Insurance, Prevention and Risk Attitudes: Experimental Analyzes

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Introduction

- We report several laboratory experiments highlighting the critical role of risk attitudes – risk aversion vs. risk loving – for insurance and prevention decisions.
- Aim:
  - Showing that risk attitudes matter for a better understanding of insurance and prevention decisions
  - Understanding the interplay between Insurance and Prevention
- Method: The experimentation
- Research program:
    - Insurance Demand in the Lab
    - Joint demands for insurance and (loss reduction) prevention
    - Compulsory insurance and voluntary (loss reduction) prevention

Prop 1: Insurance Theory is based on the assumption of **risk aversion but Risk-lovers do matter.**

Insurance Theory is based on the assumption of **risk aversion**

Risk averters :Mossin's model (1968) :

- Risk aversion is necessary for the existence of a **positive demand** for insurance.
- A risk-averse decision maker buys a comprehensive coverage if insurance price is **actuarial** and a partial coverage if insurance price is more than actuarial

For risk lovers

- A **risk lover** would **refuse** any positive **insurance** coverage based upon actuarial or more than actuarial prices.
- To get insured, a risk lover would **require** a **positive return** from the insurer. This condition would involve subsidized rates or/and negative profits for the insurer.

Insurance Theory is based on the assumption of **risk aversion**

$\Rightarrow$For all these reasons, **Insurance Theory** did **not address** the issue of **risk loving**

$\Rightarrow$and instead has been **shaped** by the assumption of **risk aversion**

Motivation: risk-lovers also matter

- Some economic **evidence** suggests that individuals **may be risk loving**:
  - Kahneman and Tversky (1979): reflection effect
  - Precisely, insurance deals with losses…
  - Experimentally, the reflection effect is confirmed in a lot of studies (Chakravarty and Roy (2009), Cohen et al. (1987), (Laury and Holt (2008))
  - Noussair et al. (2014) highlight that about 15 percent of the individuals of a large representative sample are risk loving

Motivation: risk-lovers also matter

- **Important observation:**
- In most insurance markets, **insurance** is **mandatory**:
  - Health insurance, car insurance, household insurance, liability insurance are generally compulsory
- Compulsory provisions for insurance are generally **partial** and **complemented** by voluntary devices: complementary insurance, self-insurance and self-protection.

- **So risk lovers have to deal with insurance choices**

Prop 2: Insurance Theory shows that Insurance and loss reduction activity are substitutes
(risk aversion)

Substitution between insurance and loss reduction investments

- When risk avoidance is restricted, two risk hedging tools remain available: loss reduction prevention and insurance contracting
- **Substitution between insurance and loss reduction investments (self-insurance)**: one of the major results of Risk Management**.**
- We find experimental evidence for this substitution.
- Substitution: **Insurance coverage could crowd out self-insurance demand**.

Prop 3: For risk lovers, **compulsory** Insurance and loss reduction activity are complementary

Compulsory insurance and “loss reduction” prevention

- When insurance is compulsory, risk averters adjust (by substituting) their prevention behavior to compensate for the level (too high or too low) of the mandatory insurance coverage.
- By contrast, even though they would refuse to invest in any voluntary risk-hedging scheme, risk lovers freely invest in loss-reduction to supplement compulsory partial insurance coverage.
- Both our modeling and our experimental data support this counterintuitive result: for risk lovers, mandatory insurance enhances loss-reduction effort.

Risk attitudes vs I&SI

	RA	RL
I	1st experiment	
I&SI	2nd experiment	
Compulsory insurance and SI	3rd experiment	

1st part:

Insurance Demand in the Lab

- Corcos A., Pannequin, F., and C. Montmarquette (2017), "Leaving the market or reducing the coverage? A model-based experimental analysis of the demand for insurance," *Experimental Economics*, 20(4), 836–859.
- Corcos, A., Pannequin, F. and C. Montmarquette, 2017, "Revisiting the demand for insurance: an "all or nothing" decision", Scientific Series, 2017s-07, CIRANO, Montréal.

Experimental Design

- ***Step 1: Measuring the attitude toward risk in the domain of losses***
  - ***(Holt and Laury 's method) – 10 decisions***
- ***Step 2: Eliciting the demand for insurance***
  - an endowment W_0 = 1000 EMU (Experimental Monetary Units)
  - a (q=)10 % chance of having an accident that would cost the entire 1000 EMU
  - Option: voluntary insurance against that risk of loss
    - In exchange for paying a premium P, which was due at the beginning of the period, they received an indemnity *I* if they suffered an accident during the period.
  - a two-part insurance premium: $P = pI + C$
    - *6 types of tariffs : C = {**0, 50}** ; p = {**0.05,*** **0.1** (actuarial price), **0.15}**

Step 1: Measuring the attitude toward risk in the domain of losses

Decision	Option A				Option B				
	Probability %	Loss (in $)	Probability %	Loss (in $)	Probability %	Loss (in $)	Probability %	Loss (in $)	Expected Payoff Difference E(A)-E(B)
1	10	-4	90	-6	10	0	90	-10	3.2
2	20	-4	80	-6	20	0	80	-10	2.4
3	30	-4	70	-6	30	0	70	-10	1.6
4	40	-4	60	-6	40	0	60	-10	0.8
5	50	-4	50	-6	50	0	50	-10	0
6	60	-4	40	-6	60	0	40	-10	-0.8
7	70	-4	30	-6	70	0	30	-10	-1.6
8	80	-4	20	-6	80	0	20	-10	-2.4
9	90	-4	10	-6	90	0	10	-10	-3.2
10	100	-4	0	-6	100	0	0	-10	-4

Step 2: Eliciting the demand for insurance

- Two states of nature: no loss/loss
  - A probability q to lose an endowment W_0
- Insurance contracting: a two-part insurance tariff
  - **P = C + p I** ; **C=fixed cost ; p=unit price; I=indemnity**

- 6 types of tariff:

  (q=actuarial price)

	C = 0	C > 0
p < q	T_1	T_4
p = q	T_2	T_5
p > q	T_3	T_6

Theoretical predictions (EU): Insurance demand by contract and attitude towards risk

	Less-than-actuarial unit price $p < q$		Actuarial unit price $p = q$		More-than-actuarial unit price $p > q$	
	$C = 0$	$C > 0$	$C = 0$	$C > 0$	$C = 0$	$C > 0$
RA	$I^* = x$ [a]	$I^* \in \{0,x\}$[a]	$I^* = x$ [a]	$I^* \in \{0,x\}$[a]	$I^* \in [0,x[$	$I^* \in [0,x[$
RN	$I^* = x$ [a]	$I^* \in \{0,x\}$[a]	$I^* \in [0,x]$	$I^* = 0$ [a]	$I^* = 0$[a]	$I^* = 0$ [a]
RL	$I^* \in \{0,x\}$[a]	$I^* \in \{0,x\}$[a]	$I^*=0$[a]	$I^*=0$ [a]	$I^*=0$ [a]	$I^*=0$ [a]

a: Cases compatible with the AoN hypothesis.

Insurance price grid (C=0 ; p=0.1)

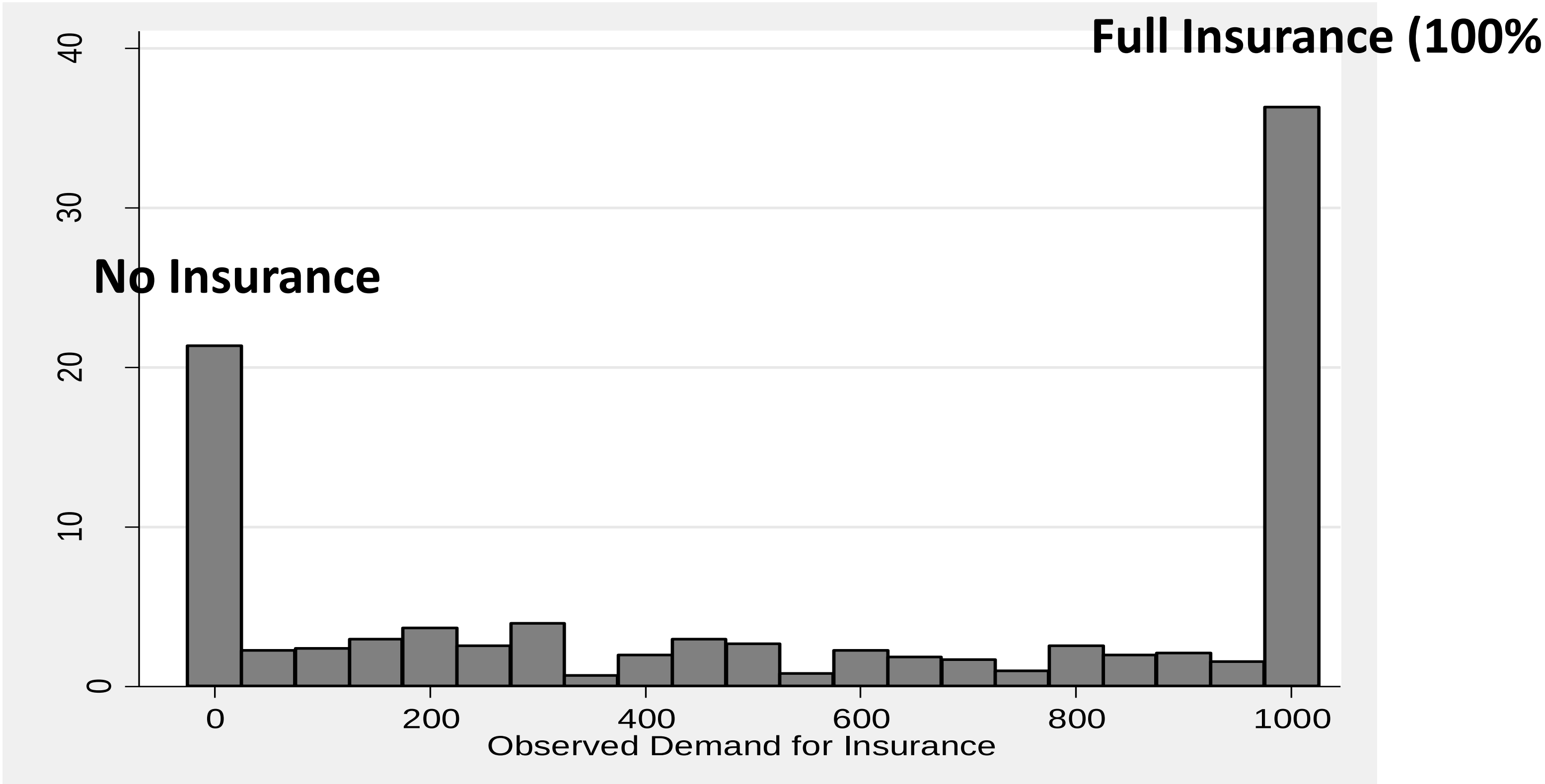
	Benefit:	Wealth at end of period	
p=0.1 C=0	Reimb. in case of accident	If no accident	If accident
Premium = Total cost of insurance		1000–premium	1000–premium–1000+benefit
0	0	1000	0
5	50	995	45
10	100	990	90
15	150	985	135
20	200	980	180
25	250	975	225
30	300	970	270
35	350	965	315
40	400	960	360
45	450	955	405
50	500	950	450
55	550	945	495
60	600	940	540
65	650	935	585
70	700	930	630
75	750	925	675
80	800	920	720
85	850	915	765
90	900	910	810
95	950	905	855
100	1000	900	900

Practical modalities

- ***Compensation***
  - a flat $5 bonus for participating in the experiment to compensate for the average loss in the risk aversion measurement of step 1
  - Six decisions in Step 2 : the gain from one period (randomly drawn) was converted into dollars at the rate 1 EMU =0.5 cents

- 117 participants
- The experiment was conducted in Montreal

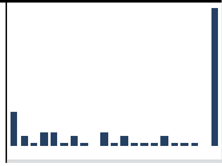
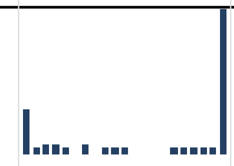
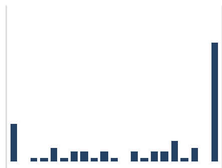
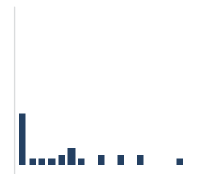
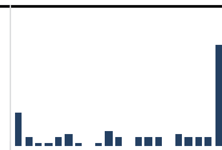
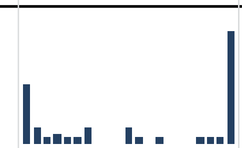
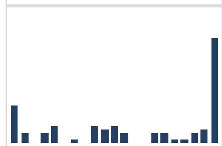
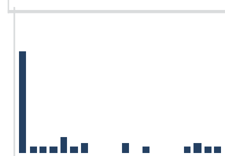
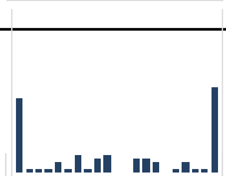
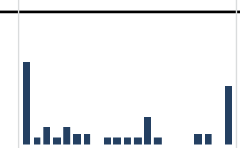
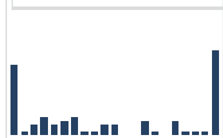
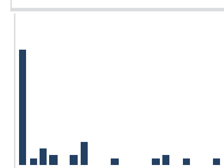
Result 1: **Insurance demand: an all-or-nothing decision**



Result 1: Experimental data show that people choose either to forgo insurance or to fully insure

An exhaustive test for the theory of insurance demand

- Theoretical predictions for both risk-averters and risk-lovers
- we identify risk-lovers and risk-averters through the Holt&Laury measure
- We compare lab choices and theoretical predictions for each type

Contractual parameters		RA (+neutrality)			RL		
p	C	Theoretical predictions (1a)	Observed Distribution (2a)	%EU vs RC[a] (%AoN) (3a)	Theoretical predictions (1b)	Observed Distribution (2b)	%EU vs RC[a] (%AoN) (3b)
Less-than-actuarial price p<q	C=0	I*=1000		47.76 vs 4.76 (59.70)	I*∈ {0,1000}		68 vs 9.52 (68)
	C>0	I*∈ {0,1000}		55.22 vs 9.52 (55.22)	I*∈ {0,1000}		68 vs 9.52 (68)
Actuarial price p=q	C=0	I* ∈ [0,1000]		100[b] vs 100 (52.24)	I*=0		22 vs 4.76 (62)
	C>0	I*∈ {0,1000}		50.75 vs 9.52 (50.75)	I*=0		38 vs 4.76 (66)
More-than-actuarial price p>q	C=0	I* ∈ [0,1000[		71.64 vs 95.24 (53.73)	I*=0		28 vs 4.76 (48)
	C>0	I* ∈ [0,1000[		71.64 vs 95.24 (52.24)	I*=0		42 vs 4.76 (64)

a:RC: random choice - b: trivial case.

Additional tests concerning risk attitude on the demands for insurance

Risk-taking features		RAs (N[a])	RLs (N[a])	Comparison tests stat (p-value)
% extreme values (0 and 1000)		0.54	0.63	-2.39* (0.017)
Variance of demand for insurance across contracts		399.19 (402)	434.88 (300)	0.8424* (0.055)
Number of times subjects successively enter and exit the insurance market		0.79 (67)[b]	1.26 (50)[b]	-4.68* (0.000)
PI of the period if, in the previous round:	no accident occurs	0.82 (307)	0.73 (223)	
	an accident occurs	0.79 (28)	0.66 (27)	

[a]N=number of observations

[b] Number of RA and RL subjects

Result 2: risk-lovers exhibit a gambling and opportunistic behavior rather than a lack of interest for insurance.

2nd part:
Substitution between Insurance and (loss reduction) Prevention

- Pannequin, F., Corcos, A. and C. Montmarquette, 2016, "Behavioral Foundations of the Substitutability between Insurance and Self-Insurance: an Experimental Study", Scientific Series, 2016s-12, CIRANO, Montréal.
- Corcos A., Pannequin, F., and C. Montmarquette, 2017, "Comparing a revealed insurance-choices-based classification with the Holt & Laury risk attitude measures", WP CREST, 2017-79.

Motivation

- A pure test of the substitution property between insurance and self-insurance
- Substitution between insurance and self-insurance: a basic result of Risk Management
- Interplay between insurance and prevention
- Two types of prevention activities have been identified (Ehrlich and Becker (1972)): **self-protection** and **self-insurance**
- Focus on self-insurance (loss reduction) and on Risk-averters to implement a pure test of the Theory.

Same risk context with insurance and loss reduction opportunities

- CONTEXT: 2 states of nature (no loss/loss); 2 means of Hedging
  - A probability q to lose an endowment W_0
- Insurance contracting: a two-part insurance tariff
  - **P = C + p I** ; **C=fixed cost ; p=unit price; I=indemnity**
  - 3 types of tariff:
    (q=actuarial price)

	C > 0
p < q	T_1
p = q	T_2
p > q	T_3

- Self-insurance framing: the loss x decreases as investment in self-insurance (« e ») increases:

$$x = x(e) = x_0 - SI(e),$$

with $SI(0) = 0, SI'(e) > 0, SI''(e) < 0$ and $x(0) = x_0$.

An EU model of Insurance and Self-Insurance Demands

- Insurance demand with a two-part premium pricing:
  - 2 states of nature:
    - $W_1 = W_0$
    - $W_2 = W_0 - x$
  - With insurance coverage: (C=fixed cost; p=unit price; I=indemnity; Premium=pI+C)
    - $W_1 = W_0 - pI - C$
    - $W_2 = W_0 - pI - C - x + I$
- On the prevention side, the extent of the loss is a decreasing function of *e*, the self-insurance investment. We have:

$x = x(e) = x_0 - SI(e)$ with $x(0) = x_0; SI'(e) > 0, SI''(e) < 0.$

  - With both hedging mechanisms:
    - $W_1 = W_0 - pI - C - e$
    - $W_2 = W_0 - pI - C - e - x_0 + SI(e) + I$

The model I/SI

- Individual preferences are supposed to be characterized by a concave utility function *U(W).* The DM maximizes the following expected utility:

$$\max_{e,I} EU = (1-q)U(W_0 - pI - C - e) + qU(W_0 - pI - C - e - x_0 + SI(e) + I)$$

- Fixed cost C=> optimal choice for I and *e* needs to respect a participation constraint (PC):

$$(1-q)U(W_0 - pI^* - C - e^*) + qU(W_0 - pI^* - C - e^* - x_0 + SI(e^*) + I^*) \geq (1-q)U(W_0 - \hat{e}) + qU\big(W_0 - \hat{e} - x(\hat{e})\big),$$

With $\hat{e} = \arg\max_{e} (1-q)U(W_0 - e) + qU\big(W_0 - e - x(e)\big)$.

FOC lead to a fundamental result (for risk averters):

- a rational EU agent invests in self-insurance in order to equalize marginal returns of insurance and prevention:

$$\frac{1}{p} = SI'(e)$$

The experiment

- The experiment took place in Montreal and involved 76 risk-averse individuals.
- This sample consisted of students and workers, men and women, aged between 18 and 67.
- The average age was 30 with a high concentration of subjects between 20 and 30 years.
- Sitting in front of a computer, the subjects had to decide whether to hedge their risk of loss or not. They could voluntarily combine insurance and self-insurance. We also measure subjects’ risk aversion in the domain of losses.

Practical modalities

- ***Compensation***
  - a flat $10 bonus for participating in the experiment to compensate for the average loss in the risk aversion measurement of step 1
  - Ten decisions in Step 1: one of these decisions was drawn at random and played out.
  - Three decisions in Step 2: the gain from one period (randomly drawn) was converted into dollars at the rate 1 EMU=0.5 cent
  - On average, our subjects earned 15 CAD per hour.

Experimental Design (1)

- **Step 1: Measuring risk attitudes in the loss domain in a non-contextualized context**

Decision	Option A				Option B			
	% likelihood	Loss (in $)	% likelihood	Loss (in $)	% likelihood	Loss (in $)	% likelihood	Loss (in $)
1	10	-4	90	-6	10	0	90	-10
2	20	-4	80	-6	20	0	80	-10
3	30	-4	70	-6	30	0	70	-10
4	40	-4	60	-6	40	0	60	-10
5	50	-4	50	-6	50	0	50	-10
6	60	-4	40	-6	60	0	40	-10
7	70	-4	30	-6	70	0	30	-10
8	80	-4	20	-6	80	0	20	-10
9	90	-4	10	-6	90	0	10	-10
10	100	-4	0	-6	100	0	0	-10

Experimental Design (2)

- ***Step 2: Eliciting the demand for insurance and for self-insurance***
  - an endowment W_0 = 1000 EMU (Experimental Monetary Units)
  - a (q=)10 % chance of having an accident that would cost the entire 1000 EMU
  - voluntary insurance against that risk of loss
    - In exchange for paying a premium P, which was due at the beginning of the period, they received an indemnity *I* if they suffered an accident during the period.
    - a two-part insurance premium: $P = pI + C$
    - *6 types of tariffs : C =* ***0, 50 ;*** *p = {**0.05,*** **0.1** (actuarial price), **0.15}**
  - And Voluntary self-insurance
    - in return for an investment « e » in self-insurance paid at the beginning of the period, they could secure a part of their wealth in case of accident.

Insurance price grid (C=50 ; p=0.1)

Premium = Total cost of insurance	**Indemnity: Demand for Insurance**	**Additional indemnity**
P = 0.1 ; C = 50	Reimbursement in the event of damage	from an additional UME of premium
0	0	-
55	50	10
60	100	10
65	150	10
70	200	10
75	250	10
80	300	10
85	350	10
90	400	10
95	450	10
100	500	10
105	550	10
110	600	10
115	650	10
120	700	10
125	750	10
130	800	10
135	850	10
140	900	10
145	950	10
150	1000	10

Self-Insurance price grid

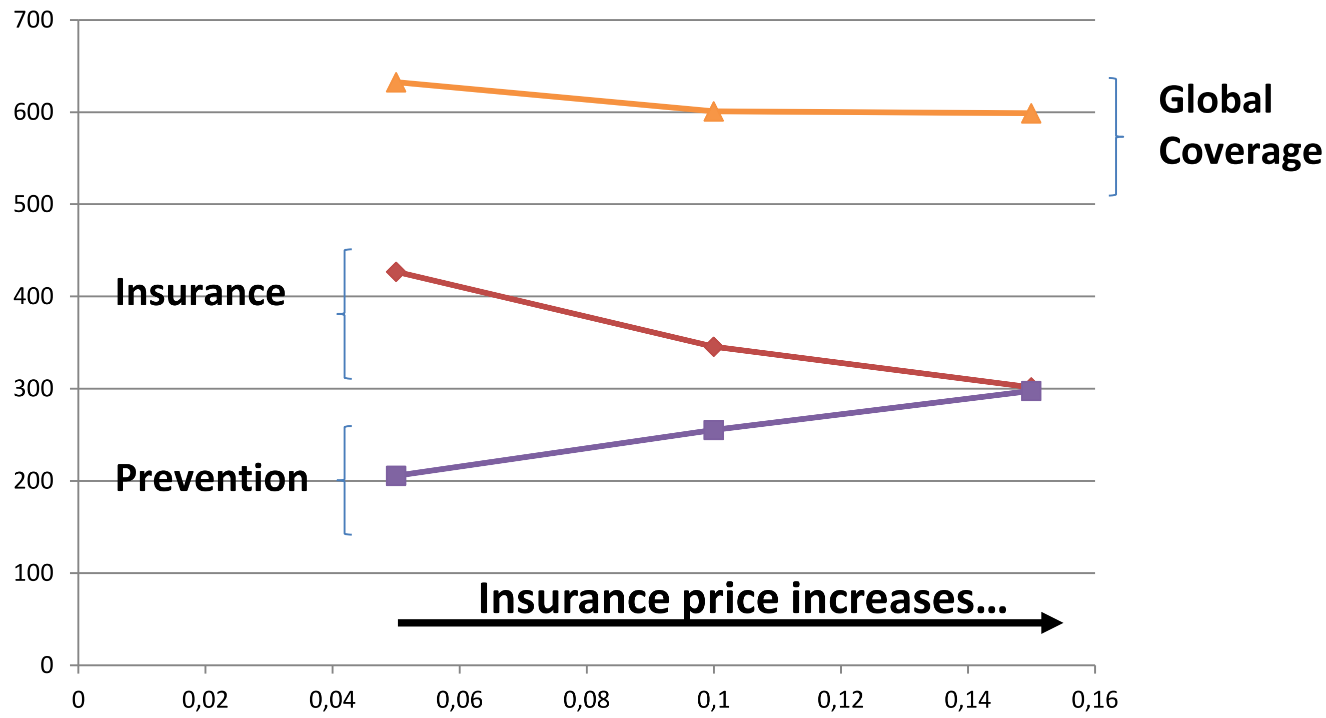
The 1st column of the table below gives the possible values for « e » (self-insurance investment),

the second column gives the corresponding SI level.

- The consequences of both hedging mechanisms on final wealths were automatically calculated in order to guide subjects

Investment in the self-insurance activity SI	Secured amount of wealth SI	Additional secured amount of wealth per additional UME of self-insurance
0	0	_
5	90	18
10	170	16
15	240	14
20	305	13
25	365	12
30	415	10
35	460	9
40	500	8
45	535	7
50	570	7
55	600	6
60	630	6
65	655	5
70	680	5
75	700	4
80	715	3
85	725	2
90	730	1
95	730	0
100	730	0

- **Experimental evidence:** **More Insurance** → **Less Prevention**



Result 3: as the insurance price raises, the demand for Insurance decreases and the demand for Prevention increases.
People want to cover a target percentage of their risks
They combine insurance and prevention to leave it unchanged

Optimality of risk hedging demands

Table 5: Observed vs. theoretical self-insurance matching

Unit Price	(1) Observed self-insurance: SI	(2) Theoretical self-insurance: SI*	(3) Nb of observed decisions in compliance with the theory (%)	(4) Kolmogorov - Smirnov stat
0.05	268	0	50 (34.72%)	0.653
0.1	324	365 or 415	12 (8.34%)	0.486
0.15	357	570	8 (5.56%)	0.771

The number of observations N is 144, given that the 0 and 50 EMU fixed costs rounds are pooled. At the 5% level of confidence, the large-sample critical value is 0.12. H_0 is rejected.

Result 4: Subjects stop investing in SI activity before its MR equalizes I's. Therefore, for a unit price of insurance $p \geq q$, the marginal returns equalization strategy (P1) is rejected.

3rd part:

Compulsory insurance and voluntary (loss reduction) prevention

- Pannequin, F., and A. Corcos, "Compulsory Insurance and Voluntary Self-Insurance: Substitutes or Complements? A Matter of Risk Attitudes", WP CREST, 2017-78.
- Experiment: work in progress

Motivation

- **Consequence of the substitutability property**: **public/compulsory insurance** $\bar{I}$ may at least be **inefficient**, at most **crowd out** self-insurance efforts:
  - If $\bar{I} > I^*$(Excess of insurance) $\Rightarrow$ $SI \searrow$ ⇒Crowding out effect
  - If $\bar{I} < I^*$ (Shortage of insurance) $\Rightarrow$ $SI \nearrow$ but global coverage (I+SI) decreases
  - If $\bar{I} = I^*$(Optimal compulsory insurance) $\Rightarrow$ $SI = SI^*$ but it assumes farsighted (and benevolent) goverments!

=>**Compulsory insurance justifications need to be deepened**

Our experiment questions this assertion.

Motivation

- It led us to study :
  - the **impact** a partial **compulsory insurance** coverage
  - on the **demand** for **self-insurance**,
  - depending on **risk attitudes**.

Theoretical framework (1)

- We consider an individual :
  - endowed with an initial wealth W_0
  - and facing a probability q to lose a share x_0 of this wealth.

- The individual is facing a compulsory insurance $\bar{I}$ and has:
  - to pay an insurance premium $P = p\bar{I}$
  - in exchange for a compensation $\bar{I} > 0$ in case of accident.
- The unit price of insurance is denoted by *p* and is assumed to be at least actuarial (p≥q)

Theoretical framework (2)

- Also, to reduce her risk-exposure, this individual can also use a self-insurance technology with diminishing returns.
- The loss *x* is therefore a function of the investment in self-insurance a: $x = x(a) = x_0 - SI(a)$, where $SI(a)$ represents the sheltered wealth, with $SI'(a)>0$, $SI''(a)<0$, and $x(0) = x_0$.
- We assume the marginal return of the first unit of self-insurance to be strictly greater than that of insurance: $SI'(0) > 1/q$.

Theoretical framework (3)

- The final wealth is therefore a function of the level of both:
  - self-insurance investment a
  - and compulsory insurance $\bar{I}$.
- Depending on the state of nature, the final wealth can be written as follows:

- $W_1 = W_0 - p\bar{I} - a$, in the absence of accident;
- $W_2 = W_0 - p\bar{I} - a - (x_0 - SI(a)) + \bar{I}$, in case of the accident.

Theoretical framework (4)

- A rational decision maker aims at maximizing her expected utility according to her self-insurance choice *a.*
- The policyholder's problem is the following:

$$\max_{a} EU(a) = (1-q)U(W_0 - p\bar{I} - a) + qU\,(W_0 - p\bar{I} - a - x_0 +$$

The risk averter's behavior (1)

- the optimal level of self−insurance under a compulsory insurance equalizes the marginal return of self−insurance to the following expression:

$$SI'(a) = \frac{(1-q)U'(W_1)}{qU'(W_2)} + 1$$

- If I and SI are freely combined, the risk averse decision maker will choose I and SI in order to equalize marginal returns of insurance and self-insurance: $SI'(a) = \frac{1}{p}$
- Comparing both situations, we obtain the following proposition:

The risk averter’s behavior (2)

- **Proposition 1:** Whatever the insurance context (either voluntary or compulsory) RAs **keep substituting I and SI:**

$$\text{if } \bar{I} \nearrow \Rightarrow \; SI \searrow$$

- If the compulsory level of insurance leads to a shortage (resp. an excess) in insurance, the RA increases (resp. decreases) her SI investment.

The risk lover's behavior (1)

- A graphical intuition
- A proof (in the paper !)

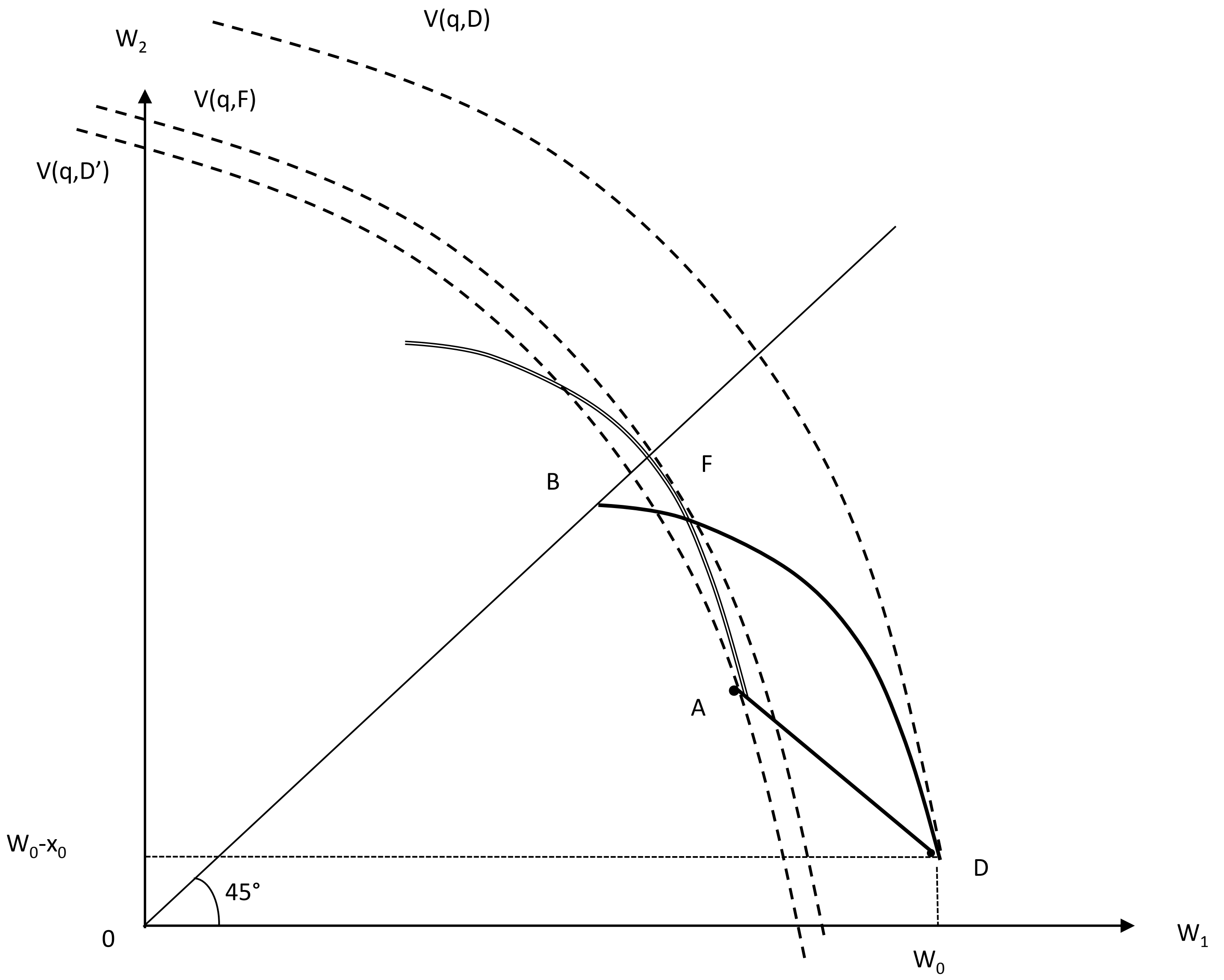


FIGURE 1: COMPULSORY INSURANCE LEADS A RISK LOVER TO INVEST IN LOSS-REDUCTION ACTIVITY

The risk lover's behavior (2)

- **Proposition 4:** Imposing compulsory partial insurance on a risk-loving individual leads her:
  - Either to increase an initially pre-existing self-insurance investment;
  - Or to invest in an initially non-existent self-insurance activity, provided that the mandatory coverage ratio exceeds a given threshold.

- **Proposition 3:** Whatever the initial level of self-insurance, an increase in the (partial) coverage of the compulsory insurance enhances the marginal benefit of self-insurance and reduces its marginal cost. This leads the risk lover to invest more in prevention.

Experimental Design (1)

- ***Step 1: Eliciting the demand for insurance and for self-insurance – 3 rounds***
  - an endowment W_0 = 1000 EMU (Experimental Monetary Units)
  - a (q=)10 % chance of having an accident that would cost the entire 1000 EMU
  - voluntary insurance against that risk of loss
    - In exchange for paying a premium P, which was due at the beginning of the period, they received an indemnity *I* if they suffered an accident during the period.
    - a two-part insurance premium: $P = pI + C$
    - *3 types of tariffs : C =* ***50 ;*** *p = {****0.05,*** **0.1** (actuarial price), **0.15}**
  - And Voluntary self-insurance
    - in return for an investment « e » in self-insurance paid at the beginning of the period, they could secure a part of their wealth in case of accident.

Experimental Design (2)

- ***Step 2: Eliciting the demand for self-insurance when facing compulsory partial insurance – 9 rounds***
  - an endowment W_0 = 1000 EMU (Experimental Monetary Units)
  - a (q=)10 % chance of having an accident that would cost the entire 1000 EMU
  - Compulsory insurance against that risk of loss
    - 3 levels of compulsory insurance: $\bar{I}$ = 300, 500 or 700
    - a two-part insurance premium: $P = p\bar{I} + C$
    - *9 types of tariffs : C =* ***50 ;*** *p = {****0.05****,* **0.1** (actuarial price), **0.15}** combined with 3 levels of compulsory insurance: $\bar{I}$ = {300, 500, 700}
  - And Voluntary self-insurance
    - in return for an investment « a » in self-insurance paid at the beginning of the period, they could secure a part of their wealth in case of accident.

Step 1 and risk attitudes

- Step 1 can be used to identify risk averters…
- How ?
  - Those who never buy insurance (for the 3 tariffs) were classified as risk lovers
  - The others were classified as risk averters
- Method: with a fixed cost of 50 EMU, the whole insurance premium is at best actuarial (full insurance, $p=0.05$, $C=50$)
- A risk-lover should not buy any insurance coverage

Patterns of consumption and risk attitudes - RL

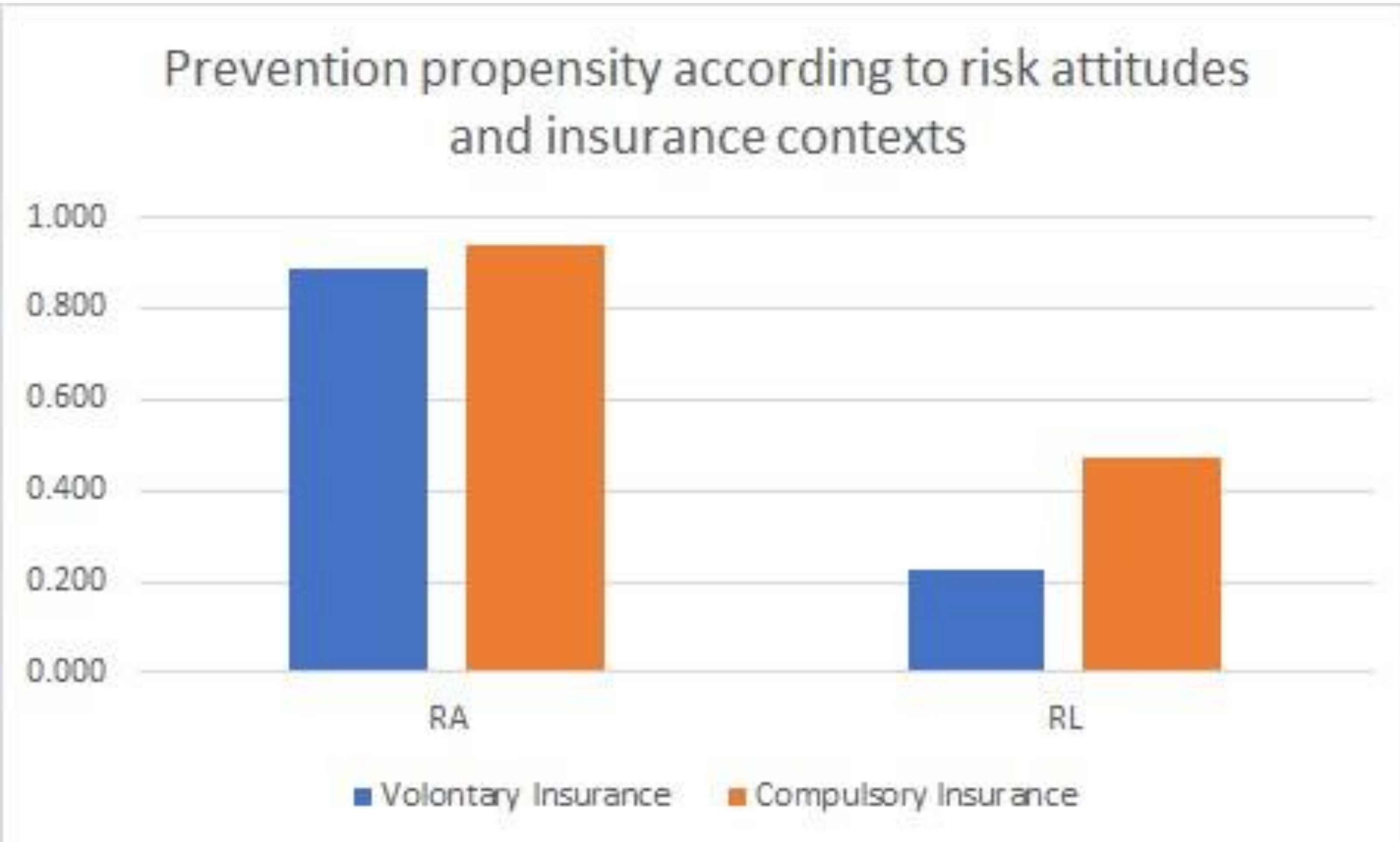
Number of times that:		**Conditions**	**Risk attitude**		**Classification Rules**
I>0	SI>0				
0	0	**I=0 ∀p**	**RL**	In our experiment, the insurance tariff is never actuarial except for (I, p) = (x_0; p<q) since C = (q-p) x_0. Therefore, for RLs, I = 0 ∀p.	Since the insurance tariff is never actuarially fair, investment in SI remains independent of the unit insurance price. The MR of the 1st unit of SI is unattractive for individuals of this case who never invest in SI.
0	1				These 2 cases characterize the behavior of RL subjects who are indifferent as to whether to invest in SI or not. They would never get insured but are likely to invest in SI sometimes.
0	2				
0	3				In this last case, RLs are attracted by the marginal return of the 1st unit of SI and always invest in SI. Moreover, they should invest the same amount in SI whatever the insurance pricing.

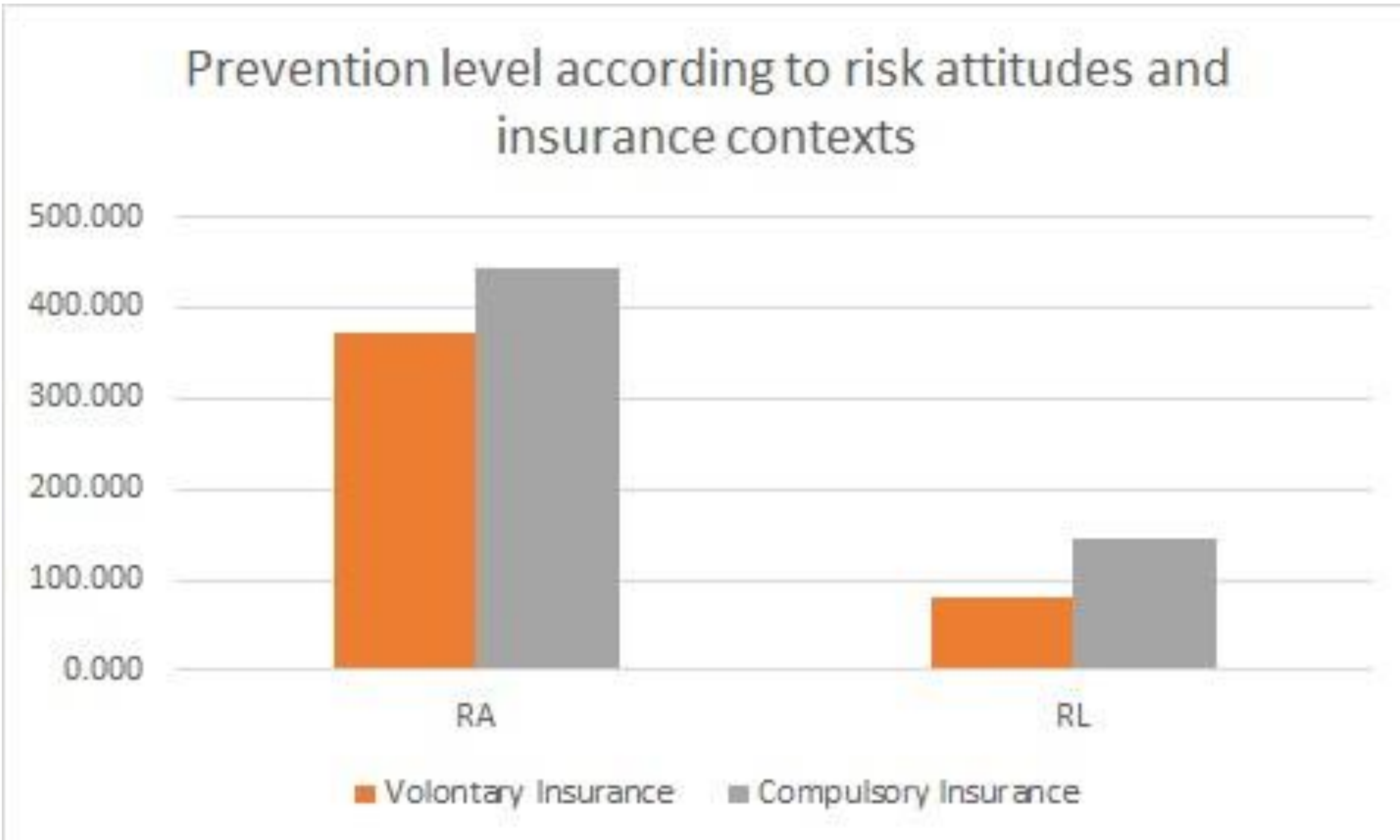
Patterns of consumption and risk attitudes - RA

Number of times that: $I>0$	Number of times that: $SI>0$	Conditions	Risk attitude	Classification Rules	
1	2	$I>0$ if $p<q$ $SI>0$ if $p\geq q$	RA	These three cases account for a perfectly rational RA who equalizes the MRs of SI and I, and should not buy SI when p is less than actuarial	When $p<q$, an RA chooses a full insurance contract, and SI is crowded out. When $p\geq q$, it is efficient to invest in SI. The intensity of risk aversion determines the extent of the participation in the insurance market.
2	2	$I>0$ if $p\leq q$ $SI>0$ if $p\geq q$	RA		
3	2	$I>0\ \forall p$ $SI>0$ if $p\geq q$	RA		
1	3	$I>0$ if $p<q$ and $SI>0\ \forall p$	RA	These 3 cases relate to imperfectly rational patterns of consumption.	When p=.05, we expect SI to be crowded out. However, as people do not perfectly equalize marginal returns, we find acceptable to include participation in the self-insurance market when p is below the actuarial price when this SI participation is effective in the other cases. At the same time, such behavior can be rationalized for a low level of risk aversion.
2	3	$I>0$ if $p\leq q$ and $SI>0\ \forall p$	RA		
3	3	$I>0\ \forall p$ $SI>0\ \forall p$	RA		

Step 1 and risk attitudes

- 66 risk-averters
- 35 risk-lovers
- Experimental data support our theory


Prevention propensity according to risk attitudes and insurance contexts
1.000
0.800
0.600
0.400
0.200
0.000
RA
RL
Volontary Insurance
Compulsory Insurance


Prevention level according to risk attitudes and insurance contexts
500.000
400.000
300.000
200.000
100.000
0.000
RA
RL
Volontary Insurance
Compulsory Insurance

Experimental works/New modeling: Focus on the behavior of Risk Lovers

When insurance is **compulsory** (health insurance, liability insurance…), Risk Lovers **voluntarily invest** in **prevention**.

$\Rightarrow$Consequence: Public Insurance, Mandatory Insurance may induce people to invest more in prevention.

Thank you for your attention!!