Utility, Risk, and Demand for Incomplete Insurance: Lab Experiments with Guatemalan Cooperatives

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Appendix A - Additional Tables and Figures

Table A.1: Distribution of States in Different Games

	Probabilities of Occurrence of States (*100) Shocks (in Quetzales)								
Games	0	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000
I1	80.95	4.76	4.76	4.76	4.76				
I2	80.95	4.76			4.76	4.76	4.76		
I3	80.95	4.76					4.76	4.76	4.76
I4	80.95	4.76				14.29			
I5	80.95	4.76			4.76	4.76	4.76		
I6	80.95	4.76		4.76		4.76		4.76	
I7	80.95	4.76	4.76			4.76			4.76
I8	76.19	4.76	4.76			14.29			
I9	76.19	4.76			4.76	14.29			
I10	76.19	4.76				14.29			4.76
I11	66.67	4.76	14.29			14.29			
I12	66.67	4.76			14.29	14.29			
I13	66.67	4.76				14.29			14.29
I14	80.95	4.76	4.76	4.76	4.76				
I15	80.95	4.76			4.76	4.76	4.76		
I16	80.95	4.76					4.76	4.76	4.76
G1	80.95	4.76			4.76	4.76	4.76		
G2	80.95	4.76		4.76		4.76		4.76	
G3	80.95	4.76	4.76			4.76			4.76
G4a	80.95	4.76			4.76	4.76	4.76		
G4b	80.95	4.76			4.76	4.76	4.76		
G4c	80.95	4.76			4.76	4.76	4.76		
G5b	80.95	4.76		4.76		4.76		4.76	
G5c	80.95	4.76		4.76		4.76		4.76	
G6b	80.95	4.76	4.76			4.76			4.76
G6c	80.95	4.76	4.76			4.76			4.76
G7	80.95	4.76	4.76			4.76			4.76
G8	80.95	4.76	7.14			4.76			2.38
G9	80.95	4.76	9.52			4.76			
G10	80.95	4.76	2.38			4.76			7.14
G11	80.95	4.76				4.76			9.52
G12	80.95	4.76	4.76			4.76			4.76

Income without shock is Q10,000. Cells with grey background are not covered by the insurance.

Table A.2: Representativeness of Those Invited to Play Games

VARIABLES	(1) Age	(2) Female	(3) Years of Education	(4) Area of Land Planted in Coffee	(5) Household Asset Index
Played in Insurance Games	0.39	0.01	0.19	-0.07	0.88***
	(0.654)	(0.018)	(0.177)	(2.188)	(0.081)
Constant (mean in Coop Survey)	49.28***	0.14***	3.74***	31.13***	2.98***
	(0.419)	(0.011)	(0.113)	(1.400)	(0.052)
Observations	1,569	1,579	1,575	1,578	1,579
R-squared	0	0	0.001	0	0.073
Number of Cooperativa	71	71	71	71	71

This table compares the averages from a representative household survey to the averages within the group of individuals who played the insurance games. Fixed effects at the level of the cooperative are included, and standard errors in parentheses. years of education counts through tertiary education, with any tertiary education coded as 13. Area of land is measured in *cuerdas* . The household asset index is a raw sum of dummies for the possession of a set of nine consumer durable assets. *** p<0.01, ** p<0.05, * p<0.1

Figure A.1: State Space and Payoffs in Games

			Payout Occurs: Yes	Payout Occurs: No
Shock Occurs	Yes	Prob. of each state:	π_s	ω_s
		Returns in each state: (uninsured; insured)	$R_s;\ R_s - c + P$	$D_s;\ D_s - c$
	No	Probability:	$\varnothing$	$1 - \sum_s \pi_s - \sum_s \omega_s$
		Returns: (uninsured; insured)	$\varnothing$	$K;\ K - c$

Appendix B - Change in WTP due to a small uninsurable shock in EU model

Simplify the model to include only one state with insurable shock (income R with probability π) and one state of uninsurable shock (income D with probability ω). In absence of uninsurable shock, the WTP wtp is defined by:

$$\pi u(R) + (1-\pi)u(K) = \pi u(R+P-wtp) + (1-\pi)u(K-wtp).$$

With an uninsurable shock $K-D$, the WTP wtp^* is defined by:

$$\pi u(R)+\omega u(D)+(1-\pi-\omega)u(K) = \pi u(R+P-wtp^*)+\omega u(D-wtp^*)+(1-\pi-\omega)u(K-wtp^*).$$

We derive a first order approximation for a small shock $(K-D)$ and the corresponding small change in WTP. Subtracting these two expressions gives:

$$\begin{aligned}
\omega\left[u(D)-u(K)\right] &= \pi\left[u(R-wtp^*+P)-u(R-wtp+P)\right] \\
&\quad +(1-\pi)\left[u(K-wtp^*)-u(K-wtp)\right] \\
&\quad +(\omega)\left[u(D-wtp^*)-u(K-wtp^*)\right] \\
\omega\left[u'(K)(D-K)+o(K-D)\right] &= -\pi u'(R-wtp+P)\Delta wtp + o(\Delta wtp) \\
&\quad -(1-\pi)u'(K-wtp)\Delta wtp + o(\Delta wtp) \\
&\quad -\omega[u'(K-wtp)+o(\Delta wtp)](K-D)+o(K-D)
\end{aligned}$$

where $\Delta wtp = wtp^* - wtp$ and $o(z)$ indicates any function $f(z)$ such that $\lim_{z\to 0} f(z)/z = 0$. This gives:

$$\Delta wtp \simeq \frac{\left[u'(K)-u'(K-wtp)\right](K-D)}{\pi u'(R-wtp+P)+(1-\pi)u'(K-wtp)}\omega < 0$$

This shows that in the EU model, the introduction of a small uninsurable shock induces a reduction in WTP that is approximately proportional to the probability ω of the shock.

Appendix C - Game Ordering, Data Entry Form Bracketing, and Framing Effects

Table C.1: Game Ordering

Title of the Games	Game Identification	Alternative Ordering of the Games A	B	C	D	E	F	G	H
MKTING: Before		1	1	1	1	1	1	1	1
IND: Risk, EL	I1-I3	2	3	2	3	6	7	6	7
IND: Risk, SDL	I4-I7	3	2	3	2	7	6	7	6
IND: Drought	I8-I13	4	4	4	4	8	8	8	8
GRP: Without Allocation Rules	G1-G3	5	5	5	5	2	2	2	2
GRP: With Allocation Rules	G4-G6	6	6	7	7	3	3	4	4
GRP: Heterogeneity	G7-G11	7	7	6	6	4	4	3	3
GRP: Deliberation	G12-G13	8	8	8	8	5	5	5	5
IND: Unframed	I14-I16	9	9	9	9	9	9	9	9
MKTING: After		10	10	10	10	10	10	10	10

Table C.2: Effect of Game Ordering and Bracketing in Data Entry Form

Dependent Variable: Willingness to Pay, US$	Bracketing	Time Trend	Sequencing of Group Game	Sequencing of SDL and Heterogeneity Games
	(1)	(2)	(3)	(4)
High Price Bracketing	1.90			
(bracket higher by $6.35)	(1.23)			
Order of Game		-0.53***		
		(0.11)		
Group Game * Group			-5.12***	-5.18***
Game after Individual Game			(0.77)	(0.77)
Group Game			1.71***	3.03***
			(0.52)	(0.54)
Standard Deviation of Loss				-0.61
* SDL after EL Game				(0.66)
SDL Game				2.16***
				(0.43)
Heterogeneity Game * Het Game				0.28
after Correlation Game				(0.58)
Heterogeneity Game				-2.68***
				(0.40)
Constant	23.77***	26.23***	29.87***	28.78***
	(0.91)	(0.69)	(0.24)	(0.26)
Observations	674	17,948	12,017	12,017
R-squared	0.014	0.412	0.518	0.526

*** p<0.01, ** p<0.05, * p<0.1. Regression in column 1 uses game I1 only, it is cross-sectional at the individual level and standard errors are clustered at the cooperative level. Regressions in columns 2-4 include fixed effects at the individual level, and standard errors are clustered at the individual level. Regression in column 2 use all individual and group games, it includes fixed effects for each specific game, so the trend is measured for the same game played in different places in the sequence. Column 3-4 include individual games I1-I7 and group games with specified rules of allocation G4-G11.

Table C.3: Robustness of Drought Effect to Game Ordering

Dependent Variable: WTP, US $.	Predicted WTP	Actual WTP	Difference Actual WTP - Predicted WTP
	(1)	(3)	(6)
Any Drought	-6.83***	-12.76***	
	(0.32)	(0.52)	
Any Drought x Ind. Game Before	-1.76***	-2.54***	
	(0.52)	(0.80)	
Residual SD of Income in Drought Games	-79.63***	-31.22***	
	(2.66)	(1.15)	
Residual SD of Income in Risk Games	62.79***	55.81***	
	(2.17)	(2.10)	
Mild Drought			-7.58***
			(0.44)
Mild Drought x Ind. Game Before			-1.71**
			(0.69)
Drought Inducing the Worst Possible State			1.92**
			(0.79)
Worstt x Ind. Game Before			1.11
			(1.16)
Constant	31.88***	31.68***	0.04
	(0.17)	(0.23)	(0.17)
Observations	8,355	8,385	8,355
R-squared	0.794	0.739	0.414

*** p<0.01, ** p<0.05, * p<0.1. Regressions are estimated using games I1-I13. There are fixed effects at the individual level, and standard errors are clustered at the individual level.

Table C.4: Robustness of Group Effect to Game Ordering

Dependent Variable: WTP, US $.	Predicted WTP	Actual WTP
	(1)	(2)
Group with No Loss Adjustment	0	-3.08***
	(0.00)	(0.68)
Group with Moderate Loss Adjustment	1.93***	0.06
	(0.14)	(0.68)
Group with Maximal Loss Adjustment	6.54***	3.33***
	(0.47)	(0.72)
Group with No Loss Adjustment * Group after	0	-4.33***
	(0.00)	(1.02)
Group with Moderate Loss Adjustment * Group after	0.47**	-4.74***
	(0.20)	(1.03)
Group with Maximal Loss Adjustment * Group after	1.68**	-5.12***
	(0.69)	(1.09)
Constant	29.41***	29.14***
	(0.11)	(0.38)
Observations	2,616	2,625
R-squared	0.954	0.743

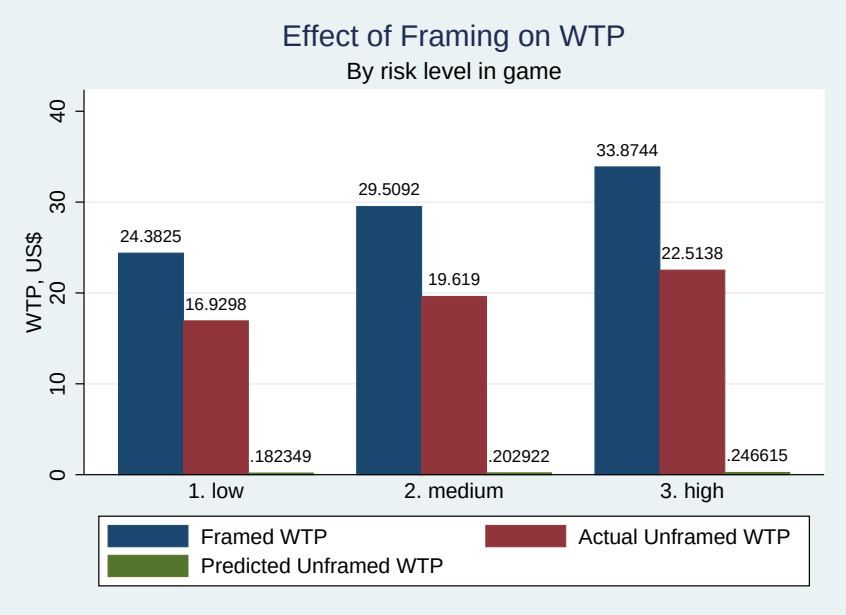
*** p<0.01, ** p<0.05, * p<0.1. Regressions include fixed effects at the individual level, and standard errors are clustered at the individual level.

Table C.5: WTP in Unframed Games

Dependent Variable: Willingness to Pay, US$	Predicted WTP		Actual WTP	
	(1)	(2)	(3)	(4)
Framed	29.21***	22.95***	9.79***	7.72***
	(0.58)	(0.56)	(0.70)	(0.66)
Framed * Medium Insured Shock		6.95***		2.29***
		(0.27)		(0.45)
Framed * Large Insured Shock		11.85***		3.92***
		(0.44)		(0.54)
Medium Insured Shock		0.03		2.50***
		(0.02)		(0.26)
Large Insured Shock		0.07***		5.29***
		(0.02)		(0.38)
Constant	0.21	0.18	19.50***	16.90***
	(0.28)	(0.28)	(0.35)	(0.34)
Observations	3885	3885	3864	3864
R-squared	0.83	0.869	0.598	0.653

*** p<0.01, ** p<0.05, * p<0.1. Regressions include fixed effects at the individual level, and standard errors are clustered at the individual level. Regressions used games I1-I3 and I14-I16.

Figure C.1: Actual and Predicted Demand in the Unframed Games



Appendix D - Discussion of Group Deliberation and Heterogeneity Games

Willingness to loss adjust after shocks are realized.

We now try to understand decisions over loss adjustment in a more natural deliberative context. The actual decision over group loss adjustment requires an aggregation of individual preferences into a group decision, and the successful implementation of group insurance requires that those individuals who suffered less severe shocks remain willing to pool after these losses have been realized. Rather than being a legal contract like index insurance, group loss adjustment is informal and hence vulnerable to ex-post renegotiation. To try to simulate this possibility in a laboratory context, we conducted a sequenced 'group deliberation exercise' (G12).

The graphical support for this exercise was a group game with the possible three options for the distribution of payouts seen before (none, moderate, and as much as possible). We first reminded them that groups could loss adjust, framed the pros (better risk protection) and the cons (tensions within the group), and asked players as individuals what degree of loss adjustment they would prefer (1 = none, 2 = moderate, 3 = as much as possible) if they were obtaining group insurance. We then asked them to discuss and decide upon this issue as a group, and recorded the outcome. Finally, we attempted to mimic the incentive to renege on group risk sharing by asking each individual to draw an actual rainfall shock (and thus a level of income) and to vote again on the group risk pooling decision. These three outcomes (pre-deliberation individual preference, group choice, and post-shock individual preference) provide a window directly into the desirability of this theoretically central feature of group insurance.

Column 1 of Table D.1 shows that players who are risk averse or ambiguity averse have a lower preference for sharing, although the point estimates are small. The group decision, explained in Column 2, shows that groups with more women and with less educated members reach agreement on a higher level of risk pooling after deliberation. The core point of the exercise, however, is illustrated in Column 3. Even in this contrived environment in which individuals are ask to state their preference twice over a very short period of time and with only a small sum of money at stake, we find evidence that the ex-post incentive incompatibility of risk pooling will prove problematic. Individuals who draw large negative shocks pivot to desire greater pooling, and those who draw small shocks desire less pooling. The extent to which preferences for sharing are altered in this interval provides an application of withdrawing the Rawlsian Veil of Ignorance, as agents who had previously not known their exact position in a shock redistribution now know what they personally stand to win or lose. The magnitude of the change in behavior provides some evidence for the extent to which the inability to writing binding contracts will pose a constraint on pooling agreements that must be ex-post incentive compatible.

The coefficients on the desired degree of risk sharing can be taken back to the coefficients from Table 6 in which the expected degree of risk pooling is estimated. Across all three of the group deliberation games participants report wanting 'moderate' risk sharing (50% of potential), and yet they expect that the groups will only provide 25% of the potential risk sharing. Given our evidence that the dynamic consistency of risk sharing is a problem in

practice, the expectation that actual risk pooling will come in below the level desired may be well justified.

The effect of heterogeneity in expected losses

We now address the effect that asymmetric loss exposure may have on demand. This is a critical issue because this asymmetry introduces a dimension of expected transfer into the loss adjustment mechanism. If certain people are subject to more extreme shocks (because, for example, they are insuring steep or flood-exposed farmland) then loss adjustment will systematically entail a transfer of payouts towards these more exposed individuals and away from those who are less exposed to risk. This alters the actuarially fair premium. The greater the heterogeneity within a group in the exposure to these shocks, the more difficult we would expect group contracting to be.

To investigate this, we introduced five scenarios in which the group was presented as being composed of heterogeneous members with different risk exposure. While the average income in the group was assumed to be $R =$ Q5,000 and idiosyncratic income could still be $R - \sigma, R$ and $R + \sigma$, with $\sigma =$ Q2,000, some members had a higher probability of smaller income $R - \sigma$, and others a higher probability of higher income $R + \sigma$. In the example represented Figure 1d, the player faces a relatively less risky environment than average, with the probability of low loss of Q2,000 equal to 6/84, while the probability of high loss of Q8,000 is 2/84. Across the five scenarios, the probability of low loss varies from 8/84 to 6/84, 4/84, 2/84, and 0, with the complementary probability to 8/84 for high loss, and the probability of average loss of Q5,000 kept at 4/84 Throughout we maintained that there would be partial risk pooling, fixing the amounts to be pooled with payout of Q560, Q1,400 and Q2,240, respectively, depending on the severity of the loss incurred. These five scenarios give the basic dislike of heterogeneity, and the change in WTP as the expected losses to that individual change.

In the first scenario, we merely presented the issue of heterogeneity, but the player's exposure to risk is the same as the average in the group (probabilities for high and low losses are equal). Results in Table D.2, column 1 show that simply framing the group as consisting of heterogeneous membership drives down WTP by \$6.54, an amount greater than the overall penalty to group insurance. The next four scenarios placed the individual in different parts of the expected loss distribution, meaning that group loss adjustment would predictably serve as a transfer to or from that individual of the difference between net expected payout and the group average. When facing a higher probability of low losses a farmer's expected payout is lower than the average payout to the group (in this particular case, expected payout is Q160 when the group average is Q200). This means an average transfer of Q40 to the group. In contrast, a farmer with higher probability of high losses will be net receiver. As a way of understanding what this move in expected payouts should have done to demand, again utilize our utility structure to predict WTP. Column 2 shows that predicted WTP from the utility models should have decreased by \$1.21 for each marginal dollar to be transferred (this number is less than negative one because the money is transferred in the worst states), while column 3 shows that the actual WTP drops by only \$.60. Thus, at the margin, the decrease in WTP from disutility of making transfers to other group members is only half of what it is when the transfers are to the insurance company. Columns 4 and 5 repeat this analysis showing each scenario separately; High (low) transfer provider corresponds to the scenario with probability 8/84 (6/84) of low loss, respectively. High (low) transfer receiver

corresponds to the reverse scenarios with probability 8/84 (6/84) of high loss. The results indicate that the divergence between the two types of WTP is particularly pronounced for the high transfer provider, i.e., when an individual is the one least exposed to shocks.

The takeaway from this analysis is that while group heterogeneity depresses demand for group insurance, and individuals do respond in the predicted way to their own shock exposure relative to the rest of the group, these individuals are only half as unwilling to transfer money to each other to reduce inequality as they are to lose money to the insurance company.

Table D.1: Group Deliberation

	Initial Individual Preference for Sharing	Group Decision on Sharing	Final Sharing Preference for Sharing
	(1=none, 2=moderate, 3=maximum possible)	(1=none, 2=moderate, 3=maximum possible)	In Difference from Group Decision
	(1)	(2)	(3)
Loss Shock Drawn after Deliberation ('000 US dollars)	-0.0109	-0.9055	0.0568*
	(0.07)	(0.66)	(0.03)
Female	0.1258	1.2967**	-0.0465
	(0.09)	(0.54)	(0.04)
Education	-0.0084	-0.0745*	0.0042
	(0.01)	(0.04)	(0.00)
Wealth	-0.0398	0.3876	-0.0188
	(0.06)	(0.42)	(0.03)
Trust in Cooperative	-0.0186	0.0722	0.0115
	(0.03)	(0.15)	(0.02)
Utility-based Risk Aversion	-0.0804**	0.4145*	-0.0308
	(0.03)	(0.22)	(0.03)
Ambiguity Aversion	-0.0510**	-0.1168	0.0297***
	(0.02)	(0.15)	(0.01)
Constant	2.7018***	-0.4691	0.1166
	(0.25)	(1.80)	(0.20)
Mean of Dependent Variable	1.98	2.01	0.00
Observations	610	68	610
R-squared	0.024	0.174	0.026

*** p<0.01, ** p<0.05, * p<0.1. Regressions are clustered at the group level; Column 3 includes group fixed effects. The dependent variable in column 1 is the preference expressed before deliberation. Column 3 reports on the group decision as function of mean value of the indicated independant variables in the group. In column 3, the dependent variable is the difference between the preference for sharing after having drawn individual shocks and the agreed upon group choice.

Table D.2: Group Heterogeneity

Dependent Variable: Willingness to Pay, US$	Heterogeneous vs. Homogenous Group	Predicted WTP	Actual WTP	Predicted WTP	Actual WTP
	(1)	(2)	(3)	(4)	(5)
Group is Heterogeneous	-6.54***				
	(0.65)				
Expected Transfer to Others		-1.21***	-0.60***		
		(0.03)	(0.02)		
High Transfer Provider (G9)				-26.78***	-7.17***
				(0.68)	(0.35)
Low Transfer Provider (G8)				-5.01***	-3.86***
				(0.23)	(0.27)
Low Transfer Receiver (G10)				3.79***	4.52***
				(0.22)	(0.28)
High Transfer Receiver (G11)				7.07***	8.28***
				(0.43)	(0.42)
Constant	33.10***	42.19***	26.74***	46.37***	26.38***
	(0.31)	0.00	0.00	(0.18)	(0.17)
Observations	1252	3330	2990	3330	2990
R-squared	0.791	0.848	0.817	0.899	0.818
Games Used:	G6b & G7	G7-G11	G7-G11	G7-G11	G7-G11

*** p<0.01, ** p<0.05, * p<0.1. Regressions include fixed effects at the individual level, and standard errors are clustered at the individual level. Expected transfers to the group are US$ 0, 6.3, 12.7, -6.3, and -12.7 in scenarios G7, G8, G9, G10, and G11, respectively.

Appendix E: Game Protocol

This appendix contains a translation of the oral instructions from Spanish to English for the experiment protocol. Large flipcharts with the graphics reported here were used in support of the presentations. The Appendix also reports an example of the program implemented in one cooperative. The ordering of the games is described and analyzed in Appendix C.

I. Introduction and Training

Welcome and Introduction

A big thank you to everyone for being here. My name is… and I will guide you through today's activities along with my colleagues. We belong to a group of researchers at the University of California, Berkeley and the University of California, San Diego. Before we begin with today's activities we would like to introduce ourselves and explain why we are here, and go through a summary of the day's activities. We are concerned about the incidents of excess rain that hurt the production of coffee. One way to cope with the consequences of these excess rains is with an insurance product against these rains. Today we will explain how this insurance product works. Moreover, we will conduct a few exercises to see if you would prefer that the insurance against excess rains be offered individually or as a group.

We would like to emphasize that any information you provide during today's activities will be kept private. Your participation today is completely voluntary. If at any moment you decide that you no longer want to participate, you can withdraw without any penalty and you will still be compensated for your time.

In the next little bit we will pay you a small compensation of Q10 to thank you for coming today. If you decide to stay until the end of today's exercises we will pay you an additional amount (maximum amount is Q70). The exact additional amount you receive will depend on the actions that you take during the second part of today's exercises. Later in the day, we will explain how this amount will be calculated. The compensation for you time and whatever additional amount you receive will be paid in cash. Your participation in today's activity will not affect your relationship with the University of California, Berkeley, or the University of California, San Diego.

Today's itinerary is as follows: first we will explain how the insurance product against excess rains works, and we will ask a few questions to see if you are interested in such a product or not. This first part will take approximately 2.5 hours. Subsequently, we will take a one-hour recess during which we will serve [a snack/ lunch if available]. In the second part of the day we will conduct a number of different exercises to establish whether you would prefer the insurance product against excess rains be offered to each individual separately or to groups of individuals. At the beginning of this afternoon session we will explain to you how your actions will determine the amount of additional money you will receive at the end of the day. There will be a small recess during the middle of these exercises. This second part of the day's activities will take approximately 3 hours. This means we will finish at approximately […]

If you need to use the restroom or if you have any other need, please let any of us know so that we can assist you accordingly.

As of right now, we are going to compensate you with Q10.

[The enumerators distribute the first compensation, and ask the participants to sign the document acknowledging receipt of payment for this first amount]

Before we continue, do you have any questions?

Explanation of the Excess Rainfall Index Insurance

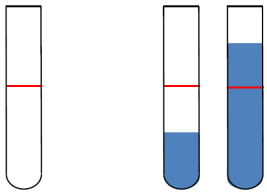
Now we will explain to you what the insurance product against excess rainfall entails. This type of insurance is very complicated and it is very important that you understand exactly what it does in order to continue with the day's activities. As a result, please pay close attention to the following explanations.

During our last visit to your cooperative we learned that this region is frequently exposed to excess rainfall. What we call excess rainfall is what is commonly referred to as tropical storms or hurricanes, like the tropical storm E-12 in October 2011, Agatha in 2010 and Stan in 2005. It sometimes simply refers to a large quantity of rain that affects your region and not the rest of the country. This excess rainfall can destroy a large part of your coffee production. When this happens, you might experience a dramatic and unforeseen drop in your income. In this context it can be very difficult to overcome any of your financial concerns.

One way of coping with the adverse consequences of excess rainfall is by purchasing an insurance against these rains. In general, an insurance against excess rainfall works as follows:

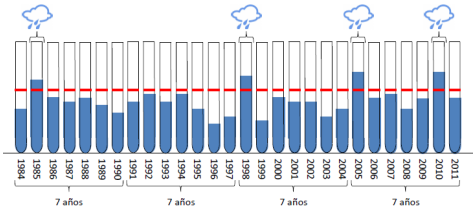
If you would like to be insured, you can purchase an insurance from an insurance company at the beginning of the coffee season. You will pay a certain premium up front for this insurance. You will then receive money from the insurance company if there is an excess of rainfall during the coffee season.
The amount of money you receive in the case of excess rainfall is much higher than the premium you paid for the insurance.
However, most coffee growing seasons do not suffer from excess rainfall.
If the rains are not excessive then you will not receive any money from the insurance company even though you paid for the insurance.
The purpose of an insurance product against excess rainfall is to ensure that you always receive some income during the coffee season; even when excess rainfall destroys the current harvest.
In general, it makes more sense to purchase an insurance when your coffee production is at greater risk of experiencing excess rainfall.
It is important to be aware of the fact that the insurance product against excess rainfall is not intended to cover the entirety of your losses. Rather, it is intended to cover part of your costs of production, for example, your expenses on fertilizers when excess rainfall occurs.
There are currently no insurance products being offered. This is because we do not know the number of coffee producers that are interested in such a product, nor do we know whether it would be better to offer it to individuals separately or to a group of producers as a whole. As a result, the goal of today's exercise is to determine what type of insurance product would be most appropriate for you: the insurance product against excess rainfall that is offered to each individual separately, or an insurance against excess rainfall that is offered to a group of producers to which you belong.
Before we focus on the question of whether you would prefer individual or group insurance, we would like to explain to you in more detail how the insurance against excess rainfall works. To this end, please focus on the following illustration.

[EM1]



An insurance product against excess rainfall[EM1] is linked to a weather station that will measure the quantity of excess rainfall. The closest meteorological station to this cooperative is located […] kilometers away. [It is located close to … at …meters above/ below this cooperative. If an insurance product were offered to you, it would be based on the data coming from this station.
The weather station measures the quantity of rain that has fallen in a graduated cylinder. We use the symbol on the left hand side to designate this cylinder for the given weather station. In order to design an insurance product against excess rainfall, a critical level of rainfall must be decided upon as indicated by the red line on the cylinder.
Let's imagine that the amount of rainfall is below the critical level. If the amount of rainfall is below this critical level, the rains were not excessive. If rainfall was not excessive, then the insurance product will not disburse any compensatory payments. But, if rainfall amount is over the threshold, the insurance company compensates you with some amount. The calibrated cylinder of this weather station shows whether or not there was excess rainfall. This cylinder is visible for anyone to see, thereby making it easy for you to check if there was excess rainfall or not.
An insurance against excess rainfall is a more viable option than others, because nobody has to check how much the insured person lost in order to determine the compensation amounts. In the case of insurances against pests for example, your crops need to be checked to determine the extent of damage and the corresponding payment, which can be a long and costly process, and possibly contentious.
An insurance against excess rainfall is intended to protect you against cases where the rains were truly excessive. In other words, it is indented to protect you in those cases where you will probably lose a large share of your income to these rains. To determine how one can see whether rainfall was excessive, we provide a visualization of past rainfall levels. To this end, we use past observations recorded by the closest weather station, which gathers information on rainfall from the past 28 coffee seasons.

[EM2]



EM2

Imagine, for example, that the closest weather station to your cooperative registered a pattern of rainfall like the one detailed above.

This pattern of rainfall serves as an example and doesn't necessarily reflect reality. In the last 28 coffee seasons, there are four that are flagged as experiencing excess rainfall. As a result, the quantity of rain measured by the calibrated cylinder exceeds the critical level. This critical level does not change over time. As you can see in the example: the 1985, 1998, 2005 and 2010 coffee seasons experienced levels of rainfall that were above the critical level.

This means that during the 7 coffee seasons from 1984 until 1990 there was one instance of excess rainfall, there were no such instances from 1991 to 1997, there was one instance from 1998-2004 and two such instances from 2005 to 2011. As a result, there were 2 periods of 7 seasons where one instance of excess rainfall occurred, one period in which none occurred, and one period in which 2 occurred. This means that on average excess rainfall occurred once every 7 years. As a result, one can expect that the insurance will pay out on average once every 7 years.

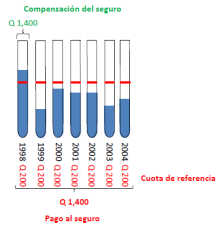
In order to better understand this last point, we focus on the 7 seasons from 1998 to 2004. In the coffee seasons of 1998, there was excess rainfall. The other 6 seasons did not experience excess rainfall. This means that if you had been insured, you would have received a payout from the insurance in one of the seven seasons.

However, it is also possible that there is a longer period of time without any excess rainfall, as was the case from 1991 to 1997. This means that although you were insured during these 7 growing seasons, you would not have received any payments from the insurance product.

On the other hand, it is also possible that excess rains occur more than once during the 7 coffee seasons – as was the case from 2005 to 2007. This means that if you were insured you would have received compensation from the insurance product twice during the seven seasons.

Regardless of how the seasons unfold, you can count on the fact that the insurance pays out on average once every 7 seasons.

[EM3]



EM3

We come back to the 7 seasons 1998-2004, with excess rainfall during the coffee season of 1998, and we focus on the insurance to individuals, and not to groups.

If you are insured individually, the insurance product compensates you when there is excess rainfall. We do not know exactly how much the insurance would pay out, but it would likely be close to Q1,400 per unit of insurance (if it were being offered in reality). As a result we will assume for today that the insurance payouts out approximately Q1,400 per unit. In reality you will be able to purchase more than a unit of insurance, but we are interested in the price that you would be willing to pay for one unit. As a result, we will focus on 1 unit of insurance for the remainder of the day.

It is possible that Q1,400 will not cover the entirety of your income loss. However, it will cover a substantial part of your expenses such as fertilizer. In other words, you can use this compensation for example to purchase more fertilizer

for the next growing season, or to purchase fungicides that counteract the negative consequences of the excess rainfall from this season.

In our example you would have received Q1400 in 1998, if you had been insured during this season. Please be aware that in any season that there isn't excess rainfall, there will not be any payouts from the insurance regardless of the level of rainfall. For example, in both the 1999 and 2000 growing seasons, you would not have received any compensation even though rainfall levels in 2000 were higher than those from 1999. Even when you lose part of the coffee harvest in a season without excess rainfall you will not receive a payout from the insurance. Moreover, it does not matter how much above the critical level we are in a given year– you will always receive the same compensation of Q1,400

You will need to purchase the insurance at the beginning of each coffee season. This means that you will have to decide whether or not to purchase the insurance before you know the levels of rainfall in any given season. In order to make your purchasing decision it is important that you know the price of the insurance product. Let's imagine for the purposes of this example that the insurance is offered for Q200. In other words, you need to pay a premium of Q200 at the beginning of each season if you decide purchase the insurance.

If you had been insured from 1998 to 2004 for Q200 each coffee season, you would have paid the same amount you would have received from the insurance – the aforementioned Q1,400. Because excess rainfall occurs on average once every seven seasons, you can assume that you will receive on average the same amount that you pay out to the insurance company if the price is Q200.

As a result, Q200 is a reference premium. An insurance company would not make any profit if it charged this price, because it would need to pay out the same amount in compensations as it received in premiums. As a result, a company would charge a higher price than Q200. However, if there were a subsidy for the insurance product against excess rainfall, the premium might be lower than the reference level.

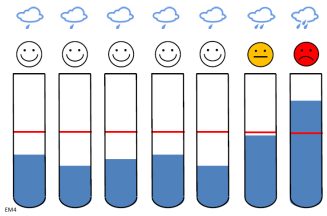
Remember that the goal of **insurance is to help you overcome any financial difficulties during years of substantial loss due to excess rainfall.** In our example, the insurance would have helped you cope with the loss that you would have incurred due to excess rainfall in 1998. In other words, even if the price of the insurance were greater than Q200, an insurance is useful for you because it can really help in the bad years.

And think about the case when two out of the seven seasons experienced excess rainfall, as was the case between 2005 and 2011. In this period you would have received two installments of Q1,400, or 2,800 total. This total compensation would have been much more than the total amount you would have paid for the premium, even if the annual premium were greater than Q200. **However, we would like to emphasize that the insurance is not intended to pay out as much as it takes in premiums**. This means that even if you are insured, you shouldn't be waiting to experience excess rainfall in the hopes of receiving a payout because you will still incur the losses to your crops from the rainfall. This is very similar to other types of insurance. For example, you can benefit from life insurance because this gives your family a sense of security. However, it is obvious that you don't want to die in order to receive the compensation from the insurance.

Please remember that any compensation from the insurance is independent of any income that you lose due to excess rainfall or any other negative event. The only thing that matters for the insurance payout is the amount of rainfall that was measured by the weather station. As a result, the purchase of insurance is very useful for you if your coffee production is at risk of being affected by excess rainfall.

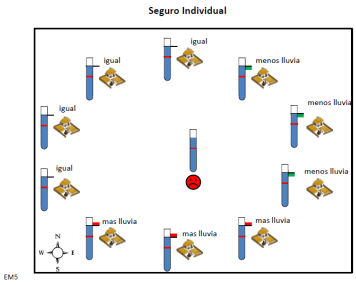
Do you have any questions?

[EM4]



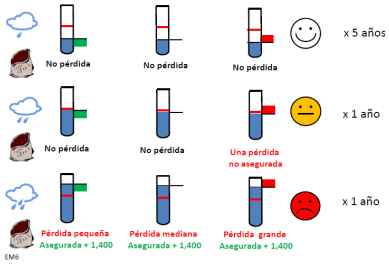
Over the course of 7 seasons, there are on average 5 seasons of normal rainfall, one season of heavy rainfall, and one season of excess rainfall. The level of rainfall is measured at the weather stations. In reality, your crops can also suffer from a lack of rainfall. However, losses due to a lack of rainfall are not covered by an insurance against excess rainfall.

[EM5]



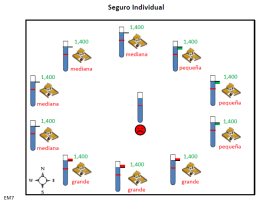
Now, please look at this picture. Please imagine that the closest weather station to this cooperative (which, as we mentioned previously, is located […] kilometers from here) is located in the middle of the picture. Your plots are located at a certain distance from this weather station (they are not located right beside the weather station)
Imagine that there is excess rainfall during the coffee season, and the weather station registers levels of rainfall above the critical level.
The amount of rain that individual plots receive can be different than what the weather station records. We use this symbol (show the red or green flag next to the individual cylinders) to indicate the difference between the amounts of rainfall your plot receives versus the amount of rainfall that was recorded by the weather station.
In these plots, there was less rainfall than what was recorded by the weather station. Some plots received the same amount of rainfall as the weather station. Finally, some plots experienced greater amounts of rainfall than the weather station.

[EM6]



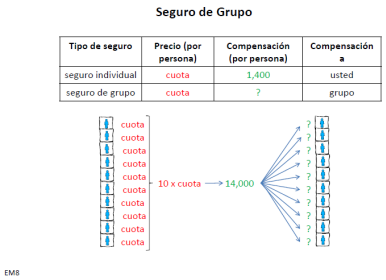
Your coffee production is influenced by the amount of rainfall.
Imagine a coffee season with normal rainfall. In a coffee season with normal rainfall, the weather station will register a normal amount of rain as shown in the first row [of EM6]. In this case it does not matter if your plot experienced less, the same or more rainfall than the weather station. There is no production loss. On average 5 out of 7 seasons are normal rainfall years.
Now imagine that there is a coffee season with heavy rainfall. In a season with heavy rainfall, the weather station will register a high amount of rain, but this will not exceed the critical level, as in the middle row. If the weather station recorded high levels of rainfall and your plot experienced similar or lower levels of rainfall, you will not lose any production. If however, your plots received higher amounts of rain than what was recorded at the weather station, you will lose some of your income from coffee production. On average, one out of every seven growing seasons experiences high rainfall.
Now imagine that there is a coffee season with excess rainfall. The weather station registers this excess, as depicted in the last row of the diagram. If your plots experience less rainfall, then you will suffer some small losses. If your plots experience the same levels of rainfall, you will suffer medium losses. If your plots experience more rainfall, you will suffer a large loss.
In order to cope with the loss of income in seasons with excess rainfall you can purchase an insurance product against excess rainfall. This insurance pays Q1,400 when the weather stations registers excess rainfall. However, it does not provide any compensation to you if the weather stations records low or normal rainfall levels. On average excess rainfall occurs once every seven seasons.

[EM7]



We come back to this picture that indicates the different levels of rainfall that affect different members of the cooperative. Here we have three members that experienced very high levels of rainfall, and therefore experienced large losses. We have three members that experienced less rainfall and therefore experienced small losses. We also have four members who suffered average losses. In the case of excess rainfall, each member of the cooperative that was insured will receive a payout of Q1,400. **This means that while the losses incurred by each individual are not equal, the amounts paid out are the same.**

[EM8]



Up to this point we have talked about an insurance product against excess rainfall that is offered to you as an individual. However, as we mentioned previously, another alternative is to purchase the insurance as a group. The insurance product against excess rainfall that is offered to the group is similar to the insurance against excess rainfall that is offered to the individual.

Remember that in the case of the individual insurance product, the insurance pays Q1,400 when the weather station registers excess rainfall during a coffee season. This compensation is given directly to you. We do not yet know the premium that will be charged for this insurance. In the case of group insurance, you will buy the insurance with a group of individuals. Each member of the group will pay the same amount for the group insurance as they would for the individual insurance. However, when the insurance pays compensations, the money goes to the group and not directly to you.

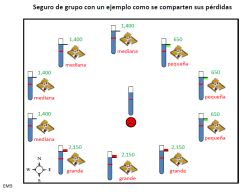
Please allow us to take you through the following example: Imagine that you belong to a group with 10 members. Both the individual and group insurance charge the same premium per person. In other words, each group member pays the same amount for the group insurance as they do for the individual insurance. As a result the insured group pays ten times the premium.

When excess rains occur, the group will receive a compensation of Q14,000. In other words, it receives ten times Q1,400.

How the members of the group decide to split the compensation they receive from the insurance product is completely up to them. This means that the compensation can be allocated however the group sees fit. Note that, in reality, if the insurance against excess rainfall was offered to groups rather than to individuals, not every member of the cooperative would be required to belong to a group for the purposes of purchasing insurance. In other words, the group insurance can be offered to a select few in the cooperative, should they choose to participate.

Do you have any questions?

[EM9]



The potential advantage of the group insurance over individual insurance is in the ability **to share the losses**. The group members that share their losses can adjust how much of the compensation goes to each member in order to reflect how much the member lost from the rains. That is, a member that incurred a really big loss receives a larger share of the compensation, while a member that only incurred a small loss receives a smaller amount.
This distribution of the insurance payout will better protect you against the risk of losses caused by excess rainfall, because you will receive a larger share of the money when you suffer large losses.
To better understand this point; please imagine that you are splitting the losses amongst the members of an insured group. More precisely, the three farmers in the group who incurred the smallest losses receive the smallest amount, or Q650, which is smaller than the amount they would have received with the individual insurance as well.
They receive less than the others because it is easier for them to overcome their financial difficulties with this smaller amount than it is for the other members.
The four farmers that experienced medium losses receive the same compensation they would receive under the individual insurance, Q1,400.
The three farmers with larger losses receive a larger amount, Q2,150, which is more than what they would have received with the individual insurance.
They receive more because they need a larger compensation than the others to overcome their financial difficulties.
If you belong to an insured group and you share your losses in this way, you will be better insured against excess rainfall than you would have been under the individual insurance.
However, there is one potential disadvantage of the group insurance: if you share losses within the group, the group needs to decide how the money will be distributed among its members and this process can be contentious.
We would like to evaluate the demand for insurance against excess rainfall in this cooperative. Recall that the insurance is designed to pay an amount of Q1,400 in the case of excess rainfall, which occurs on average once every 7 years.
The amount of rainfall is measured at a weather station, located […] from here. If the amount of rain exceeds the critical level and you are insured, then you will receive compensation. That is, neither the amount of rainfall that affected your specific plots, nor the level of your losses determines whether or not you receive an insurance payout.
Please consider the risk that comes from being exposed to excess rainfall in this region and the impact that these excess rains can have on your coffee production. Also consider that the rainfall at the weather station can be different from the rainfall on your plots. Now we would like to ask you if you would be willing to purchase these types of insurance.
Now my colleagues will come by each one of you and take down your answer to this question.

Participants fill in a card that gives their willingness to pay following this reasoning:
Suppose that in the real world, this insurance against excess rainfall was offered to you as an individual insurance for Q40, would you buy it? Yes or No? and at Q60? etc. What is the highest price at which you would buy it? Please indicate this on your card.
Now suppose that this insurance against excess rainfall was offered to you as a group insurance for Q40, would you buy it? and at Q60? etc. What is the highest price at which you would buy it? Please indicate this on your card.

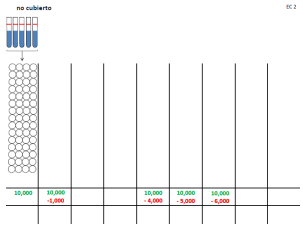
Training for the Games

From this point on, we are moving into a new stage of the presentation where we assign specific amounts to the earnings and to the losses associated with various climatic events.
Please allow us to conduct a small exercise to check that you have understood how the insurance against excess rainfall works. This is simply an example to help with your understanding of the product. Do not assume that it reflects real life, your actual earnings, or the amount of rainfall that affected the region.
For this exercise please imagine that you are a coffee grower and a member of a cooperative. In a normal coffee season your income from coffee is Q10,000. You do not have any other source of income. Also image that an insurance company has placed a weather station right beside your cooperative. The insurance company offers you an insurance product against excess rainfall. If the weather station beside your cooperative records rainfall above the critical level, and you are insured, you will receive a payout of Q1,400.

[EC1]

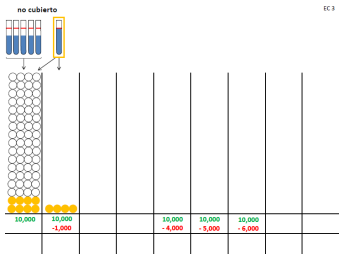
We come back to the picture that represents the different levels of rainfall, as well as the income and losses associated with each one of these.
In each coffee season with normal levels of rainfall, which occurs on overage 5 out of 7 years, your income is Q10,000.
In a season that experiences high levels of rainfall, which occurs on average once every seven years, if you have the same or less rainfall on your actual plots than what the weather station records, you do not experience losses. If your plots experience higher rainfall, you will experience slight losses of Q1,000.
During a season with excess rainfall, which occurs on average once every 7 years, if the quantity of rainfall on your plot is less than what is recorded by the weather station, your loss is of Q4,000, if it is equal then your loss is of Q5,000 and if is greater than your loss is Q6,000.
Just as before, the payout from the individual insurance is Q1,400 in the case of excess rainfall.

[EC2]



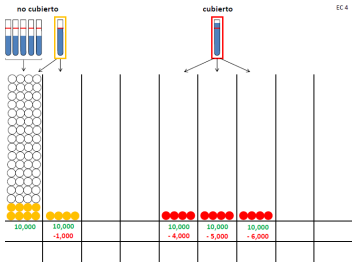
If you had to decide whether or not to purchase the insurance against excess rainfall you would want to know what the chances were of losing some of your income, and what the chances were of receiving compensation from the insurance. For the purposes of this example please imagine that the possibilities are like the ones we will present below.
[also show EC1→]
In order to understand this picture, please focus on the first numbers presented at the bottom.
These numbers reflect all the possible combinations of incomes and losses from the rain. These numbers are exactly the same ones as those we saw in EC1. The potential income in each column is Q10,000. The losses depend on the quantity of rainfall and could be Q1,000, Q4,000, Q5,000 or Q6,000.
[←also show EC1]
Allow us to talk about the possibility that you generate income Q10,000 without any losses. We are referring to the left most column.
We use balls to demonstrate the different possibilities.
For each year there are 12 balls that represent the different possibilities for income and losses. As a result, in the 5 years that there were normal rains, all the balls represent an income of Q10,000 and no losses. There were 5 times 12, or 60 balls that appear like this.

[EC3]



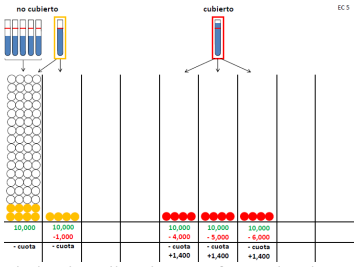
Other combinations of rainfall that leave you with an income of Q10,000 and no losses, are heavy rainfall in the weather station and the same or less rainfall on your plot. Conversely, if there is excess rainfall at the weather station and even more rainfall on your plot, you will incur a small loss of Q1,000.
The yellow balls represent these possibilities of heavy rain. There are 8 balls in the column without any loss, and 4 balls in the column that indicates a loss of Q1,000.

[EC4]



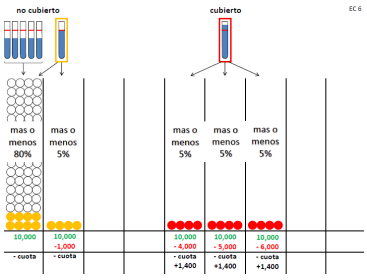
Now we would like to move on to a coffee season that experiences excessive rainfall, which occurs on average once every 7 years. Cases of excess rainfall are represented by red balls. In all cases there are losses, and the exact amount of these losses depends on the amount of rainfall that affected your plot. It is equally likely for you to lose Q4,000, as it is to lose Q, 5,000, i.e. half of your income, or Q, 6,000 in a season with excess rainfall. As a result there are 4 red balls in each column.

[EC5]



The purpose of this exercise is to understand the implications of purchasing an insurance product against excess rainfall. Recall that the insurance only covers cases of excess rainfall and not cases of heavy or normal rainfall. The last two rows on the figure indicate what happens if you purchase the insurance:
If you purchase the insurance, you will pay the premium in each case. Whether or not you receive the payout depends on the level of rainfall measured by the weather station. Each column that features a payout from the insurance of Q1,400 represents an instance where the weather station recorded excess rainfall.

[EC6]



The picture now shows all the possibilities associated with the different levels of rainfall in this scenario. In the first column, there are 60 white balls that represent the 5 out of 7 years where rainfall levels are normal and there are no losses. Without a doubt this is the most likely case.

In one out of 7 years, there are heavy rains represented by the yellow balls. When heavy rains occur, in 8 out of 12 cases there are no losses. In the other 4 cases, there are small losses of Q1,000.
In one out of 7 years, there is excess rainfall. The corresponding cases are represented by 12 red balls, which indicate the equal possibility of losing Q4,000, Q5,000 or Q6,000
In total there are 84 balls in this picture. To better understand the possibility of each different scenario unfolding, you can imagine a deck of 84 cards. Each ball that we see here represents one of these cards. 68 cards, or 80% of the cards, imply that you will not lose anything. 4 cards, which amount to less than 5%, imply that you will lose Q1,000. Another 4 cards imply that you lose Q4,000. Another 4 cards imply that you lose Q5,000. The last 4 cards imply that you lose Q6,000.
Before we continue it is important that you understand the three crucial aspects of an insurance against excess rainfall: first, you pay the premium at the beginning of the coffee season and this money will not be reimbursed under any circumstances. Second, there are cases when you will lose some of your crops due to rains but you will not receive any compensation even though you are insured, just like the four yellow balls indicate. Third, when the insurance pays our, the exact amount does not reflect the actual losses you incurred.
We would like for you to have an idea of how the insurance against excess rainfall works. As a result, please imagine that this is the beginning of the coffee season and these are the different situations that can occur with different probabilities.
The question is whether or not you would like to purchase an insurance against excess rainfall in this example. To answer this question each one of you will receive one of these papers. Please write your name in the top row.

[EC7]

EC 7

SEGURO INDIVIDUAL															
Fila:	Quetzales:														
José	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320
Miguel	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320

temporada	ingresos	cuota	compensación	pérdida	TOTAL
José					
1	10,000				
2	10,000				
3	10,000				
Miguel					
1	10,000				
2	10,000				
3	10,000				

In the top part of the sheet you will see a table similar to the one above.
[also show EC5→]
Imagine that the different situations that can occur with different probabilities are the same as those we show here [EC5].
Focus on the table in front of you. In this scenario, [EC5], what is the highest price you would be willing to pay for the individual insurance against excess rainfall? Whatever the price you are willing to pay, the compensation stays the same at Q1,400. Please circle the highest amount of Quetzales that you would be willing to pay.
[←also show EC5]
Did everyone write down his or her willingness to pay?

[Indicate on the board that Jose is willing to pay Q120 and Miguel is willing to pay Q240]
Now imagine that the insurance company offers you the insurance against excess rainfall for a price of Q200. Please look at your sheet and see whether the price you indicated you would be willing to pay for the insurance is equal to or higher than this Q200 price.
Now please take a look at the bottom part of the sheet in front of you. Here you see a table similar to the table that is shown here below.
If the maximum price you were willing to pay for the insurance is lower than Q200, please fill out the last 3 rows under the column "premium" with a 0. We do this because you did not purchase the insurance in this example. In other words you paid 0 for the insurance.
Also, please fill out the last three rows of the column "compensation" with a 0. We do this because you will not receive any compensation from the insurance if you are not insured regardless of the level of rains recorded by the weather station.

However, if the maximum price you were willing to pay for the insurance is Q200 or higher, please fill out the last 3 rows of the column "premium" with 200. We do this because you purchased the insurance for a price of Q200 in this example.

[Fill in the table for Jose (who doesn't purchase) and Miguel (who purchases)]
Now lets pretend that we are in the first coffee season. First let's determine the level of rainfall that was measured by the weather station by drawing a card from the deck of cards
[show the deck of cards]
In this deck there are seven cards. As there are, on average, 5 out of 7 normal years, 5 out of 7 of these cards represent normal rainfall levels.
[show the five cards with normal rainfall levels]
Because on average every 1 out of 7 years experiences heavy rainfall, one of these cards represents heavy rainfall levels.
[show the card with heavy rainfall]
Because on average every 1 out of 7 years experiences excess rainfall, one of these cards represents excess rainfall levels.
[show the card with excess rainfall]

[let one of the participants draw a card, and show the card to the audience]

[If you draw a normal rainfall card from the deck →]
This card tells us that the weather station recorded a normal level of rainfall. In this case there is no payout from the insurance. As a result, if you purchased the insurance please write 0 in row 1, under the column "premium". Moreover, if rainfall was normal at the weather station you will not lose anything regardless of the difference in rainfall between your parcel and the weather station. As a result, please write 0 in row 1, under the column "losses".
Please calculate your total income including any payout from the insurance, minus the losses you incurred and the premium you paid. Please indicate this amount in row 1 under the column "TOTAL".

[Complete the profiles for José and Miguel and what happened and why]
Did you understand how much income you lost, the compensation you received from the insurance and how much you paid for the insurance in this example?
Also did you understand the total amount you would have had with and without the insurance in this example?
[← if the card from the deck indicates normal rainfall]

[if the card from the deck indicates heavy rainfall→]
This card tells us that the weather station recorded heavy levels of rainfall. In this case there is no payout from the insurance. As a result, if you purchased the insurance please write 0 in row 1, under the column "premium".
If the weather station recorded heavy rainfall you may have suffered a small loss. This will depend on the difference in rainfall levels that affected the weather station versus your plot. If your plot was affected by the same or less rainfall than the weather station, you will not lose anything. If however your plot received more rain, then you will lose Q1,000. To determine how much more/less rainfall affected the weather station versus your plot, we will draw a card for the deck.
[show the deck of cards]
This deck contains 12 cards. The composition of the cards reflects the possibility that you lose nothing or that you lose Q1,000 in the case of heavy rains. There are 8 cards that imply 0 losses,
[show the 8 cards implying zero losses]
and 4 cards that imply losses of Q1,000.
[show the 4 cards implying losses of Q1,000]
Now we will come by each one of you so that you can draw a card from the deck. After you have drawn your card we will place it back in the deck. The card that you draw will determine whether you lost Q0 or Q1,000 because of the heavy rains. Depending on the card drawn, we will fill in row 1 under the column "losses" with 0 or 1,000.
[Draw the same card for Jose and Miguel]
Please calculate your total income including any payout from the insurance, minus the losses you incurred and the premium you paid. Please indicate this amount in row 1 under the column "TOTAL".

[Complete the profiles for José and Miguel and what happened and why]
Did you understand how much income you lost, the compensation you received from the insurance and how much you paid for the insurance in this example?

Also did you understand the total amount you would have had with and without the insurance in this example?
[← if the card from the deck indicates heavy rainfall]

[if the card from the deck indicates excess rainfall→]
This card tells us that the weather station recorded excess rainfall. In this case you will receive a payout from the insurance if you are insured. As a result, if you purchased the insurance, please write Q1,400 in row 1 under the column "payout".
If the weather station recorded excess rainfall you will lose some of your income. How much you lose depends on the difference in rainfall that affected the weather station versus your plot. You can lose Q4,000, Q5,000, or Q6,000. To determine your loss we will draw a card from the deck
[show the cards]
This deck contains 12 cards. The composition of the cards reflects the possibility that you lose Q4,000, Q5,000 or Q6,000. There are 4 cards that imply losses of Q4,000,
[show the 4 cards that imply losses of Q4,000]
There are 4 cards that imply losses of Q5,000
[show the 4 cards that imply losses of Q5,000]
There are 4 cards that imply losses of Q6,000
[show the 4 cards that imply losses of Q6,000]
Now we will come by each one of you so that you can draw a card from the deck. After you have drawn your card we will place it back in the deck. The card that you draw will determine the amount you lost because of the excess rains. Depending on the card drawn, we will fill in row 1 under the column "losses" with 4,000, 5,000, or 6,000.
[Complete the profiles for José and Miguel and explain what happened and why]
Did you understand how much income you lost, the compensation you received from the insurance and how much you paid for the insurance in this example?
Also did you understand the total amount you would have had with and without the insurance in this example?
[← if the card from the deck indicates excess rainfall]

[Now choose the two other options directly, but each time show the 7 cards to explain the different possibilities. And proceed to have the participants each fill rows 2 and 3 in their table. Fill in the table for Jose and Miguel and explain the difference]

We would like to finish the first part of today's activities with a few short questions about how the insurance product against excess rainfall works. After this we will have a one-hour break.
After the break we will continue with the second part of the day's activities. We will compensate you for your participation in the second part of the day with a maximum of Q70. At the beginning of the second part of the day's activities we will explain how we determine your exact compensation.

[Administration of test]
BREAK

II. Explanation of compensation

We now start the second part of our activities. In this part, we will see different exercises in which we will present different scenarios of rainfall. As we did in the exercise before the recess, we will ask you the maximum price at which you would be willing to buy the insurance. In some case, this will be for an individual insurance, in other cases, it will be for a group insurance.
As we told you before, in this part of the activities, you could gain up to Q70. Let us explain to you now how we will determine how much you will gain exactly. The amount that we will pay you depends on the decisions that you will take during the exercises.
We will do 32 exercises with you. In each exercise, we will present a scenario of rainfall and will ask you the maximum price at which you would be willing to buy the insurance. After we will have done all the 32 exercises, we will randomly select one of them to determine the payment for your participation.
With the selected exercise, we will proceed as in the exercise that we presented this morning. To better undertsand the process, please imagine that we go through this process with a participant called Miguel. Miguel did all 32 exercises with us and recorded his decisions as we showed you here.
In the table shown here, we see the decisions taken by Miguel in those 32 exercises. From these exercises, we randomly draw one, by drawing a card from this deck of 32 cards

[Draw a card from a deck of 32 cards]
Suppose that we drew the exercise "Individual 3"
[Show the row #3 on the table]
In the exercise "Individual 3", Miguel was willing to pay Q200 for the insurance.

Now we determine the price at which the insurance is offered by selecting one card in this deck.
[Show a deck of 15 cards]
This deck has 15 cards and each of them refers to a price at which the insurance company will offer the insurance.
Imagine that in this case of exercise "Individual 3", we draw a card with a price of Q120. In this case, we consider that Miguel is insured against excess rainfalls because he was willing to pay a price higher than this one.

Let's talk about this first example
Miguel pays Q120 for the insurance in the exercise "Individual 3".
Now we determine the rainfall level that was measured in the weather station. We draw randomly one card in this deck of 7 cards
[Show a deck of 7 cards]
This deck is the same as the one we used in the exercise this morning, it includes 7 cards that correspond to normal, heavy, or excess rainfall.
Imagine that we draw a card for 'normal rain'. Miguel thus does not receive any payout from the insurance.
However, Miguel loss some income due to the rainfall, let's say Q1,000.
His net income is thus Q10,000-1,000-120 = Q8,880.
We convert this amount by taking 0.7% , so that Miguel will receive Q62.2

Let's talk about a second example
Imagine now that the insurance product is again offered at Q120, and that there was excess rainfall at the weather station.
In this case, Miguel pays Q120 for the insurance.
Because there was excess rainfall, Miguel receives Q1,400 from the insurance company.
In case of excess rainfall, Miguel loose some of his income. Let's determine how much he looses by drawing a card from this deck of 12 cards. The cards from this deck are set so as to represent the different levels of loss that Miguel could suffer in the exercise "Individual 3". This deck of card is similar to the one we use this morning for the exercise.
Let's say we draw a card showing a loss of Q5,000.
This leaves Miguel with Q5,000-120+1400=Q6520. We transform this number into a payment of Q45.6 for this exercise "Individual 3".
He will receive a lower payment than in the first example because he suffered a large loss due to excess rainfall.

Let's talk about a third example
Imagine now that the insurance product is offered at Q240.
In this case, Miguel is not insured against excess rainfall because he decided that he would not buy the insurance at this price in the exercise "Individual 3". In consequence Miguel pays nothing for the insurance.
Since he is not insured, we know that Miguel receives no payout from the insurance.
Please imagine now that there was excess rainfall and that Miguel lost Q5,000. This leaves Miguel with an income of Q5,000. In this case, we transform this into a payment of Q35.
Miguel would receive a payment much lower than in the first example because he suffered a large loss due to excess rainfall.
He receives a payment lower than in the second example because he has not purchased the insurance.
Do you have any question?

III. Protocol for the block of exercies with Individual Insurance (I1-I16)

I1-I16 refer to the graphic representation of the risk scenario for each game, as shown in Appendix A

1. Individual Risk Games – change in expected losses:
Presentations: I1, I2, I3

Now we will be referring to an insurance against excess rainfall that is offered to the individual.
Remember that the insurance pays out Q1,400 every time there is excess rainfall. On average excess rains occur on once every seven years

I1:

Let's focus on the following scenario.

Under this scenario the losses incurred from the excess rains are not severe. On average the losses are Q3,000. The amount of rainfall that your plot receives will vary from one year of excess rainfall to the next. As a result, it is equally likely that you will lose Q2,000, Q3,000 or Q4,000.

We now ask: what is the maximum price you would be willing to pay to purchase the individual insurance against excess rainfall under this scenario.

At this time my colleagues will approach each one of you to record your answer to this question.

Participants fill in a card that gives their willingness to pay

I2:

Let's focus on the following scenario.

[also show I1 →][1]

Let's imagine now that your plot is located on a slight incline and tends to be more affected by excess rainfall than in the previous scenario. As a result the losses you incur due to excess rainfall are more severe than before. On average the losses rise from 3,000 to half of your income, Q5,000. Yet again the amount of rainfall that your plot receives will vary from one year of excess rainfall to the next. As a result, it is equally likely that you will lose Q4,000, Q5,000 or Q6,000.

[←also show I1]

On the one hand, the insurance continues to pay the standard compensation of Q1,400, even though you suffer greater losses than you did previously in the face of excess rainfall.

On the other hand, the payout from the insurance is more useful in this scenario than the one before, because it is more difficult to overcome your financial difficulties in years of excess rainfall.

Comparing this scenario to the previous one, what is the maximum price you would be willing to pay to purchase this insurance?

At this time my colleagues will approach each one of you to record your answer to this question.

Participants fill in a card that gives their willingness to pay

I3:

Let's focus on the following scenario.

[also show I2→]

Let's imagine now that your plot is located on a steeper incline and tends to be more affected by excess rainfall than in the previous scenario. As a result the losses you incur due to excess rainfall are more severe than before. On average the losses rise from 5,000 to more than half of your income, Q7,000. Yet again the amount of rainfall that your plot receives will vary from one year of excess rainfall to the next. As a result, it is equally likely that you will lose Q6,000, Q7,000 or Q8,000. In other words, if there is excess rainfall you will certainly lose more than half your income.

[←also show I2]

On the one hand, the insurance continues to pay the standard compensation of Q1,400, even though you suffered greater losses than you did previously in the face of excess rainfall.

On the other hand, the payout from the insurance is more useful in this scenario than the one before, because it is more difficult to overcome your financial difficulties in years of excess rainfall.

Comparing this scenario to the previous one, what is the price you would be willing to pay to purchase this insurance?

At this time my colleagues will approach each one of you to record your answer to this question.

Participants fill in a card that gives their willingness to pay

2. Individual Risk Games – changing the variance in losses:

Presentations: I4, I5, I6, I7

I4:

Let's focus on the following scenario

[also show I2→]

This scenario [I4] is similar to [I2], which we saw previously

The difference is that we now imagine that the rainfall that affects your plot is always the same, in any year of excess rainfall. As a result, you always lose fifty percent of your income, Q5000 for certain in the case of excess rainfall. This means that in both scenarios the average losses covered are Q,5000.

[1] [also show I1 →] indicates that the presenter shows graphic I1 in addition to the current graphic I2 until [←also show I1]

On the one hand, the insurance against excess rainfall is less useful in [I2] than it is in this situation [I4] if you lose Q4,000.
On the other hand it is more useful if you lose Q6,000
Comparing these two scenarios, what is the price you would be willing to pay to purchase this insurance?
At this time my colleagues will approach each one of you to record your answer to this question.
Participants fill in a card that gives their willingness to pay

I5:
Let's focus on the following scenario
[also show I4→]
If there are excess rains, it is equally likely that you lose Q4,000, Q5,000 or Q6,000. That is to say, you are now exposed to greater risk than you were before. The risk may comne from the fact that, for example, the levels of rainfall that affect your plot are not always the same in the face of excess rainfall. On average the losses covered are the same as before, Q5,000.
[←also show I4]
On the one hand, the insurance against excess rainfall is less useful than before if you lose Q4,000.
On the other hand it is more useful if you lose Q6,000
Comparing this scenario to the previous one, what is the price you would be willing to pay to purchase this insurance?
At this time my colleagues will approach each one of you to record your answer to this question.

I6:
Let's focus on the following scenario
[also show I5→]
This scenario [I6] is also similar to [I5] , which we saw previously
The difference now is that we imagine that the rainfall affecting your plot can change significantly from one year with excess rainfall to another. As a result, it is equally possible that you lose relatively little, Q3,000, or half of your income, Q5,000, or a large part of your income, or Q7,000. In both cases however the average losses covered are Q5,000.
On the one hand, the insurance against excess rainfall is less useful here than it is in [I5] if you lose Q3,000.
On the other hand, it is more useful if you lose a large amount of your income, Q, 7,000
Comparing these two scenarios [I6] and [I5], what is the price you would be willing to pay to purchase this insurance?
[←also show I5]
At this time my colleagues will approach each one of you to record your answer to this question.

I7:
Let's focus on the following scenario.
[also show I6→]
In this scenario you are exposed to greater risk than you were previously. The amount of rainfall that your plot receives can vary considerably from one year of excess rainfall to the next. As a result, it is equally possible that you lose relatively little, Q2,000, or half of your income, Q5,000, or the majority of your income, Q8,000. On average the losses incurred by excess rainfall continue to be Q5,000 as they were before.
[←also show I6]
On the one hand, the insurance against excess rainfall is less useful here than before if you lose only a little, Q2,000.
On the other hand, it is more useful if you lose the majority of your income, Q8,000
Comparing this scenario to the previous one, what is the price you would be willing to pay to purchase this insurance?
At this time my colleagues will approach each one of you to record your answer to this question.

3. Individual Drought Games:
Presentations: I8, I9, I10, I11, I12, I13

I8:
Let's focus on this scenario.
[also show I4→]
This scenario [I8] is similar to the scenario [I4], which we saw previously. However there is one crucial difference: now your coffee production can be damaged not only by excess rainfall or heavy rainfall but also by drought. It is not very likely that a drought occurs. Excess rainfall, which occurs on average once every seven years, is three times more likely than a drought. In the case of a drought you lose relatively little, Q2,000. The insurance does not pay any

compensation, because it is an insurance against excess rainfall and not against drought. In the case of excess rains you lose much more, Q5,000, and the insurance pays Q1,400 if you are insured.
On the one hand, a large loss of Q5,000 due to excess rainfall is more probable that a much smaller loss of Q2,000 due to drought, and therefore the insurance is still useful.
On the other hand, the insurance against excess rainfall is not worth as much if there is an uninsured risk like drought.
Comparing the differences between two scenarios [I8] and [I4], what is the price you would be willing to pay to purchase this insurance?
[←also show I4]
At this time my colleagues will approach each one of you to record your answer to this question.

I9:

Let's focus on this scenario
[also show I8→]
In this scenario you are exposed to greater risk than before because your coffee production is more severely affected by drought. You lose Q4,000 instead of Q2,000. However, a drought continues to be less serious than excess rainfall.
On the one hand, a large loss of Q5,000 caused by excess rainfall is more probable than a small loss of Q4,000 caused by a drought, and therefore the insurance is still useful.
On the other hand, the insurance against excess rainfall is less useful because a drought causes greater loses than before. This loss is not covered by the insurance.
[←also show I8]
Comparing this scenario to the previous one, what is the price you would be willing to pay to purchase this insurance?
At this time my colleagues will approach each one of you to record your answer to this question.

I10:

Let's focus on this scenario
[also show I9→]
In this scenario you are exposed to greater risk than before because your coffee production is more severely affected by drought. You lose the majority of you income, Q8,000 instead of Q4,000. Now the consequences associated with a drought are more severe than those associated with excess rainfall.
On the one hand, the insurance continues to be useful in years of excess rainfall, which are more likely than drought years.
On the other hand, the insurance against excess rainfall is much less useful because the drought can generate very large losses and these losses will not be covered by the insurance. Moreover in a drought year you are left with net income of Q2,000. It can be very difficult to feed your family with such a small income. Moreover if you paid a premium for the insurance that year, you would be left with even less income making it almost impossible to feed your family
[←also show I9]
Comparing this scenario to the previous one, what is the price you would be willing to pay to purchase this insurance?
At this time my colleagues will approach each one of you to record your answer to this question.

I11:

Let's focus on this scenario
Yet again, your coffee production can be affected by excess or heavy rainfall, as well as drought. In the case of drought, which is not covered by the insurance against excess rainfall, you will lose a little, or Q2,000. In the case of excess rainfall, you lose much more, Q5,000.
[also show I8→]
This situation is very similar to the first scenario with drought. The difference now is that both drought and excess rainfall are equally likely to occur. Therefore you suffer a drought on average once every seven years. Moreover, you suffer from excess rainfall on average once every seven years.
On the one hand, a large loss of Q5,000 due to excess rainfall continues to be possible and is more severe than a loss of Q2,000 due to a drought, and therefore the insurance is still useful.
On the other hand, the insurance against excess rainfall continues is less useful in this scenario [I11] than in [I8] because it is more likely than before that you will have losses that are not covered.
[←also show I8]
Comparing the differences between two scenarios [I11] and [I8], what is the price you would be willing to pay to purchase this insurance?
At this time my colleagues will approach each one of you to record your answer to this question.

I12:

Let's focus on this scenario

[also show I11→]

In this scenario you are exposed to higher risks than before because your coffee production is more severely affected by drought. You lose Q4,000 rather than Q2,000. However, a drought continues to be less severe than excess rainfall.

On the one hand, a greater loss of Q5,000 caused by excess rainfall continues to be more severe than a loss of Q4,000 caused by drought, and therefore the insurance is still useful.

On the other hand, the insurance against excess rainfall is now less useful because a drought will cause a greater loss than before. This loss is not covered by the insurance.

[←also show I11]

Comparing this scenario to the previous one, what is the price you would be willing to pay to purchase this insurance?

At this time my colleagues will approach each one of you to record your answer to this question.

I13:

Let's focus on this scenario

[also show I12→]

In this scenario you are exposed to higher risks than before because your coffee production is much more severely affected by drought. You lose the majority of your income, Q8,000, instead of Q4,000. Now the drought is more severe than excess rainfall.

On the one hand, the insurance continues to be useful in years of excess rainfall

On the other hand, the insurance against excess rainfall is a lot less useful than before because a drought causes very large losses and these losses are not covered by the insurance. Moreover in a drought year you are left with net income of Q2,000. It can be very difficult to feed your family with such a small income. Moreover if you paid a premium for the insurance that year, you would be left with even less income making it almost impossible to feed your family

[←also show I12]

Comparing this scenario to the previous one, what is the price you would be willing to pay to purchase this insurance?

At this time my colleagues will approach each one of you to record your answer to this question.

IV. Protocol for the block of exercises with Group Insurance (G1-G13)

G1-G13 refer to the graphic representation of the risk scenario for each game, as shown in Appendix A

[This is to be read before the second bloc, either individual or group, depending on the cooperative program]

Before starting with the second bloc it is very important that you remember:

First: In all of the following exercises until the end of the day your potential income is Q10,000 for cultivating coffee and you do not have other sources of income. That is, we do not want to know your willingness to pay in real life but your willingness to pay for the insurance under these conditions.

Second: The more of your income you can lose due to excess rainfall, the more valuable is having insurance for you.

Third: The more of your income you can lose due to excess rainfall, the more valuable is having an insurance that compensates you for more of your losses.

1. Group Sharing Games – without sharing rule:

Presentations: G1, G2, G3

Now, we will talk about insurance against excess rainfall that is offered to groups.

Remember that the group insurance is very similar to the individual insurance. For example, the premium that each member of an insured group has to pay is the same as the premium of the individual insurance. Also, the insurance company pays as much compensation per member of the group insurance as it pays to a person who has an individual insurance. In other words, in case of excess rainfall the insurance company pays to a group with 10 members 10 times Q1,400, or Q14,000.

The difference between individual insurance and group insurance is that you receive your compensation directly in the first case while it is the insured group that receives the compensation in the second case. How one distributes the compensation among the members of the insured group is completely up to the group.

G1:

Let us focus on this scenario.

Again, on average excess rainfall occurs once every seven years. If there is excess rainfall, a third of the members of the cooperative experience relatively little damage and lose Q4,000 because their plots did not get much rain. Another third lose half of their income, so the average loss within this group is Q5,000. A final third of the members suffer larger income losses due to the excess rainfall, totaling Q6,000.

Each member of the cooperative faces the same likelihood of losing relatively little, the same, or more than the other members. In other words, you could suffer relatively little during this year with excess rainfall but be heavily affected during the next year.

We know ask what is the price you are willing to pay to purchase a group insurance against excess rainfall in this scenario.

Please indicate your maximum willingness to pay in the first row. [G1]

G2:

Let us focus on this scenario.

[show also G1→]

In this scenario the members of the cooperative are exposed to more risk than before. In case of excess rainfall, a third of the members now only lose a little, Q,3000, while another third loses a large share of their income, Q7,000. And there is a final third of members that suffer the average losses within the group, Q5,000. The average losses are the same as before.

[←show also G1]

There can also be more risk because, for example, the rainfall in the area of the cooperative can be very different, damaging some members much more than others.

On the one hand, the insurance against excess rainfall is less useful than before if one loses only a little, Q3,000.

On the other hand, it is more useful if one suffers from big losses of Q7,000.

Considering the differences between this scenario and the previous scenario, at what price are you willing to purchase the insurance?

Please indicate your maximum willingness to pay in the second row. [G2]

G3:

Let us focus on this scenario.

[show also G2→]

In this scenario the members of the cooperative are exposed to even more risk than before. Now, in case of excess rainfall a third of the cooperative loses very little, Q2,000, while another third loses the majority of their income, Q8,000. Also, the last third of members lose the average loss amount of the group of Q5,000. The average loss in the group is the same as before.

[←show also G2]

On the one hand, the insurance against excess rainfall is less useful than before if one loses very little, Q2,000.

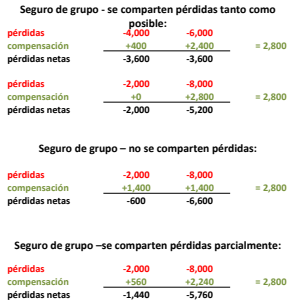
On the other hand, it is more useful if one loses the majority of his or her income, Q8,000.

Considering the differences between this scenario and the previous scenario, at what price you are willing to purchase the insurance?

Please indicate your maximum willingness to pay in the third row. [G3]

2. Group Sharing Games – explanation of sharing rules:

Presentation: RP



As we indicated before lunch, the potential advantage of group insurance is the possibility to assign more compensation to the members that lose relatively more, and less compensation to the members that lose relatively little due to excess rainfall. If the insured group distributes the compensation in this way, its members **share their losses**. Members that

share their losses insure their losses better because they receive more compensation whenever they suffer from big losses. The individual insurance does not offer this advantage.
Until now we said that the distribution of the compensation among the members of an insured group is completely up to the group. However, in the next exercises of the group insurance we are going to suppose that one enforces one of the following three rules for distribution within an insured group:

There is a rule with which the members of the insured group share their losses as much as possible. For example, let us imagine that Mauricio and I form an insured group of two members. We receive a compensation of Q2,800 in case of excess rainfall, twice Q1,400 like in the individual insurance. It is our decision how we distribute these Q2,800 among us.
In this first example Mauricio had little damaged and only lost Q4,000 while I was very damaged and lost Q6,000. As Mauricio lost Q2,000 less than I did, he receives Q2,000 less of the compensation than I do, that is only Q400 while I receive Q2,400. With this distribution of the compensation both of us have net losses of Q3,600 at the end.
In this case we, the members, share our losses entirely.
However, sometimes it is not possible to share his or her losses entirely. For example, if Mauricio only loses Q2,000 and I lose Q8,000 and within the group we share our losses as much as possible, Mauricio do not receive any compensation while I receive Q2,800. In other words, we would have different net losses of Q2,000 and Q5,200.
On the one hand, with this rule it is possible that one does not receive any compensation from the insurance although one paid the premium.
On the other hand, a group insurance with a rule to share his or her losses as much as possible insures big losses much better than an individual insurance because it assigns the highest possible compensation to the members that suffer from very big losses. Also, only if one has small losses does one not receive any compensation, that is, if one can solve his or her economic problems in a more or less easy way. This rule fully harnesses the potential advantage of the group insurance.
Do you have any question?

There is another rule with which the members of the insured group do not share their losses. That is, whenever there is excess rainfall each member receives the same compensation in spite of different losses within the group. Therefore, the differences between the losses of the members are the same after the distribution of the compensation as they were before. Considering the insurance that we are presenting today, and again imagining that Mauricio and I form an insured group, we would both receive Q1,400 of compensation in case of excess rainfall. Therefore in this example, although Mauricio only lose Q2,000 and I lose much more, Q8,000, we both receive the same compensation. We receive Q1,400 both with the group insurance that is based on this rule and with an individual insurance. In this case, Mauricio finishes with a net loss of Q600 and I finish with a loss of Q6,600. The difference between our net losses is much bigger with this sharing rule than with the rule in which we share the losses as much as possible. That is, it will be much more difficult for members with big losses to solve their economic problems than for other members with small losses. Consequently, the rule of not sharing his or her losses does not harness the potential advantage of the group insurance.
A group insurance with this rule is very similar to an individual insurance.
Do you have any question?

Also, there is a rule in which the members of the insured group share their losses partially. That is, the members that lose relatively more receive more compensation while the members that lose relatively little receive little compensation. For example, if Mauricio and I form an insured group again we would receive Q2,800 of compensation in case of excess rainfall. To share our losses partially, we consider the total amount of our losses. In this case, these are Q10,000. Of these Mauricio lose 1/5, Q2,000, and I lose 4/5, Q8,000. Having in mind this relation between the losses of Mauricio and my own, we distribute the compensation. Since Mauricio lost 1/5 of the total losses, he receives 1/5 of the total compensation, Q560. Since I lost 4/5 of the total losses, I receive 4/5 of the total compensation, Q2,240.
[Ask questions of the type: if I lose ½ of the total loss, how much do I receive of the total compensation?]
In this case, Mauricio at the end has a net loss of Q1,440 and I one of Q5,760. The difference between our net losses is smaller with this sharing rule than with the rule with which we do not share the losses. But it is bigger than with the rule with which we share our losses as much as possible. The rule of sharing his or her losses partially harnesses the potential advantage of the group insurance partially.
On the one hand, an insurance with this rule insures big losses better than an individual insurance because it assigns a higher compensation to the members that suffer from big losses.
On the other hand, it insures big losses worse than a group insurance with a rule to share his or her losses as much as possible because it assigns a lower compensation to the most affected members than the other.
Do you have any question?

In the following exercises we assume that the group adopts one of the previous sharing rules and we ask you how much you are willing to pay for joining it.

3. Group Sharing Games – with explicit sharing rule:
Presentations: G4, G5, G6
G4:
[Cover sharing rules "partially" and "as much as possible"]
Let us focus on this scenario.
Again, on average excess rainfall happens once every seven years. If there is excess rainfall, a third of the members of the cooperative are little affected and lose Q4,000 because their plots did not get much rain. Another third loses half of their income, or Q5,000, which is the average loss within the group. At the same time there is a third of the members that suffer a lot from excess rainfall on their plots and lose a big part of their income, Q6,000. For each member of the cooperative it is equally possible to lose little, a half, or a lot. In other words, you could suffer little during this year with excess rainfall but a lot during the next and so on.
First, let us imagine that the members of an insured group **do not share their losses**. That is, all members receive Q1,400 of the compensation independent of the losses that they may have: little, medium or big losses. Remember that group insurance with this distribution of compensation is very similar to an individual insurance.
The question is at what price you are willing to purchase a group insurance in which members do not share their losses in this scenario? Please mark your maximum willingness to pay in the first row of the first bloc. [G4A]

[Reveal sharing rule "partially"]
Now, let us imagine that the members of an insured group **share their losses partially**. That is, the members that lose relatively more receive a high compensation while the members that lose relatively little receive a low compensation. For example, if the loss of one member represents 1/5 of the total loss of the group, he or she also receives 1/5 of the total compensation of the group.
[Ask questions of the type: if I lose ½ of the total loss, how much do I receive of the total compensation?]
Compliant with this rule, in this exercise members that lose little only receive Q1,120 of the compensation, members that lose half of their income receive Q1,400 and members that lose a big part of their income receive Q1,680.
On the one hand, this rule of distributing the compensation is less useful than the previous rule if one loses Q4,000.
On the other hand, it is more useful if one loses Q6,000.
Considering the differences between this rule and the previous rule: The question is at what price are you willing to purchase a group insurance in which members share their losses partially in this scenario? Please mark your maximum willingness to pay in the second row of the first bloc. [G4B]

[Reveal sharing rule "as much as possible"]
Now, let us imagine that the members of the insured group **share their losses entirely**. That is, members that lose Q4,000 receive Q400 in compensation, while members that lose Q1,000 more, Q5,000, receive Q1,000 more in compensation, Q1,400, and members that lose Q2,000 more, Q6,000, receive Q2,000 more of compensation, Q2,400.
The calculation of potential income less the loss plus the compensation has as result that each member keeps a total net amount of Q6,400 less the premium of the insurance in case of excess rainfall in all cases.
[10,000-4,000+400=6,400; 10,000-5,000+1,400=6,400; 10,000-6,000+2,400=6,400]
In other words, although one does not know how much one will lose in case of excess rainfall, each member of the insured group knows with certainty the net income that he will have.
On the one hand, this rule of distributing the compensation is less useful than the previous rule if one loses Q4,000.
On the other hand, it is more useful if one loses Q6,000. Also, with this rule you know with certainty how much you will have in case of excess rainfall, which is also very useful.
Considering the differences between this rule and the previous rule: The question is at what price are you willing to purchase a group insurance in which members share their losses as much as possible in this scenario? Please mark your maximum willingness to pay in the third row of the first bloc. [G4C]

G5:
Let's focus on this scenario.
[cover sharing rule "as much as possible"]
[show also G4→]
In this scenario the members of the cooperative are exposed to more risk than before. There can be more risk because, for example, the rainfalls in the area of the cooperative tend to be very heterogenous, damaging some members much more than others. In case of excess rainfall the average loss is the same as before. But there is more

inequality between members. Now a third loses little, Q3,000, while another third loses a big part of their income, Q7,000. And there is a third of the members that lose the average of the losses of the group, Q5,000.
[←also show G4]
First, let us imagine that the members of an insured group **share their losses partially**. That is, members that lose little only receive Q840 of the compensation, members that lose half of their income receive Q1,400 and members that lose a big part of their income receive Q1,960.
On the one hand, in this scenario this sharing rule of the compensation is less useful than in the previous scenario if one loses little, Q3,000.
On the other hand, it is more useful if one suffers from big losses of Q7,000.
Considering the differences between this scenario and the previous scenario: The question is at what price are you willing to purchase a group insurance in which members share their losses partially in this scenario? Please mark your maximum willingness to pay in the first row of the second bloc. [G5B]

[Reveal sharing rule "as much as possible"]
Now, let us imagine that the members of the insured group **share their losses as much as possible**. That is, members that lose little do not receive any compensation, members that lose half of their income receive Q1,400 and members that lose a big part of their income receive Q2,800. One cannot share more because one does not pay any compensation anymore to the members with little losses.
On the one hand, this rule of distributing the compensation is less useful than the previous rule if one loses little, Q3,000. In such a case one does not receive any compensation of the insurance although one paid a certain premium.
On the other hand, this rule is more useful if one suffers from big losses of Q7,000 because it insures very well the big losses.
Remember that you could suffer little during this year with excess rainfall but a lot during the next year and vice versa. In other words, in the long run each member of the cooperative will receive as many times no compensation as he or she will receive the highest compensation of Q2,800.
Considering the differences between this rule and the previous rule: The question is at what price are you willing to purchase a group insurance in which members share their losses as much as possible in this scenario? Please mark your maximum willingness to pay in the second row of the second bloc. [G5C]

G6:
[Cover sharing rule "as much as possible"]
Let us focus on this scenario.
[also show G5→]
In this scenario the members of the cooperative are exposed to even more risk than before. In case of excess rainfall the average loss continues to be Q5,000 like in the previous scenarios, but there is a big difference in losses between the members of the cooperative. Now, a third loses very little, Q2,000, while another third loses the majority of their income, Q8,000. Also, there is a third of the members that lose half of their income, Q5,000.
[←show also G5]
First, let us imagine that the members of an insured group **share their losses partially**. That is, members that lose little only receive Q560 of the compensation, members that lose half of their income receive Q1,400 and members that lose the majority of their income receive Q2,240.
On the one hand, in this scenario this sharing rule of the compensation is less useful than in the previous scenario if one loses very little, Q2,000.
On the other hand, it is more useful if one loses the majority of his or her income, Q8,000.
Considering the differences between this rule and the previous rule: The question is at what price are you willing to purchase a group insurance in which members share their losses partially in this scenario? Please mark your maximum willingness to pay in the first row of the third bloc. [G6B]

[Reveal sharing rule "as much as possible"]
Now, let us imagine that the members of an insured group **share their losses as much as possible**. That is, members that lose little do not receive any compensation, members that lose half of their income receive Q1,400 and members that lose a big part of their income receive Q2,800. It is better to share losses in this way than to share losses partially, because this way one ensures better the cases with big losses.
On the one hand, this rule of distributing the compensation is less useful than the previous rule if one loses very little, Q2,000. In such a case one does not receive any compensation of the insurance although one paid a certain premium.

On the other hand, this rule is more useful if one loses the majority of his or her income, Q8,000, because it ensures very well this big loss.

Remember that you could suffer little during this year with excess rainfall but a lot during the next year and vice versa. In other words, in the long run, each member of the cooperative will receive no compensation as many times as he or she will receive the highest compensation of Q2,800.

Considering the differences between this rule and the previous rule: The question is at what price are you willing to purchase a group insurance in which members share their losses as much as possible in this scenario? Please mark your maximum willingness to pay in the second row of the third bloc. [G6C]

4. Group Heterogeneity Games

Presentations: G7, G8, G9, G10, G11

G7:

Let focus on this scenario.

Again, on average excess rainfall occurs in one out of seven years. If there is excess rainfall, for all members of the cooperative it is equally possible to lose little, a half or a lot. A third of the members have little damage and lose Q2,000 because they do not have too much excess rain on their plots. Another third loses half of their income, which is the average of the losses within the group, Q5,000. Another third of the members suffers very much from excess rainfall on their plots and lose the majority of their income, Q8,000.

Let us imagine that the members of an insured group share their losses partially. That is, the members that lose relatively more receive more compensation while the members that lose relatively little receive little compensation. For example, if the loss of one member represents 1/5 of the total loss of the group, he or she also receives 1/5 of the total compensation of the group.

[Ask questions of the type: if I lose ½ of the total loss, how much do I receive of the total compensation?]

Compliant with this rule, in this exercise members that lose little only receive Q560 of the compensation, members that lose half of their income receive Q1,400 and members that lose the big majority of their income receive Q2,240.

For each member of the cooperative it is equally possible to lose only a little, the average or a lot. In other words, you could suffer little during this year with excess rainfall but a lot during the next year and vice versa. Therefore, in the long run each member equally benefits from a group insurance that shares the losses partially.

The question is at what price are you willing to purchase a group insurance with this distribution of compensation in this scenario? Please mark your maximum willingness to pay in the first row. [G7]

G8:

Let us focus on this scenario.

This scenario is similar to the previous one: Again, in case of excess rainfall, some members of the cooperative have little damaged and lose Q2,000. Others lose half of their income. Also, there are members that are very damaged and lose the majority of their income, Q8,000. Within the group one shares losses partially.

[show also G7→]

However, there is a crucial difference: Now it is more likely that the losses of the members are very different. There are some that tend to lose less and others that tend to lose more. You are among those that tend to lose less. In other words, you are exposed to less risk than the majority of the other members of the cooperative. For example, it can be that your plot has a slope that tends to be less affected by excess rainfall than the plots of the others. This implies that in the majority of cases you lose little due to excess rainfall. However, you still could have big losses.

[←show also G7]

On the one hand, the insurance continues to be very useful if you suffer from big losses of Q5,000 or Q8,000.

On the other hand, in this scenario it is more likely than in the previous scenario that the insurance is not very useful because you tend to lose little and receive less compensation on average.

Considering the differences between this scenario and the previous scenario, at what price are you willing to purchase a group insurance in which members share their losses partially in this scenario? Please mark your maximum willingness to pay in the second row. [G8]

G9:

Let us focus on this scenario.

[show also G8→]

In this scenario it is even more likely that you lose little. It is not possible that you lose a lot. In other words, you are exposed to an even lower risk than the majority of the other members of the cooperative than before.

[←show alsoG8]

On the one hand, the insurance continues to be very useful if you suffer big losses of Q5,000.
On the other hand, in this scenario it is even more likely than in the previous scenario that the insurance is not very useful because even more than before you tend to lose little and receive even less compensation on average.
Considering the differences between this scenario and the previous scenario, at what price are you willing to purchase the group insurance in which members share their losses partially in this scenario? Please mark your maximum willingness to pay in the third row. [G9]

G10:
Let us focus on this scenario.
In case of excess rainfall the members of the cooperative still lose Q2,000, Q5,000 or Q8,000. Within the group one shares losses partially.
[show also G7→]
The crucial difference between this scenario and the previous scenarios is that now you are among those that tend to lose more than the other members. In other words, you are exposed to more risk than the majority of the others of the cooperative. For example, it could be that your plot has a slope that tends to be more affected by excess rainfall than the plots of the other members of the cooperative.
On the one hand, the insurance is not very useful if you suffer little losses of Q2,000.
On the other hand, in this scenario it is more likely than in the previous scenario that the insurance is very useful because you tend to lose a lot and receive more compensation on average.
Considering the differences between this scenario and the first scenario G7, at what price you are willing to purchase a group insurance in which members share their losses partially in this scenario?
[←show also G7]
In the first row of the second bloc you see your willingness to pay in the first scenario. Please mark now your maximum willingness to pay in this scenario in the second row of the second bloc. [G10]

G11:
Let us focus on this scenario.
[show also G10→]
In this scenario it is still more likely that you are among those that tend to lose more than the other members in case of excess rainfall. It is not likely that you lose little. In other words, you are exposed to an even bigger risk than the majority of the other members of the cooperative than in the previous scenario.
[←show also G10]
In this scenario it is even more likely than in the previous scenario that the insurance is very useful because more than before you tend to lose a lot and receive even more compensation on average. And also if you suffer from a loss of Q5,000 the insurance is very useful.
Considering the differences between this scenario and the previous scenario, at what price are you willing to purchase a group insurance in which members share their losses partially in this scenario?
Please mark now your maximum willingness to pay in this scenario in the third row of the second bloc. [G11]

5. Group Sharing Games – deliberation:
G12:
Let us focus on this scenario.
Again, on average excess rainfall happens once every seven years.
If there is excess rainfall, a third of the members of the cooperative experience little damage and lose Q2,000 because they do not have too much excess rain on their own plots. Another third loses half of their income, which is the average loss within the group, Q5,000. At the same time there is a third of the members that suffer very much from excess rainfall on their plots and loses the majority of their income, Q8,000. It is equally possible that you belong to the third with little losses, to the third with medium losses or to the third with very big losses.
At the bottom you see the distributions of compensation of the different rules.

The rule with which the members of the insured group share their losses as much as possible **insures the big losses better** than the other rules because it assigns the highest compensation to the members that lose a lot. The rule with which the members of the insured group do not share their losses insures the big losses worse than the other two rules because it is very similar to the individual insurance and does not harness the potential advantage of the group insurance. The rule with which one shares the losses partially insures the big losses worse than the rule with which one shares the losses as much as possible, but better than the rule with which one does not share the losses.
Do you have any question?

Another possibility to compare the three rules is to ask oneself which one is the **fairest**. The rule with which one does not share his or her losses can appear to be fairer than the others because each member pays the same premium then the compensation also should be the same. On the other hand, it can appear to be fairer that the members with the biggest losses receive the highest compensation. In this case the rule with which one shares his or her losses as much as possible would be the fairest. Also, it can appear that the rule with which one shares the losses partially is the fairest because it assigns more compensation to members with big losses than the rule with which one does not share the losses. At the same time, it does not leave the members of the group with small losses without compensation as is the case with the rule with which one shares the losses as much as possible.
Do you have any question?

Finally, one can compare the three rules with respect to their **potential of conflict** within the group. In groups with rules with which one shares the losses partially or as much as possible members could have an incentive to indicate more losses than they actually had because this way they would receive more compensation. In this sense the rule with which one does not share the losses can have less potential of conflict than the other two.
Do you have any question?

Considering these three aspects – how the losses are insured, how fairly compensation are distributed and the potential of conflict – the question is what type of rule do you prefer?
Remember that the insurance company determines the premium of the insurance independently of the sharing rule that the group adopts.
Please mark your preference in the first row. [G12A]

To better understand how the different rules function let us imagine now that the weather station records excess rainfall and we consider all of you to be insured as a group. That is, if we use this exercise to determine your payout for participation at the end of the day, we will consider all of you to be insured should there be excess rainfall.
In case of excess rainfall you will lose Q2,000, Q5,000 or Q8,000. To determine your exact loss each of you is going to draw a card from this deck. In this deck there are four cards that indicate a loss of Q2,000, four cards that indicate a loss of Q5,000 and four cards that indicate a loss of Q8,000. In other words, it is equally possible that you lose little, the average or a lot.
[Make the connection between the cards and the red balls in the presentation]
[Participants draw individually one card of the deck; interviewers mark the loss]
Now you know how much you lost due to excess rainfall in our example and which rule of distribution you would prefer. Remember that you could suffer little during this year with excess rainfall but a lot during the next one and vice versa. In other words, in the long run each of you would benefit equally from a rule with which one shares the losses although in this year it can be that you benefit a lot or little. If the insurance company offers a group insurance in the real world, you would have to decide whether you would accept the offer. Before taking this decision you also would have the opportunity to discuss together how you would share the losses in your group in case you would want to purchase the insurance. Therefore, we ask you now to discuss what type of rule would be better for your group. At the beginning of this discussion each of you should say in one sentence which rule he prefers and why. After this we give you 10 minutes to discuss the different options in a detailed manner. The objective of this discussion is that you decide which rule you adopt.
[each participant indicates and justifies his or her preference; if it is necessary animate by giving the three arguments]
[there is no discussion if all prefer the same rule!]
[the group discusses not more than 10 minutes; if it is necessary animate indicating the different preferences]
It can be that during this discussion you changed your opinion with respect to the different rules because, for example, now you understand better how they function. Therefore, we ask you again what type of rule you prefer.
Please mark your preference in the second row. [G12B]

V. Protocol for the block of Individual Real Value Games

Presentations: I14, I15, I16
Throughout the day we've asked you to imagine that you are coffee farmers with potential incomes of Q10,000 and that your coffee production may be affected by excess rainfall. Now, let's not talk about this any more.
On the contrary, we will present to you different hypothetical lotteries and ask you how you would like to play these lotteries. Lotteries are based on monetary values that are equal to the values that will be used for payment at end of day. That is, if one of the following exercises is used to determine payment for participation, its monetary values represent the actual monetary value of the payment.

Are there any questions?

I14:

The maximum payment for your participation in the second part of today's exercises is Q70. But you can lose a part of this payment. Imagine that you take a random card from a deck consisting of 84 cards to determine how much you lost. Every ball we see in this illustration is one of these cards. 68 cards, or roughly 80%, indicate that you lose nothing. Four cards, or about 5%, indicate that you lose Q7. Another 4 cards indicate that you lose Q14. Another 4 cards indicate that you lose Q21. The last 4 cards indicate that you lose Q28.

Before drawing the card you can pay a certain price to discount its loss by Q9.8 if it indicates a loss of Q14, Q21 or Q28. The question is what price are you willing to pay to get this discount on losses?.

Now my colleagues will approach you to record your answer to this question.

I15:

[show also I14 →]

Now imagine that you can lose more than before. The 4 cards that involved a loss of Q14 in the previous bet now involve a loss of Q28. The four cards which involved a loss of Q21 in the previous bet now involve a loss of Q35. And the four cards which involved loss Q28 in the previous wager now involve a loss of Q42.

[← show also I14]

Before drawing the card you can pay a certain price to discount its loss by Q9.8 if it indicates a loss of Q28, Q35 or Q42. Considering the differences between this and the previous lottery, what price are you willing to pay to get this discount on losses?

Now my colleagues will approach you to record your answer to this question.

I16:

[show also I15 →]

Now imagine losing a similar bet. The difference is that this time you can lose more because of the bet. The 4 cards that involved a loss of Q28 in the previous bet now involve a loss of Q42. The four cards which involved a loss of Q35 in the previous bet now involve a loss of Q49. And the four cards which involved loss Q42 in the previous wager now involve a loss of Q56.

[← show also I15]

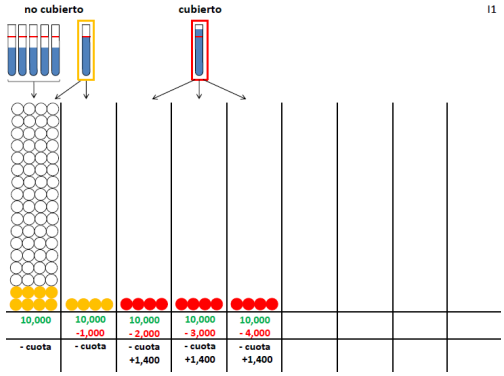
Before drawing the card you can pay a certain price to discount its loss by Q9.8 if it indicates a loss of Q42, Q49 or Q56. Considering the differences between this and the previous lottery, what price are you willing to pay to get this discount on losses?

Now my colleagues will approach you to record your answer to this question.

END OF EXPERIMENT PROTOCOL

Games Graphical Representation
Risk Games

I1:



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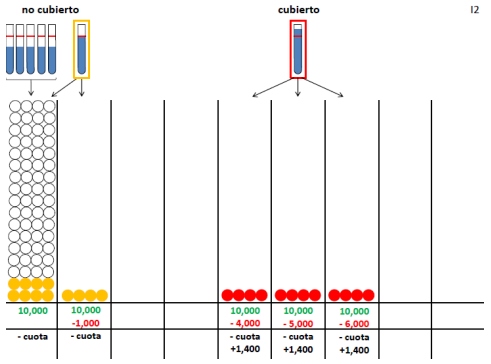

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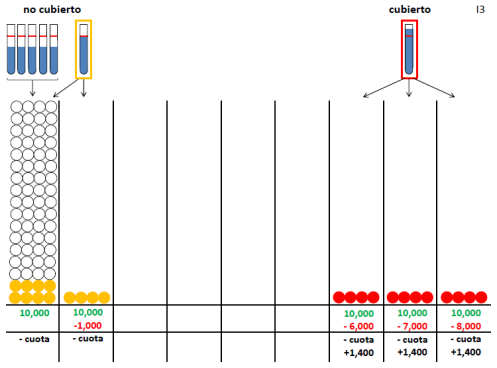

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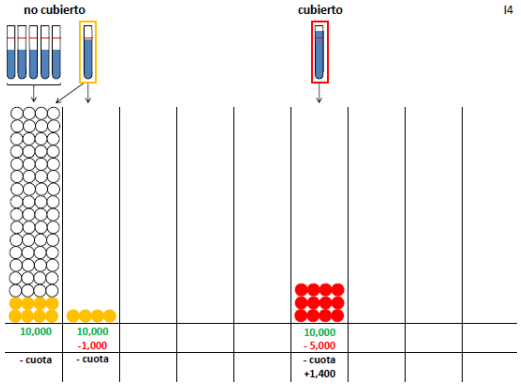

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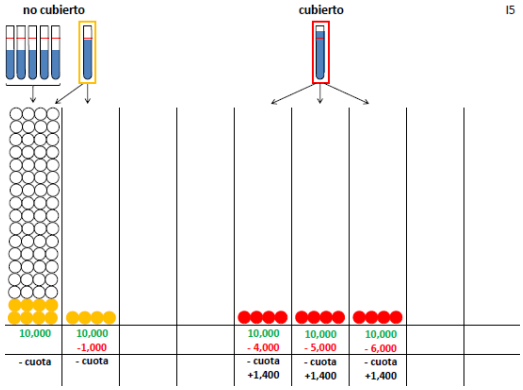

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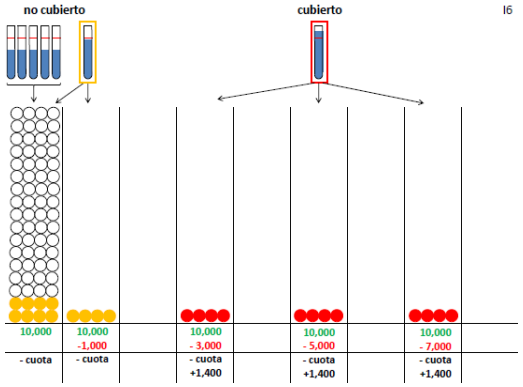

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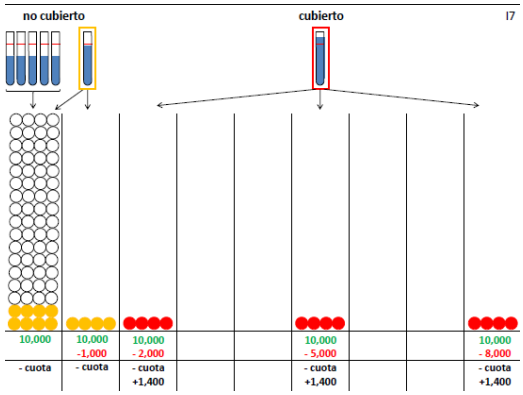
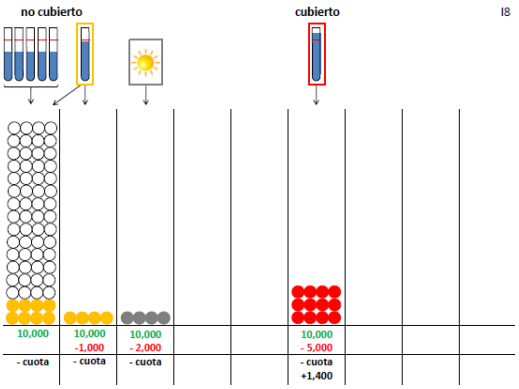
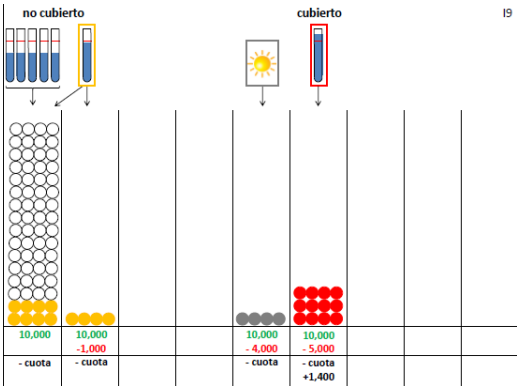


Drought Games

I8:



I9:



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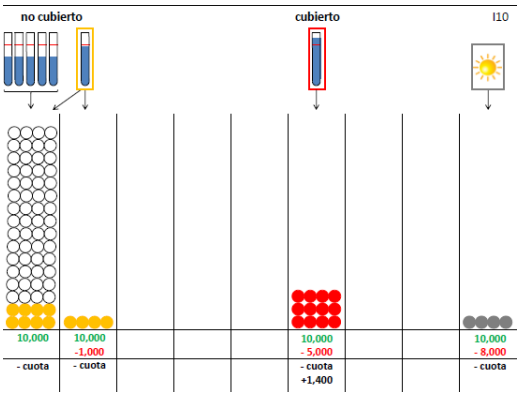

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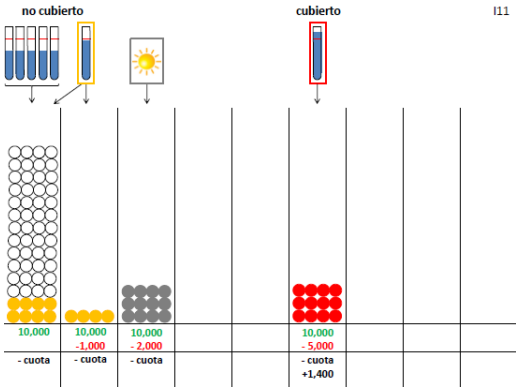
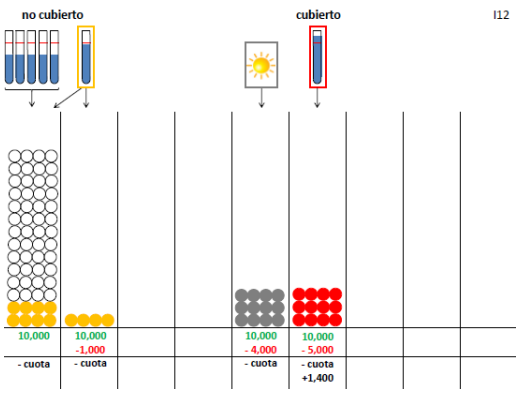


I12:



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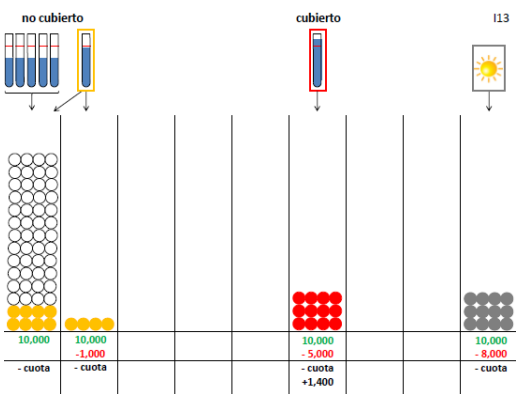
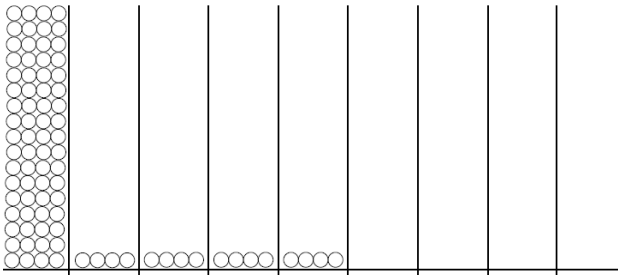


Real Value Games

I14:

I14

Q 70



-0	-7	-14	-21	-28				
- precio	- precio	- precio +9.8	- precio +9.8	- precio +9.8				

I15:

I15

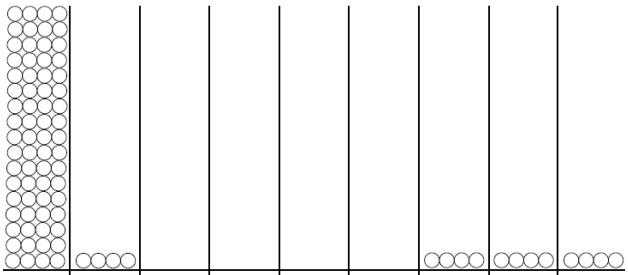
Q 70

-0	-7			-28	-35	-42		
- precio	- precio			- precio + 9.8	- precio + 9.8	- precio + 9.8		

I16:

I16

Q 70

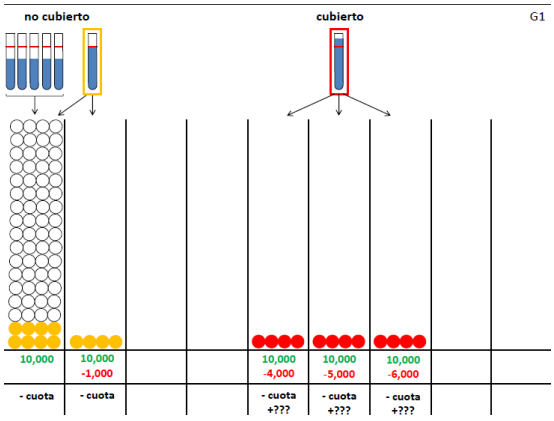


-0	-7					-42	-49	-56
- precio	- precio					- precio + 9.8	- precio + 9.8	- precio + 9.8

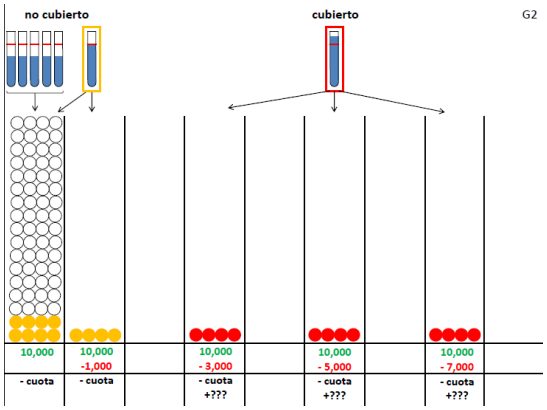
Group Sharing Games

Without distribution rules

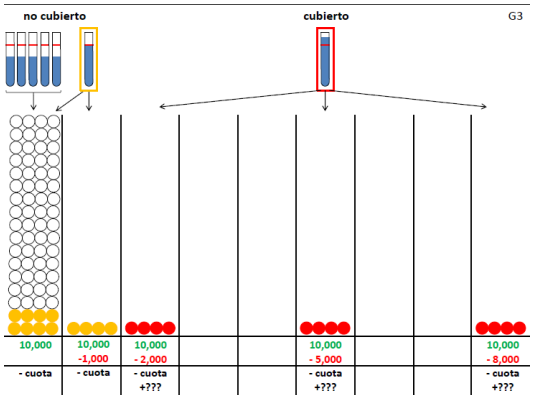
G1:



G2:

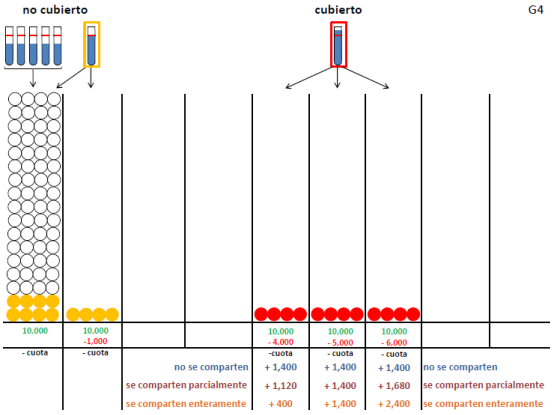


G3:

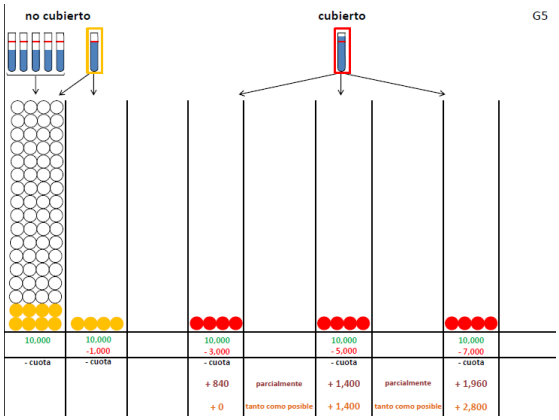


With distribution rules

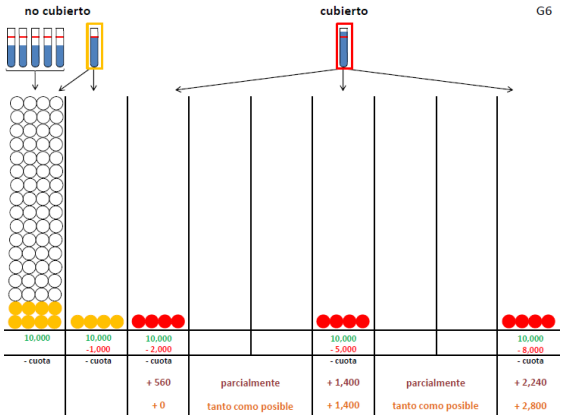
G4:



G5:

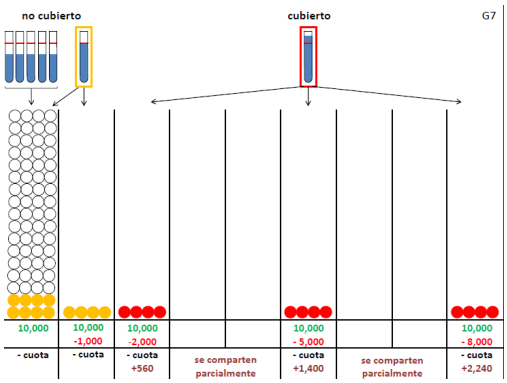


G6:

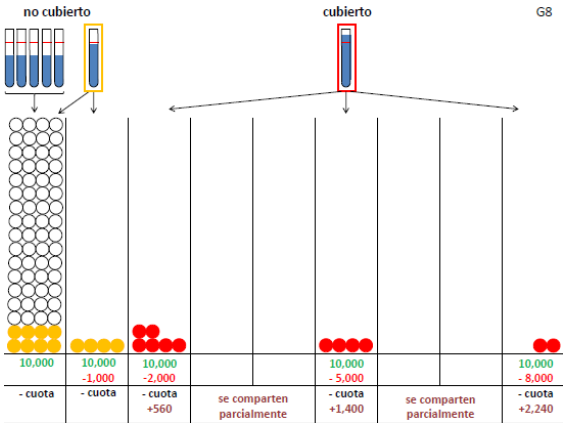


Group Heterogeneity Games

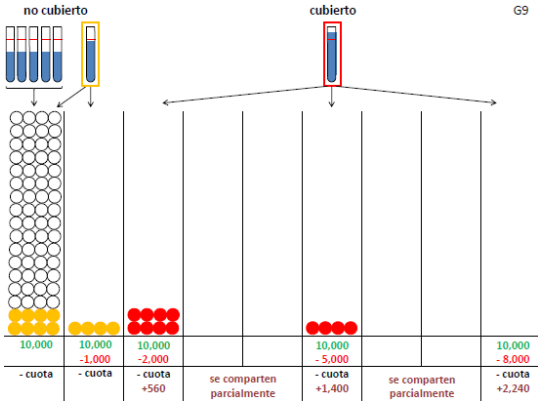
G7:



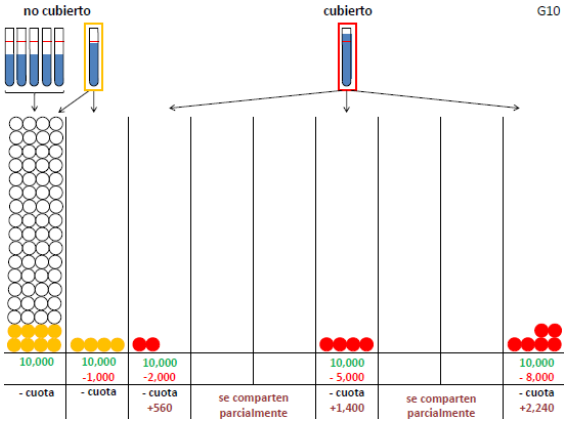
G8:



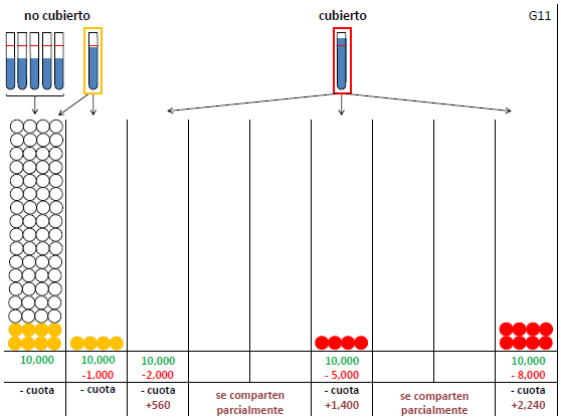
G9:



G10:

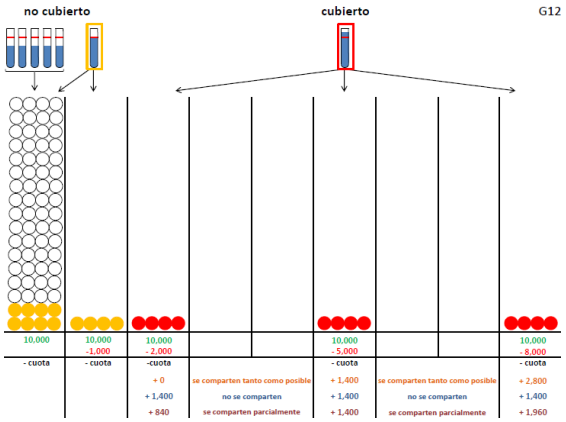


G11:



Group Deliberation Game:

G12



Example of Willingness to Pay Answer Sheet:

Sheets are either 40-320 or 80-360

Game	Lower price	Quetzales:															Higher price
I1		40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	
I2		40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	
I3		40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	

Game	Lower price	Quetzales:															Higher price
I1		80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	
I2		80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	
I3		80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	

Example of a cooperative specific program

Name of cooperative	Code	Department	Distance to the closest weather station (km)	Location of the closest weather station
Integral Agrìcola Semarac, R.L.	52	Alta Verapaz	13	Papalja
Precios	Q40 – Q320			

Programa:

A. Preparation	**A1**	Check the closest weather station (distance and location)
	A2	Prepare the material to be distributed with the selected price range and in the order indicated below
	A3	Prepare presentations (order according to plan for the day)
	A4	Prepare and start filling the coop information sheet (fill in during the course of the day)
B. Part 1	**B1**	Short survey (to be administered individually)
	B2	Determine and note the seating plan
	B3	Introduction and welcome
	B4	Check that participants were invited and their seating
	B5	Market exercise Presentations: EM 1 – EM 9
	B6	Training exercises Presentations: EC 1 – EC 7 / EC 8
	B7	Test
	B8	Fill in the questionnaire on coffee price history (during the break)
Break		
C. Part 2	**C1**	Explain the payment Presentation: EP
	C2	First bloc of exercises: Group insurance 1. Exercises without sharing rules Presentations: G1-G3 2. Explanation of sharing rules Presentation: RP 3. Exercises with sharing rules Presentations: G4-G6 4. Heterogeneity: Presentations: G7-G11 5. Deliberation (Fill in the sheet on the group deliberation) Presentations: G12
	C3	Second bloc of exercises: Individual insurance 1. Change in expected loss Presentations: I1-I3 2. Change in variance of losses (I5 = I2) Presentations: I4-I7 3. Drought Presentations: I8-I13
	C4	Individual insurance – Real value exercises (prices: 28-224) Presentations: I14-I16
	C5	Market exercise
	C6	Payment
D. End	**D1**	Check that all surveys are completed
	D2	Data entry

Note: The different orderings of the games are reported in Appendix C