16 *0.12*	-0.67*** *0.12*	0.26* *0.14*
Risk Aversion	0.11* *0.06*	-0.11 *0.08*	-0.01 *0.06*	-0.40*** *0.09*
Initial Wealth	0.00 *0.00*	0.00 *0.00*	0.00 *0.00*	0.00 *0.00*
Loss	0.00 *0.00*	0.00 *0.00*	0.00 *0.00*	0.00 *0.00*
Probability	-3.23** *1.29*	-1.13 *1.35*	-4.42*** *1.29*	-3.44** *1.63*
Constant	1.60*** *0.55*	1.27** *0.6*	2.07*** *0.53*	2.24*** *0.65*
Nb Obs	1062		1062	
Nb Subjects	177		177	
R^2	0.264		0.336	
R^2 adjusted	0.254		0.327	

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- Same trend than for underwriting choices
- Better fit
- Miss some switch behaviors ?

Distribution Channel Choice

Multinomial Logistic Regression including Panel specification

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Referent Level: BROKER	Model 2		Model 4	
Coefficients	COMPARATOR	INSURANCE	COMPARATOR	INSURANCE
Std. Error				
Trust	0.01	0.06	0.24	0.53**
	0.15	*0.15*	*0.31*	*0.22*
Risk Aversion (R.A)	0.09	0.06	0.05	-0.18
	0.09	*0.09*	*0.13*	*0.15*
Initial Wealth				
Loss				
Probability	0.94	0.83		
	1.01	*1.08*		
Round's First Choice - Comparator	5.48***	2.45***	3.76***	-0.83
	0.41	*0.42*	*1.21*	*1.49*
Round's First Choice - Insurer	2.42***	5.40***	1.78	3.19***
	0.52	*0.49*	*1.33*	*1.21*
Round's First Choice - Comparator X R.A			0.21	0.48*
			0.25	*0.29*
Round's First Choice - Insurer X R.A			0.11	0.29
			0.33	*0.27*
Round's First Choice - Comparator X Trust			-0.58*	-0.78**
			0.38	*0.36*
Round's First Choice - Insurer X Trust			0.01	-0.57
			0.57	*0.46*
Constant	-2.20***	-2.31***	-1.42	-0.35
	0.66	*0.67*	*0.76*	*0.79*
Nb Obs	1062		1062	
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- Inertia of choices

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- Inertia of choices
- Trusty subjects switch more for Brokers

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- Inertia of choices
- Trusty subjects switch more for Brokers
- Risk Averse subjects firstly choosing comparator significantly change for Insurer

Contract Choice

Ordinary Least Squares Regression

Dependant Variable:	**Relative coverage***
Coefficients *Std. Error*	Model 1
Trust	0.023* *0.00*
Risk Aversion (R.A)	0.00 *0.00*
Initial Wealth	0.00 *0.00*
Loss	0.00 *0.00*
Probability	0.36** *0.12*
Number of Alt	-0.02* *0.01*
Gender M	
Round Number	
Comparator	-0.01 *0.01*
Insurer	-0.07 *0.04*
Constant	0.439*** *0.07*
Nb Obs	915
Nb Subjects	177
R^2	0.261
R^2 adjusted	0.256

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* (Chosen coverage - min) / (max-min) of subject having at least two choices

- Only probability of loss is significant for coverage choices

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- Only probability of loss is significant for coverage choices
- Trusty subjects chose to be more covered

Contract Choice

Ordinary Least Squares Regression

Dependant Variable:	**Relative coverage***
Coefficients *Std. Error*	Model 1
Trust	0.023* *0.00*
Risk Aversion (R.A)	0.00 *0.00*
Initial Wealth	0.00 *0.00*
Loss	0.00 *0.00*
Probability	0.36** *0.12*
Number of Alt	-0.02* *0.01*
Gender M	
Round Number	
Comparator	-0.01 *0.01*
Insurer	-0.07 *0.04*
Constant	0.439*** *0.07*
Nb Obs	915
Nb Subjects	177
R^2	0.261
R^2 adjusted	0.256

Signif. codes: p-value> 0.001: *** ; p-value> 0.05: **; p-value> 0.1: *

* (Chosen coverage - min) / (max-min) of subject having at least two choices

- Only probability of loss is significant for coverage choices
- Trusty subjects chose to be more covered

→Independently of channel choices

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→Independently of channel choices

- We observe number of alternative effect on decision, too many alternatives lead to chose lower coverage (i.e. lower premium)

Contract Choice

Ordinary Least Squares Regression

Dependant Variable:	**Relative coverage***	
Coefficients *Std. Error*	Model 1	Model 2
Trust	0.023* *0.00*	0.022* *0.01*
Risk Aversion (R.A)	0.00 *0.00*	0.00 *0.00*
Initial Wealth	0.00 *0.00*	0.00 *0.00*
Loss	0.00 *0.00*	0.00 *0.00*
Probability	0.36** *0.12*	0.36** *0.15*
Number of Alt	-0.02* *0.01*	-0.02* *0.00*
Gender M		-0.06* *0.00*
Round Number		*0.00* *0.00*
Comparator	-0.01 *0.01*	
Insurer	-0.07 *0.04*	
Constant	0.439*** *0.07*	0.47*** *0.009*
Nb Obs	915	915
Nb Subjects	177	177
R^2	0.261	0.2611
R^2 adjusted	0.256	0.254

Signif. codes: p-value> 0.001: *** ; p-value> 0.05: **; p-value> 0.1: *

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→Independently of channel choices

- We observe number of alternative effect on decision, too many alternatives lead to chose lower coverage (i.e. lower premium)
- Male are less covered

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Initial Wealth	0.00 *0.00*	0.00 *0.00*
Loss	0.00 *0.00*	0.00 *0.00*
Probability	0.36** *0.12*	0.36** *0.15*
Number of Alt	-0.02* *0.01*	-0.02* *0.00*
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Round Number		*0.00* *0.00*
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- Male are less covered
- Control of round dependence

Search strategy

10% of subjects decide to have a saving search costs strategy by choosing the lowest price of comparator without additional exploration.

Probit Regression

Dependant Variable:	**1 for saving search cost strategy**
Coefficients	Model 1
Std. Error	
Trust	-0.22***
	0.00
Risk Aversion (R.A)	-0.10***
	0.00
Initial Wealth	0.01**
	0.00
Loss	0.00
	0.00
Probability	-1.92***
	0.51
Constant	0.69***
	0.02
Nb Obs	1062
Nb Subjects	177
R^2	0.052
R^2 adjusted	

Signif. codes: p-value> 0.001: *** ; p-value> 0.05: **; p-value> 0.1: *

- Probabilities of loss have negative impact on the probability of choosing a saving search cost strategy

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- Trusty subjects tend to explore more than non trusty one

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- Probabilities of loss have negative impact on the probability of choosing a saving search cost strategy
- Trusty subjects tend to explore more than non trusty one
- Risk averse subjects (in the gain domain) prefer to have more possible alternatives at the choice moment

Defection behavior of Intermediaries

Own interest bias: in 60% of cases, intermediaries do not propose the most optimal policy to subjects.

Logit Regression	
Dependant variable	**Intermediaires Behaviors**
1: Deviation	Model
Initial_wealth	0.04*** *(0.02)*
Loss	-0.01** *(0.001)*
Probability	-1.11 *(1.70)*
Bonus_optimal_contract	-0.06** (0.02)
Risk_aversion	-0.21 *(0.13)*
Constant	-0.69 *(0.98)*
Obs	294

Significance levels: * p-value<.1 , ** p-value<.05 , *** p-value<0.01

- Defection behavior depends on, "consumer" environment :

→ They tends to defect more when consumer's wealth is higher while defect less when the probability of loss increase.

Defection behavior of Intermediaries

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Significance levels: * p-value<.1 , ** p-value<.05 , *** p-value<0.01

- Defection behavior depends on, "consumer" environment :

→ They tends to defect more when consumer's wealth is higher while defect less when the probability of loss increase.

- An increase of the bonus of the optimal contract decrease the probability of defection.

Conclusion

Results

- Trust is a major determinant of the distribution channel choice
  → *Non-trusty subjects do not ask for advice*
- The number of alternatives tend to push subject to choose lowest price
  → *Price acts as referent point*
- Risk aversion explains behavioral heterogeneity in search strategy decision
  → *Lowest risk averse subjects prefer to save search cost*

Insights

- Brokers and tied-agents have a real additive value because of obfuscation, in particular for trusty consumers, even with a high rate of deception
- Obfuscation can lead to higher competition in price because of irrelevant alternatives
- Distribution channel choices reveal a selection effect that could explain risk heterogeneity among insurers

Conclusion

Thank you

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Appendix

Période : **1 / 10**
Chance de perdre : **50 %**
Montant de la perte : **20 ECU**

Votre richesse : 100

Votre crédit d'exploration : 118

Sélectionnez un mode d'achat.

Conseiller ◎	**Offres A** ◎	**Offres B** ◎
Comparateur ◎	**Offres C** ◎	**Offres D** ◎

Cout de votre choix de découverte : Découvrir

Prix :

Franchise : Souscrire

Appendix

Vous êtes un joueur de type **A**.

Veuillez patienter...

Période : **1 / 10**
Chance de perdre : **50 %**
Montant de la perte : **20 ECU**

Richesse initiale : 100

Veuillez classer les contrats puis soumettre vos conseils.

Classement proposé	Prime	Franchise	Quel contrat conseillez-vous en 1er ?	Quel contrat conseillez-vous en 2ème ?	Quel contrat conseillez-vous en 3ème ?	Bonus
1	31	6	○	○	○	12
2	30	8	○	○	○	12
3	34	3	○	○	○	13
4	33	5	○	○	○	13
5	32	7	○	○	○	13
6	39	1	○	○	○	15

Soumettre mes conseils

Appendix

Période : **1 / 10**
Chance de perdre : **50 %**
Montant de la perte : **20 ECU**

Votre richesse : 100

Votre crédit d'exploration : 106

Sélectionnez un mode d'achat.

Conseiller

Rang	Offres	Prime	Franchise	
1	B	31	6	○
2	A	30	8	○
3	A	34	3	○

Offres A ○

Offres B ○

Comparateur ○

Offres C ○

Offres D ○

Cout de votre choix de découverte :

Découvrir

Prix :

Franchise :

Souscrire

Appendix

Période : **1 / 10**
Chance de perdre : **50 %**
Montant de la perte : **20 ECU**

Votre richesse : 100

Votre crédit d'exploration : 94

Sélectionnez un mode d'achat.

Conseiller

Rang	Offres	Prime	Franchise
1	B	31	6
2	A	30	8
3	A	34	3

Offres A

Offres B

Comparateur

Offres	Prime	Franchise	
B	31	☐	○
D	32	☐	○
B	33	☐	○
C	37	☐	○
D	39	☐	○
C	40	☐	○

Offres C

Offres D

Cout de votre choix de découverte :

Découvrir

Prix :

Franchise :

Souscrire

Appendix

Période : **1 / 10**
Chance de perdre : **50 %**
Montant de la perte : **20 ECU**

Votre richesse : 100

Votre crédit d'exploration : 82

Choisissez un contrat, demandez un conseil ou changez de mode d'achat.

Conseiller

Rang	Offres	Prime	Franchise
1	B	31	6
2	A	30	8
3	A	34	3

Offres A

Prime	Franchise	
30	8	○
34	3	○

○ **Demander un conseil**

Offres B

Comparateur

Offres	Prime	Franchise
B	31	
D	32	
B	33	
C	37	
D	39	
C	40	

Offres C

Offres D

Cout de votre choix de découverte : Découvrir

Prix : Souscrire

Franchise :

Appendix

Vous êtes un joueur de type **A**.
Veuillez patienter...

Période : **1 / 10**
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Montant de la perte : **20 ECU**

Richesse initiale : 100

Veuillez classer les contrats puis soumettre vos conseils.

Classement proposé	Prime	Franchise	Quel contrat conseillez-vous ?	Bonus
1	30	8	○	12
2	34	3	○	13

Valider

Appendix

Conseiller

Rang	Offres	Prime	Franchise
1	B	31	6
2	A	30	8
3	A	34	3

Offres A

	Prime	Franchise	
	30	8	○
Conseil	34	3	◉

Offres B

Comparateur

Offres	Prime	Franchise
B	31	
D	32	
B	33	
C	37	
D	39	
C	40	

Offres C

Offres D

Cout de votre choix de découverte :

Découvrir

Prix : 34

Franchise : 3

Souscrire

Appendix

Search Costs calibration:

- C: exploration endowment
- x: choice of any decision design
- y: revelation of deductible through cyber-brokers
- u: advice from tied-agents
- k: fixed fee paid in case of underwrite through brokers

1st constraint: the expected cost to reveal all the information of the optimal policy of the market and underwrite it is equal for each decision design

- $EMC(DD1) = k + \frac{8}{6}x$
- $EMC(DD2) = \frac{8}{6}\left(x + y + \frac{5}{6}y + \frac{4}{6}y + \frac{3}{6}y + \frac{2}{6}y + \frac{1}{6}y\right) \Longrightarrow 6k = 28y = 7x$
- $EMC(DD3) = x + \frac{3}{4}x + \frac{2}{4}x + \frac{1}{4}x$

2nd constraint: possibility to explore the entire market before underwrite.

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

Appendix

Insurance Contracts: (Schlesinger 2013) :

4 firms compete on an oligopoly market. Each firms offer 2 different contract composed of a Commercial premium CP and a deductible D.

According to Schlesinger we define:

$$CP(\alpha) = E(X)(1+\lambda)\alpha$$

Where α is the level of coverage, $\alpha = \frac{(R-D)}{R}$, λ the loading factor chosen by insurer and $E(X)$ the expected cost of claim, $E(X) = pR$.

Thus we generate a set of possible contract as below:

$$CP \in (0, W), D(CP) = R - \frac{CP}{p(1+\lambda)} \; with \; \lambda \in (-5\%, 40\%)$$

For simplicity, we create a subset by deleting randomly strictly dominated or dominant contracts and impossible contracts such:

$$W - CP - D - k < 0$$

We finally randomly choose 8 contracts for each treatment and ranked them for each aversion level according to the utility controlled in 2nd part of the experiment.

Appendix

A Trust Game (based on Honesty)

Trust is broadly construed as a willingness on the part of individuals to put their wellbeing in the hands of other persons

- **Trust Based on Exchange** :
  Most studies use a version of the "investment game" Berg, Dickhaut and McCabe (1995).

- **Trust Based on Honesty** :
  Our design is based on a modified version of Cohn, Marechal an Noll (2015)

In an isolated space, each prisoner in a jail proceeds to 10 draws between

$10 on the table

Appendix

2nd step: Elicitation of attitudes towards risky decision in the loss domain

The specification of utility function is used in the third part. We rank each insurances contracts with respect to their optimality depending on subject's risk aversion level.

How to define risk aversion level of subjects?

Assume a subject i choosing option A at the 4th questions. According to the Expected Utility Theory we have:

$$EU_{i,A} = \sum_{k_A=1}^{K_A} p_{k_A} \times U_{i,k_A} > EU_{i,B}$$

Where $\mathrm{K_A}$ is the issue number of lottery A and $\mathrm{p_{k_A}}$ the probability associated to the loss. Hence,

$$\frac{4}{10}\,\mathrm{U_i}(\$5 - \$3.85) + \frac{6}{10}\mathrm{U_i}(\$5 - \$0.10) > \frac{4}{10}\,\mathrm{U_i}(\$5 - \$2) + \frac{6}{10}\mathrm{U_i}(\$5 - \$1.60)$$

We specify a CRRA (constant relative risk aversion) function where r is the estimated parameter for each subjects such:

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

Thus for each possible choice we are able to compute a interval of r. For simplicity we assume that r is equal to the mean of the interval.

Appendix

Number of Safe Choices	Range of Relative Risk Aversion for $U(x) = x^{1-r}/(1-r)$	Risk Preference Classification
0-1	$r < -0.95$	highly risk loving
2	$-0.95 < r < -0.49$	very risk loving
3	$-0.49 < r < -0.15$	risk loving
4	$-0.15 < r < 0.15$	risk neutral
5	$0.15 < r < 0.41$	slightly risk averse
6	$0.41 < r < 0.68$	risk averse
7	$0.68 < r < 0.97$	very risk averse
8	$0.97 < r < 1.37$	highly risk averse
9-10	$1.37 < r$	stay in bed