Insurance Contracts when Farmers "Greatly Value Certainty:" Results from Field Experiments in Burkina Faso

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October 5, 2016

Abstract

In discussing the paradoxical violation of expected utility theory that now bears his name, Maurice Allais noted that people tend to "greatly value," or overweight, outcomes that are certain. This observation would seem to have powerful implications for the valuation of insurance in which individuals are offered an uncertain benefit in return for a certain cost. Pursuing this logic, we implemented experimental insurance games with cotton farmers in Burkina Faso, finding that on average, farmer willingness to pay for insurance increases significantly when a premium rebate framing is used to render both costs and benefits of insurance as uncertain. Digging deeper, we draw on the more recent work of Andreoni and Sprenger on a Discontinuous Preference for Certainty and show that that impact of the rebate framing on willingness to pay for insurance is driven by individuals who exhibit a well defined discontinuous preference for certainty. Given that the potential impacts of insurance for small scale farmers is high, and yet demand for conventionally framed contracts is often low, we argue that the insights from this paper suggest new, welfare-enhancing ways of designing and marketing insurance for low income farmers.

Keywords: Index Insurance, Risk and Uncertainty, Discontinuity of preferences, Field Experiments

JEL: Q12; D03

1 Introduction

An abundance of theoretical and empirical evidence has long identified uninsured risk as a key factor underlying the gap between the technological [yield] frontier and what small farmers in developing coun-

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tries actually achieve in their fields (or more generally the gap between the income small farmers produce and what would seem feasible given their available technologies, market access and endowments). Conversely, transfer/removal of risk promises to mind and close the gap, a promise that has motivated recent efforts to design and promote small farm-friendly index insurance contracts (see the reviews in Miranda and Farrin, 2012; Carter et al., 2014; International Fund for Agricultural Development and the World Food Program, 2010; De Bock and Gelade, 2012). While the empirical evidence that risk transfer can close the gap is still modest, it consistently shows that insurance boosts investment at both the intensive and extensive margins (e.g. see the studies by Karlan et al., 2014; Elabed and Carter, 2014; Janzen and Carter, 2013).

Despite this compelling theoretical logic and empirical evidence, insurance is an unusual commodity which has a certain cost, but offers uncertain benefits.[1] From this perspective, it is not surprising that the effectiveness of insurance projects has often been constrained by low levels of farmer demand (Gine and Yang, 2009; Cole et. al 2013; Hill and Robles, 2011). Communicating the idea of insurance to a never before insured population is a non-trivial exercise. Small farm insurance projects have employed a variety of devices, including simulation games, to communicate this core idea of insurance as a commodity with a fixed annual cost, but an uncertain benefit stream that may occur sometime in the future. While communicating this key feature of insurance is necessary to avoid the kind of misunderstanding, this sharp educational juxtaposition of certain costs and uncertain benefits puts a premium on understanding how individuals make choices when considering tradeoffs between certain and uncertain. In describing his paradoxical findings Allais (1953) shows behavioral departures from expected utility theory when risky are compared with certain outcomes by simply noting that people "greatly value certainty" (whereas away from certainty their behavior is consistent with the postulates of expected utility theory).

While Allais' paradox has helped motivate a more general rethinking of behavior under risk, his simple observation suggests that emphasizing the certain cost of the premium versus the far from certain stochastic benefits of insurance may make such contracts decidedly unappealing to individuals who indeed greatly value certainty.

Motivated by this observation, as well as by farmers expressing incredulity that they must pay the premium even in bad years, we carried out a willingness to pay for insurance experiment for cotton farmers in the West African country of Burkina Faso. In the experiment, these farmers, who lived in an area where an actual index insurance contract was being marketed, were randomly offered either a

[1] Indeed, insurance is the one commodity that you buy, but you would prefer to get nothing tangible in return (since in the presence of deductible, getting an insurance payment means that the individual is worse off than if she had not qualified for a payment).

conventional insurance frame (the premium is always paid, and indemnities are returned in bad years) or an unconventional premium rebate frame in which the payment of the premium is uncertain as it is forgiven in bad years.[2] While the contracts were actuarially identical, and only differed in their framing, average willingness to pay for rebate frame was 10% higher than willingness to pay for the $'same'$ insurance contract offered with the conventional frame. Moreover, the rebate framing pushed average willingness to pay from 150% to 165% of the actuarially fair price, an important difference given that small farm index insurance contracts are offered at prices in excess of 150% of the actuarially fair value. While inexplicable from a standard expected utility perspective, this revealed preference for the rebate framing may reflect no more than farmers' belief that it is only fair that they not pay the premium in bad years. However, this paper digs deeper to see if this behavior reflects something fundamental about certainty preferences and the demand for insurance. In particular we build on the work of Andreoni and Sprenger (2010) who build on Allais' insights and suggest a simple way to model a discontinuous preference for certainty. Based on these ideas, we implemented a simple set of lotteries designed to elicit whether or not individuals greatly value certainty or exhibit what Andreoni et al. (2010) call a discontinuous preference for certainty (or DPC). Our results reveal that some 30% of the Burkina cotton farmers who participated in the insurance willingness experiment also exhibit a DPC, whereas the remainder do not. In addition, we find that the average impact of the rebate frame on willingness to pay for insurance is driven almost entirely by the preferences of the DPC individuals. In particular, DPC famers' willingness to pay for insurance rises from 135% of the actuarially fair price under the standard frame to 176% of the actuarially fair price when presented with the rebate frame. In contrast, for non-DPC farmers, the impact of the rebate frame is small (5 percentage points) and statistically insignificant. While elements of cumulative prospect theory might explain the attractiveness of the rebate frame in the willingness to pay experiment, that approach can only with difficulty explain behavior in the choice lotteries that suggest a DPC, and much less explain the correlation between apparent DPC-like behavior and the preference for the rebate frame.

The rest of the paper is structured as follows: Section 2 introduces the insurance concept and the experimental design implemented to elicit the willingness to pay for the insurance. Section 3 describes the implications of the preferences' discontinuity in the insurance context. Section 4 introduces the games used to elicit the discontinuous preferences for certainty. Section 5 concludes.

[2] In the Burkina cotton insurance pilot, the insurance premium is financed for the farmer as part of a loan package and hence a premium rebate would exempt the farmer from having to pay the premium at all.

2 Willingness to Pay for a Standard Certain Premium Contract and a Premium Rebate Contract

We design an experiment to test whether farmers are willing to pay more for an insurance contract when it is framed as a premium rebate contract than when it is framed as a standard insurance contract. A standard contract involves a premium paid with certainty and indemnities obtained only in the bad states of nature. In contrast, the premium rebate frame waives the premium in the bad states of nature. As a result, the payment of the premium is state-contingent and uncertain, just like the transfer of indemnities. In order to isolate the effect of the state-contingency of the premium on players' willingness to pay, we keep other characteristics of the insurance contract identical across both frames. In particular, the net pay-out in each state of nature (indemnities net of premium) is identical for the two frames, implying that the level of indemnities in the premium rebate frame is lower than in the standard contract (the difference is exactly the premium amount). In practice we randomize the contract type (standard vs premium rebate) across participants.

In the rest of this section, we first describe in detail the game set-up, before introducing the sample of players and presenting the results.

2.1 Experimental Procedure

We run the experiment with 56 randomly selected groups of cotton producers ("GPCs") in the provinces of Tuy and Bale in the South-West of Burkina-Faso.[3] Within each group, thirteen farmers had been randomly chosen to be part of a base-line survey for the impact evaluation of a micro-insurance program and we invited them to participate in the experimental games after the survey. A total of 571 cotton farmers played these games and we have detailed information on individual, farm and household characteristics for all of them. Table ?? in Appendix A1 provides descriptive statistics for the sample of participants.

Data collection and experimental games took place in January and February 2014. Three rural area animators translated the experimental protocol from French to Doula and More, the local languages, and ensured that it was easily understood by cotton farmers. Game trials were conducted with students at the University of Namur (Belgium), and with cotton farmers who were not part of the final experimental sample.

The experiments took place in an open space (with at most thirteen players), and they lasted

[3]These groups take joint liable loans for cotton seed and chemical inputs and sell jointly their cotton production to the parastatal local cotton company.

around two and a half hours. Farmers took part in three activities. The first was the willingness to pay game that elicited the willingness to pay for insurance for either the standard insurance frame or the premium-rebate frame. The other two activities were designed to elicit discontinuity of preferences (we describe them in the next sections). Activities were incentivized to encourage players to take thoughtful decisions.[4] Farmers were paid at the end of the session a show-up fee and their gains in one, randomly selected, activity. Minimum and maximum earnings, excluding the show-up fee of 100 FCFA, were respectively 0 FCFA and 3200 FCFA, with mean earnings of 1792 FCFA. The mean earnings were thus nearly twice the daily wage for a male farmer in the area (usually 1000 FCFA).[5]

2.2 The Willingness- to-pay Game Design

We use a game set-up that both closely mimics farmers' reality and is easily understandable to participants with very low level of literacy. The insurance contract proposed in the game is insuring cotton production. In the set-up in which farmers are endowed with one hectare of cotton and cotton yields are stochastic. To keep things simple, there are only two possible yield realizations: a good yield of 1200 kg / ha and a bad yield of 600 kg / ha. In accordance with the distribution of historical yields in the area of study, the probability to have a good yield is set to 0.8 and the probability to have a bad yield is set to 0.2. Cotton prices and input costs are known and set at realistic levels (respectively 240 FCFA/kg and 100.000 FCFA/ha).

The game starts with a careful description of the stochastic yield realization and the corresponding " total family money " available at the end of the campaign. In particular, farmers draw their yield realizations from a bag containing four orange balls and one pink ball. The orange balls corresponds to the good yield, while the pink ball corresponds to the bad yield. Farmers are then carefully explained how the income available at the end of the cotton campaign is computed. Table 1 presents the decomposition of the total family money in its two components in both states of the world, in the absence of any insurance contract.

	Good Yield	**Bad Yield**
Net Cotton Revenue	188000	44000
Initial Saving Endowment	50000	50000
Total Family Money	238000	94000

Table 1: Income without insurance

[4]The animator announced the payment procedure at the beginning of each activity.
[5]In December 2013, the exchange rate was 483 FCFA to the dollar.

After making sure that all farmers understand the computation of the total family money, we present the insurance contract using one, randomly chosen, frame: the standard certain premium frame or the premium rebate frame. The standard contract involves a premium of 20.000 FCFA, paid by the farmer regardless of the state of nature and an indemnity of 50.000 FCFA paid to the farmer in case of a bad yield. The premium rebate contracts waives the premium in case of a bad yield, but only pays an indemnity of 30.000 FCFA. As a result, both contracts involve the same net insurance payment in both states of nature, but differ in their framing: the payment of the premium is presented as stochastic in the case of the premium-rebate contract and certain in the standard contract. In both case the actuarially fair price of the insurance corresponds to 10.000 CFA. Table 2 summarizes the contract terms under both frames. The rural animators present the contract and carefully explain how total family money is computed in each state of the world, with and without insurance. Note that the decision to insure is taken before the state of nature is drawn while total family money is computed after. Thus premia are effectively subtracted after yields are realized. Insurance is thus treated just like any other input farmers buy to produce cotton: it is effectively paid at the end of the campaign when yields are realized.[6]

	Standard Certain Premium Contract		**Premium Rebate Contract**	
	Good Yield	Bad Yield	Good Yield	Bad Yield
Premium, π	20000	20000	20000	0
Indemnity, I	0	50000	0	30000
Net Insurance Payment, π-I	-20000	30000	-20000	30000

Table 2: Payouts and Premium under the Two Contracts

Once farmers are familiar with the insurance contract, we elicit their willingness to pay. In practice, farmers have to decide whether or not to buy the insurance contract for seven different premia from 30000 FCFA to 0 FCFA (30000, 25000, 20000, 15000, 10000, 5000 and 0). The willingness to pay corresponds to the highest premium at which a farmer decides to buy the insurance.

For the visual representation of the game we use eight boxes, each one with two bags, a green one representing the non insurance choice and a blue one representing the insurance choice. Each bag contains the orange and pink balls representing yield realizations, as described above. In front of each box, a poster indicates the total family money available in both states of the world (good and bad yield), as well as the premium paid.[7] Animators explain that the price of insurance decreases from one

[6] In practice production inputs are delivered to the cotton group at the beginning of the campaign but they are paid after cotton is sold. Input prices communicated to farmers always include interest rate payments.

[7] Specifically, farmers see their saving net of the premium paid. The detailed composition of the family money (saving

box to the next and indicate how the total family money available in both states increases from one box to the next in the insurance case. The first box (highest premium) was used as an example. Farmers then walk individually from box to box with a sheet of paper representing the boxes and decide for each price whether they wish to purchase the insurance or not. They are then asked to cross the box corresponding to the price at which they start buying the insurance (multiple switching points are not allowed).

2.3 Descriptive Results

Table 3 reports the average willingness to pay for the insurance contract for the whole sample, the sub-sample of farmers offered the standard insurance contract and the sub-sample of farmers offered the premium rebate contract.[8] On average farmers are willing to pay 1.58 times the actuarially fair price for the insurance contract, but the framing of the contract matters: the average willingness to pay is 1.5 times the actuarially fair price for farmers presented the standard certain premium frame against 1.65 for farmers offered the premium rebate frame. Farmers were thus willing to pay 10% more for a premium rebate frame than for a standard one and this difference in willingness to pay is significative at 10%. In the next section we discuss how we can conceptually account for this preference for a premium rebate contract.

Willingness To Pay	Mean	Std. Dev.	N
All	15,796	10438	571
Standard Certain Premium	15,052	10356	287
Premium Rebate	16,549	10486	284
Premium Rebate - Standard	1497*		

* The p-value of the student test of equality of means is 0.08

Table 3: Frame and Willingness to Pay

- premium + cotton revenue + indemnities) remains on a general poster. In Appendix B we list the information given to farmers for each insurance price.

[8] We perform the ttest of equality of the means. In particular we test whether the average willingness to pay for the insurance is the same between the two frames.

3 Theoretical Perspectives on the Preference for the Insurance Rebate Frame

Since the premium rebate contract offers the same net payout in each state of nature as the standard certain premium contract, conventional expected utility theory cannot account for a higher willingness to pay for the former contract. In this section we investigate how insights from behavioral economics, and, in particular a discontinuous preference for certainty, may help explain the revealed preference for the premium rebate frame.

3.1 The Allais Paradox and the Attraction of Certainty

In a seminal contribution, Allais (1953) noted that most people routinely violate the predictions of conventional expected utility theory when asked to choose between a certain and an uncertain outcome. Table 4 describes the experiments used by Allais to illustrate this routine violation of expected utility theory. He notices that when given the choice between Gamble 1A, with a sure pay-off of 1 million dollars, and 1B, in which a pay-off of 1 million dollars is associated to a probability 0.89, 5 million dollars to probability 0.1 and 0 dollars to probability 0.01, most people would choose 1A. Similarly, most people would choose gamble 2B, where 5 million dollars are associated to a probability of 0.1 and 0 dollars to probability 0.9, over 2A, where 1 million dollars is associated to a probability of 0.11 and 0 dollars to probability 0.89. However, simultaneously preferring 1A over 1B and 2B over 2A is violates expected utility theory. Under expected utility theory, preferring 1A to 1B implies that:

$$1u(\$1m) > 0.01u(0) + 0.89u(\$1m) + 0.10u(\$5m) \tag{1}$$

which after subtracting the common consequence of 0.89u($1m) can be rewritten as:

$$0.11u(\$1m) > 0.01u(0) + 0.10u(\$5m) \tag{2}$$

Similarly, preferring 2B to 2A implies that:

$$0.89u(0) + 0.11u(\$1m) < 0.90u(0) + 0.10u(\$5m) \tag{3}$$

which by subtracting 0.89u(0) can be rewritten as:

$$0.11u(\$1m) < 0.01u(0) + 0.10u(\$5m) \tag{4}$$

which of course directly contradicts prior result and expected utility theory.

Experiment 1				**Experiment 2**			
Gamble 1A		**Gamble 1B**		**Gamble 2A**		**Gamble 2B**	
Pay-offs	Probabilities	Pay-offs	Probabilities	Pay-offs	Probabilities	Pay-offs	Probabilities
		0	1%	0	89%	0	90%
$1 milion	100%	$1 milion	89%	$1 million	11%		
		$5 million	10%			$5 million	10%

Table 4: The Allais Paradox

The simply and undeniable allure of $1m with certainty is part of what makes the Allais paradox so convincing as a demonstration of the weakness of expected utility theory. As noted by Andreoni and Sprenger (2010), Allais himself made the following two observations about his paradoxical result:

1. Expected utility theory is "incompatible with the preference for security in the neighborhood of certainty" (Allais, 2008).

2. But "far from certainty," individuals act as expected utility maximizers, valuing a gamble by the mathematical expectation of its utility outcomes (Allais, 1953)

While the probability weighting function of prospect theory can account for the Allais paradox, Andreoni and Sprenger (2010, 2012) propose a parsimonious framework that account for both the Allais Paradox "in the neighborhood of certainty" and the fact that "far from certainty" expected utility theory holds (which is the other "half of Allais' intuition" in their words). Specifically, they hypothesize that individuals discontinuously give greater weight or value to certain payouts than to uncertain payouts (i.e., they discretely value a probability one outcome more than an outcome with a probability of 0.999).

Specifically, Andreoni and Sprenger suggest the following alteration of the standard utility specification in which a single utility function is used to equally value certain and uncertain payouts:

$$v(y) = y^{\alpha} \tag{5}$$

if y is certain; and,

$$u(x) = x^{\alpha-\beta} \tag{6}$$

if x is uncertain, where $\beta \geq 0$ is a measure of a discontinuous preference for certainty. In their lab experiments they show that while many individuals reveal a strong preference for certainty, when these same individuals are choose between risky with less risky (but non-degenerate) lotteries, behavior appears to be consistent with expected utility theory.

An alternative way to capture the Andreoni and Sprenger intuition while allowing for mixed payouts comprised of both certain and uncertain elements is the following:

$$w(x,y) = \frac{(\alpha y+x)^{1-\gamma}}{1-\gamma} \tag{7}$$

where y is certain and x is uncertain and $\alpha \geq 1$.

In this "a bird in the hand is worth two in the bush" specification, α is the constant marginal rate of substitution of a uncertain for a certain dollar. Note that if $\alpha = 1$, this structure reduces to a standard utility function.

To see the impact of a discontinuous preference for certainty on insurance demand, consider a farmer who has a fixed money endowment m and a stochastic farm income. In the bad state of the world occurring with probability p_b, the farm income is x_b, and in the good state it is x_g. Consider first a standard insurance frame that involves a certain premium π and an uncertain insurance indemnity payment,I^S, that occurs only in the bad state of the world. Under the DPC utility function, expected utility under the standard insurance contract is given by:

$$W^s = p_b w\left(\alpha(m-\pi) + x_b + I^s\right) + (1-p_b) w\left(\alpha(m-\pi) + x_g\right). \tag{8}$$

Consider now a premium rebate frame that carries the same premium π that is paid only in the good state of the world. To keep the contract actuarially identical to the standard contract, the indemnity payment in the bad state of the world is defined as $I^r = I^s - \pi$. The farmer's expected utility under the rebate contract is thus given as:

$$W^r = p_b w\left(\alpha m + x_b + I^S - \pi\right) + (1-p_b) w\left(\alpha m + x_g - \pi\right) \tag{9}$$

As can be seen, if $\alpha > 1$, then $W^r > W^s$, whereas $W^r = W^s$ if $\alpha = 1$. It follows that farmers with a discontinuous preference for certainty DPC will attach a greater value to, and be more willing to purchase, insurance under the premium rebate than the standard frame.

Before turning to a more thorough investigation as to whether a discontinuous preference for certainty can explain this revealed preference for the rebate insurance frame, it is worth remarking that despite the insights it offers on the Allais paradox, the probability weighting function of prospect theory does not by itself offer insights into the preference for the premium rebate frame. As discussed in the Appendix E, it is possible to rationalize a preference for the rebate frame using a carefully chosen mix of separate mental accounting (premium payments are thought about separately from stochastic income components) and elements from prospect theory–namely a judiciously chosen reference point and severe loss aversion–to explain the rebate framing. However, before considering these issues further, we turn to consider direct evidence on the veracity of an explanation of the rebate frame preference based on the DPC ideas of Andreoni and Sprenger.

4 Discontinuous Preference for Certainty and Preference for a Premium Rebate Contract: Experimental Results

One manifestation of a disproportionate preference for certainty (DPC) is that individuals appear less risk averse when their decision set includes only stochastic outcomes than when their decision set includes a certain outcome. This suggests that a simple way to identify individuals exhibiting DPC is to compare elicited degrees of risk aversion when the choice set includes a certain outcome and when it does not. Building on this idea, we have designed two games that allow to compare individuals' behavior when they are asked to choose between two risky lotteries ("risky vs risky game") to their behavior when they are asked to choose between a risky lottery and certain outcome ("risky vs degenerate game"). Sub-section 2.4.1 below present these games. As detailed in 2.4.2, about 20% of the 571 farmers who played these games appear to exhibit DPCs. When we compare the willingness to pay for the premium rebate contract of DPCs farmers with that of non-DPCs farmers (sub-section 2.4.3), the disproportionate preference for certainty appears to be strongly correlated with a higher willingness to pay for a premium rebate contract. These results suggest that DPCs may dampen the demand for standard insurance contracts.

4.1 Experimental Procedure to Elicit Disproportionate Preference for Certainty

Risky vs risky lottery game (RR)[9]

The purpose of this first game is to elicit risk aversion in a situation where the decision set only includes risky outcomes. The game involves eight pairs of lotteries and for each pair, farmers have to choose between the riskier lottery, R, and the safer lottery, S. Each lottery has two possible outcomes (low, l, and high, h), each with probability 0.5. The eight lottery pairs are described in Table 5. As we move from one pair to the next, the low pay-off of the riskier lottery, R, decreases, making this lottery less and less attractive. In fact, for the first two choices, lottery, R, dominates lottery, S, as it involves larger pay-offs in both states of nature. Starting with the third pair, farmers face a classic risk-return trade-off as lottery R implies a greater expected payoff than lottery S, but also a lower payoff in the bad state of the world. While all farmers should prefer R to S for the first two pairs of lotteries, their decision

[9] In the field, these lottery games preceeded the willingness to pay games.

to switch and choose the safer lottery for subsequent pairs depends on their level of risk aversion: the earlier they switch, the higher their level of risk aversion. Note that once a farmer has switched to preferring the safer lottery, he should not switch back to preferring the riskier lottery for subsequent pairs since the value of the latter decreases monotonically while the value of the former lottery stays constant. In practice we forbade multiple switching points by asking the farmers to indicate the single pair at which they switch choose lottery S to lottery R (their switching point). The switching point provides an estimate of a player's degree of risk aversion. Column (4) of Table 5 reports the ranges of relative risk aversion associated to each switching point, assuming constant relative risk aversion.[10]

Pair	Riskier Lottery (R)		Safer Lottery (S)		*E(R)-E(S)*	CRRA
	Bad outcome	Good outcome	Bad outcome	Good outcome		
1	90,000	320,000	80,000	240,000	45,000	–
2	80,000	320,000	80,000	240,000	40,000	–
3	70,000	320,000	80,000	240,000	35,000	$1.58 < \gamma$
4	60,000	320,000	80,000	240,000	30,000	$0.99 < \gamma < 1.58$
5	50,000	320,000	80,000	240,000	25,000	$0.66 < \gamma < 0.99$
6	40,000	320,000	80,000	240,000	20,000	$0.44 < \gamma < 0.66$
7	20,000	320,000	80,000	240,000	10,000	$0.15 < \gamma < 0.44$
8	0	320,000	80,000	240,000	0	$0 < \gamma < 0.15$

Table 5: Risky versus Risky Lottery

In this game, we hold probabilities constant across pairs (the probability of the how and hight outcomes was always held fixed at one-half) and change only payoffs. This design appears particularly appropriate in contexts of low literacy: our field tests indicate that changing payoffs across pairs of lottery was more easily understood than changing probabilities. Designs of this sort are very common in the decision analysis literature (Galarza 2009) and have been used in experimental economics by Schubert et al. (1999).

The game is implemented with visual aid and examples. In particular, as in the insurance game, players face eight boxes, one for each pair of lotteries. Each box contains two bags, a blue one for the safer lottery and a green one for the riskier lottery. The first pair is used as an example and we clearly explain why lottery R is undoubtedly superior to lottery S in this first case. We then describe

[10]The CRRA utility function is: $u(x) = \frac{x^{1-\gamma}}{1-\gamma}$. This specification implies risk aversion for $\gamma > 0$, risk neutrality for $\gamma = 0$ and risk loving for $\gamma < 0$. When $\gamma = 1$, the natural logarithm is used to evaluate risk preferences. There is no coefficient of risk aversion associated to the first two pairs, since lottery R respectively strictly and weakly dominates lottery S.

the outcomes of all eight boxes and discuss the tradeoffs in choosing the riskier lottery over the safer one. Farmers walk from box to box and individually report on a sheet of paper the number of the box at which they switch from preferring the riskier to preferring the safer lottery. Their decision remains unknown to other farmers.

Risky vs degenerate lottery game (*RD*)

This game is identical to the game presented above, except that a certain outcome (or degenerate lottery D) replaces the safer lottery. Table 6 presents the outcomes of the eight pairs of lotteries. Note that the ranges of risk aversion associated with each switching point (column 4) are identical to those of the RR game. In other words, from pair 3 to 8, the certain outcome corresponds to the certainty equivalent associated to the safer lottery.[11] Thus, an expected utility maximizer (with CRRA preferences as described above) would choose the same switching point in the RD game as in the RR game.[12] In contrast, an agent with a disproportionate preference for certainty would switch earlier in the RD game. This is because an individual with strong preferences for certainty would value the risk-free alternative with a different utility function that includes a mark-up for certainty. She would thus be willing to give up an extra expected return for this alternative, compared to what her risk aversion level would predict.

Pair	Risky Lottery (R)			Certain 'Lottery' (D)
	Bad outcome	Good outcome	*E(R)-E(D)*	
1	90,000	320,000	145,000	60,000
2	80,000	320,000	120,000	80,000
3	70,000	320,000	67,800	127,200
4	60,000	320,000	51,000	139,000
5	50,000	320,000	39,000	146,000
6	40,000	320,000	29,300	150,700
7	20,000	320,000	12,600	157,400
8	0	320,000	0	160,000

Table 6: Risky versus Degenerate Lottery

[11] For example, suppose that a farmer switches at pair 5 in the risky vs risky game. His coefficient of relative risk aversion is then at least equal to the lower bound of the corresponding interval, that is 0.66. Thus the same farmer would switch at pair 5 in the risky vs degenerate game if the certain outcome x is equal to the certainty equivalent of the safer lottery for a coefficient of relative risk aversion of 0.66.In practice x solves the following equation: $\frac{1}{2}\frac{(50000)^{1-0.66}}{1-0.66}+\frac{1}{2}\frac{(320000)^{1-0.66}}{1-0.66}=\frac{x^{1-0.66}}{1-0.66}$.

[12] Our ranges of estimated coefficient of relative risk aversion are specific to the functional form we chose for the utility function. In Appendix D we examine whether individuals with constant absolute risk aversion preferences would also switch at the same pair in both games. It turns out that ranges of absolute risk aversion corresponding to each switching points are remarkably similar in the two games.

Note that, as in the RR game, in the first two pairs, lottery R dominates lottery D. Again the first pair was used as an example. While choosing D over R in the second pair may appear irrational, Gneezy et al. (2006) show that many individuals value risky prospects less than their worst possible realization.[13] In practice, we illustrate the eight pairs of lotteries with eight boxes as we did in the risky versus risky lottery game. Each box contains two bags, a green one and a red one. The green bag corresponds to the risky lottery, and was identical to the green bag of the first game. The red bag corresponds to the degenerate lottery and it only contains one yellow ball. The rest of the procedure was the same as the one described above for the RR game.

4.2 Results of the Games: Eliciting Agents' Type

Table 7 reports the number and the percentage of farmers' switching at each pair of lottery for the two games. Farmers are relatively evenly distributed over the range of switching points with a concentration of about 30% of the sample between pair 3 and 4. In both games, more than 50% of farmers switch before (or at) pair 5, which implies coefficients of relative risk aversion greater or equal to 0.66, which is considered very high.

	Risky vs Risky			**Risky vs Degenerate**		
	Number	Percentage	cumpct	Number	Percentage	cumpct
2	84	14.71	14.71	65	11.38	11.38
3	76	13.31	28.02	78	13.66	25.04
4	96	16.81	44.83	89	15.59	40.63
5	89	15.59	60.42	82	14.36	54.99
6	55	9.63	70.05	59	10.33	65.32
7	43	7.53	77.58	59	10.33	75.66
8	64	11.21	88.79	64	11.21	86.87
9	64	11.21	100.00	75	13.13	100.00
Total	571	100.00		571	100.00	

Table 7: Switching Points

The distributions of switching points reported in Table 7 suggest that, on average, farmers do not choose an earlier switching point in the RD game than in the RR game. If anything they appear to switch later in the RD game, suggesting lower relative risk aversion when a certain option is available.

[13] In their original experience, Gneezy et al. (2006) show that the average willingness to pay for a gift certificate of 50$ was 38$, and the average willingness to pay to participate in a lottery with 1/2 probability to receive a gift certificate of 50$ and 1/2 probability to receive a gift certificate of 100$ was 28$. In practice, individuals were valuing the risky prospects less than its worst possible realization. They call it the "uncertainty effect". Andreoni and Sprenger (2010) show that DPC can explain the uncertainty effect. In Appendix C2 we include these agents in our DPC category.

In fact the comparison of individual behavior across games suggests that 29% of farmers switch earlier in the RD game than in the RR game and thus exhibit DPC, as reported in Table 8.

		Risky vs Degenerate Game									
		2	3	4	5	6	7	8	9	Total %	Total freq
Risky vs Risky Game	2	**39.29**	16.67	10.71	3.57	2.38	7.14	9.52	10.71	100	84
	3	10.53	**27.63**	26.32	13.16	7.89	7.89	2.63	3.95	100	76
	4	8.33	19.79	**29.17**	18.75	9.38	6.25	5.21	3.12	100	96
	5	2.25	10.11	17.98	**30.34**	20.22	5.62	7.87	5.62	100	89
	6	1.82	14.55	7.27	12.73	**21.82**	20.00	12.73	9.09	100	55
	7	4.65	6.98	6.98	11.63	18.60	**20.93**	18.60	11.63	100	43
	8	7.81	3.12	9.38	12.50	4.69	20.31	**31.25**	10.94	100	64
	9	9.38	3.12	4.69	6.25	1.56	4.69	10.94	**59.38**	100	64
	Total %	11.38	13.66	15.59	14.36	10.33	10.33	11.21	13.13	100	
	Total freq	65	78	89	82	59	59	64	75		571

The transition matrix shows a better way of looking at the switching between lottery games. As can be seen ... . Our basic specification here assigns only those in the lower triangle as having a DPC. Note that 15% are quasi-Gneezy players. We can also put forward a conservative classification ... .

Agent Types	**Simple definition**	**Conservative definition**
Discontinuous Preferences for Certainty (DPC)	29%	15%
Non-DPC	71%	85%
N	571	571

Table 8: Agent types

Note that this may be a lower bound of the prevalence of DPC since each switching point is associated with a range of coefficient of relative risk aversion. Thus even if an individual has the same switching point in both games, she may be "closer" to the upper bound of the interval (or closer to switching earlier) in the RD than in the RR game. On the other hand, we may also be worried that switching at different pairs in both games simply reflects small errors in comparing options. To address this later concern we construct a more conservative estimate of the prevalence of DPC by only classifying as DPC those who switch at least two pairs earlier in the RD game than in the RR game. With this classification 15% of farmers exhibit DPC (Table 8).[14]

[14] In Appendix C1 we present the distribution of farmers over all possible combination of switching points and detail how this data is used to classify agents into DPC and non-DPC categories.Note that some farmers also behave as if they had a lower level of risk aversion when they play the RD game than when they play the RR game. In other words they appear to have a strong preferences for uncertainty. We call these farmers "players". While we only focus on the distinction between DPC and non-DPC farmers in the main text, in Appendix C1 we split the non-DPC category into players and

4.3 DPC and Willingness to Pay for the Premium Rebate Contract

In this Section we explore the correlations between discontinuity of preferences for certainty and insurance demand. An interesting contrast emerges when we compare how DPC and non-DPC farmers reacted to the premium rebate frame.

		Basic		Conservative		
	All Agents	DPC	Non-DPC	DPC	Non-DPC	
WTP	15.796	15.271	16.012	16.420	15.683	
	(10.438)	(10.677)	(10.344)	(11.268)	(10.288)	
	571	166	405	88	483	
WTP under Standard Insurance Frame	15.052	13.526	15.807	14.200	15.232	
	(10.356)	(10.540)	(10.207)	(11.173)	(10.191)	a
	287	95	192	50	237	
WTP under Premium Rebate Frame	16.549	17.605	16.197	19.342	16.117	
	(10.486)	(10.483)	(10.488)	(10.853)	(10.383)	
	284	71	213	38	246	
WTP Premium Rebate-WTP Standard	0.08	0.01	0.70	0.03	0.34	
Standard Deviation in parenthesis.						

Table 9: Willingness to Pay for Insurance

The willingness-to-pay levels reported in Table 9 indicate that DPC farmers are willing to pay 30% more when the contract is presented with the premium rebate frame than when it is presented with the standard frame and this difference is statistically significant (last row). In contrast, non-DPC farmers have the same willingness-to-pay for both frames. This different effect of the framing for DPC and non-DPC farmers is confirmed by an econometric analysis where we control for order effect and farmer characteristics. In particular, we estimate a tobit model where the dependent variable is the individual willingness to pay for the insurance, WTP_i.

expected utility maximizers. This does not change our main results and we find that these two types of agents behave similarly in the WTP games.

	Basic Definition				Conservative Definition			
	Estimated Coefficients		Marginal Impacts		Estimated Coefficients		Marginal Impacts	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Premium Rebate Frame	696	734			1272	1372		
	(1415)	(1466)			(1309)	(1328)		
DPC	-2528	-3041*			-1190	-1882		
	(1638)	(1612)			(2211)	(2159)		
Non DPC	(.)	(.)			(.)	(.)		
Premium Rebate # DPC	3671	4466*	3837**	4565**	3679	4882	4426*	5583**
	(2542)	(2499)	(1861)	(1818)	(3369)	(3205)	(1818)	(2592)
Premium Rebate # Non DPC	(.)	(.)	620	655	(.)	(.)	1126	1217
			(1260)	(1307)			(1158)	(1176)
Start RR	3187***	3574***			3224***	3593***		
	(1179)	(1256)			(1201)	(1269)		
Cons	13081***	12437***			12440***	11658***		
	(1298)	(2561)			(1242)	(2584)		
Controls	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**
Observations	571	561	571	561	571	561	571	561

Standard errors in parentheses and clustered at cotton group level.

Controls used in the estimation: age, years of schooling, religion, ethnicity, agricultural surface 2013, household size.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Tobit regression and Estimated Marginal Impact of Premium Rebate Frame on WTP

The main variables of interest are: a binary variable indicating whether the premium rebate frame was used to present the insurance, ($PremiumRebate_i$), a binary variable indicating whether the individual exhibit DPC (DPC_i), and the interaction of these two variables. We also control for order effects between the two games and for individual characteristics.[15] Table 10 presents the results of tobit regressions using the simple definition of DPC (column 1 to 4) and the conservative definition (column 5 to 8). Columns 1, 2, 5 and 6 report the coefficients of Tobit regressions with and without controlling for individual characteristics while columns 4, 5, 7 and 8 report the marginal effects of the premium rebate frame separately for DPC and non-DPC agents. The results based on the basic definition suggest that DPC agents are willing to pay 4565 FCFA more for an insurance presented with premium rebate

[15] The variable $startRR_i$ is a dummy variable that takes value one if the individual started with the risky vs risky game and value zero if we started with the risky vs degenerate game. The individual characteristics used in the regression are age, years of schooling, religion, ethnicity, household size, area cultivated.

frame than with standard frame (column 4). This represents a 34% increase in the willingness to pay for insurance. In contrast, non-DPC agents are not willing to pay when the insurance is presented with this frame.[16] Using the conservative definition, we find the same effects as in the simple definition: agents with Discontinuous Preferences for Certainty are willing to pay 5583 FCFA more for the premium rebate frame (column 8). Interesting the order of the games has a significant impact on the WTP: farmers who started with the risky vs risky game are willing to pay more for the insurance.

While these results provide provocative evidence that a discontinuous preference for certainty explains the revealed preference for the insurance premium rebate frame, it is natural to ask whether alternative theoretical frameworks might explain the confluence of results. As mentioned in section 2.3.1 above, a mix of ideas from prospect theory and separate mental accounting might explain the preference for the rebate frame. As further developed in the Appendix E, other ideas from cumulative prospect theory (notably probability weighting in combination with rank order utility) may separately explain why individuals might exhibit a surprising (from the perspective of expected utility theory) preference for the degenerate lotteries studied in this section. However, given that these two separate alternative accounts seem orthogonal to each other, it is difficult to imagine how they might explain the striking relationship revealed here between a discontinuous preference for certainty and a preference for the rebate frame. In contrast, the parsimonious DPC theory offers an integrated explanation for the observed relationship between play in the two experimental games.

5 Conclusion

In recent years the demand of insurances has been characterized by a surprisingly low take up, although insurances provide a good alternative to the informal risk managing mechanism. In this paper we attempt to demonstrate how behavioral economics could help in designing supply insurance policies in respect to farmers' behavior. Behavioral lab experiments have uncovered a wealth of evidences that people do not approach risk in accord with economics' workhorse theory of "expected utility". This behavioral evidence would seem to have rich implications for the design and the demand for insurance, and to date efforts have been sparse to develop those implications (Elabed and Carter, 2014; Petraud 2011). In this regard, this paper presents a novel way to understand the low micro-insurance take-up using the behavioral concept of discontinuity of preferences. In a framed field experiment conducted with cotton farmers in Burkina Faso, we find that 10% of farmers generally do not behave in accordance with the conventional expected utility theory, since they prefer a premium rebate contract, in which

[16] Appendix C1 presents the same result, distinguishing further between players and expected utility agents. The results are unchanged.

there is " fake" uncertainty about the payment of the premium, to a standard insurance contract, in which the premium is paid in all states of the world. In particular, if we consider a price of 20.000 FCFA (10.000 FCFA higher than the actuarially fair price), 52% of farmers will buy the insurance under the premium rebate frame, and 45% will buy the insurance under the standard one. This implies a 15.5% increase in the number of farmers buying the insurance when the insurance is presented with the premium rebate frame instead of the standard one. We find that the agents revealing themselves to have discontinuous preferences, as defined, by Andreoni and Sprenger (2010; 2012), are the ones willing to pay more for a premium rebate contract, and they pay 30% more for this kind of insurance than the standard one.

It follows that framing the insurance product with uncertainty about the payment of the premium might induce an increase in the insurance take-up, especially for farmers with DPC preferences. This increase in the insurance coverage, could then induce an increase in the ex-ante investment decisions of cotton farmers. In this regard, Elabed and Carter (2014) show that, in Mali, in presence of an area yield index insurance contract, as the one in Burkina, farmers increase the area cultivated in cotton of 15%, and the expenditure in seeds of 14%. From a policy point of view, we think that a deep understanding of farmers' preferences must be the starting point of a new investigation of the micro-insurance demand in order to increase the insurance take-up, to reduce income variability, and, in turn, allow households to avoid the costly asset and consumption smoothing behaviors.

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Appendix

A: Randomization and Socio Demographic Characteristics

A1: Randomization

Table 11 reports the results of the double randomization process (Insurance's frames and order of the DPC games) by providing the number of farmers in each of the four possible categories. In particular, 144 participants were first proposed the risky vs degenerate game and then the premium rebate frame; 140 were first proposed the risky vs risky game and then the premium rebate frame; 138 were first proposed the risky vs degenerate game and then the standard insurance frame; 149 were first proposed the risky vs risky game and then the standard insurance frame.

	RD vs RR	RR vs RD	Total
Premium Rebate Frame	144	140	284
Standard Frame	138	149	287
Total	282	289	571

Table 11: Players Randomization

In Table 2.12 we test whether the randomization is balanced at frame's level. We can clearly see that our randomization is balanced.

In Table 13 we test the balance of the randomization between the two frames for each agent type. The premium rebate frame is indicated by "PR" and the standard insurance frame by "S". We can see that the randomization is balanced.

A2: Individual Characteristics

Table 14 reports the individual characteristics.

B: WTP Game: Graphical Representation

In Table 15 we present the information available to the farmers for the WTP game. For each situation (no insurance, insurance presented with the standard frame and insurance presented with the premium-rebate frame). The first part of the Table considers the information in case of not insurance purchasing and the other two parts of the Table represent the gains for the farmers in case of standard insurance frame and premium rebate frame. The values reported distinguish between good and bad harvest [yields].

C: Robustness Checks

C1: WTP for the Insurance and Tobit Regression Considering Three Types of Agents

We report here the information relative to the WTP for the insurance distinguishing between the three agent categories. Specifically we further distinguish between "expected utility maximizer" and "players" within the category of "non-DPC". To understand this distinction, consider Table 16 presents the cross tabulation of switching points in both games. Expected utility agents (EUT) are on the diagonal since they are switching at the same pair in both games. We have two kinds of agents with discontinuous preferences. Agent with discontinuous preferences revealing strong preferences for certainty, called agents with "Discontinuous Preferences for Certainty" (DPC), and the ones having strong preferences for uncertainty, who we call "Players". DPC are below the diagonal since they switched earlier in the Risky vs Degenerate game than in the Risky vs Risky one. Players are above the diagonal.

Based on the combination of switching points of the two games, Table 17 presents the frequencies of the agent types using two classification criteria. The first is a simple classification and it considers as expected utility agent only those switching at the same pair in both games, while the second is a conservative classification since it allows for small departures from the standard model by calling expected utility agents even those who switch just below or above the diagonal. In particular we notice that 33% of the farmers in our sample belong to the category of EUT agents, 29% are DPC agents and 38% are Players. Under the conservative definition we will naturally increase the number of EUT agent to 63%.

Table 18 reports the WTP for the insurance distinguishing between the three agents categories. We notice that in general agents are willing to pay more for an insurance presented with a premium rebate frame, but this difference is entirely driven by DPC agents. This result is also confirmed by the Tobit regression reported in Table 19. We see that agents with DPC preferences are willing to pay 4576 FCFA significatively more for an insurance presented with a premium rebate frame than a standard frame.This result holds both in case of simple and conservative definition.

C2: Gneezy Agents. Are they DPC or EUT Agents?

Andreoni and Sprenger (2010) show that Gneezy agents can be easily considered as agents with extreme preference for certainty and therefore agents with Discontinuous Preferences for Certainty. In the following we re-group these agents among the ones with discontinuous preferences for certainty. In other words, we consider as Gneezy the farmers switching at pair 2 in both games. It follows that the number of DPC agents increases and they become the 35% of the sample, as shown in Table 20.

Agent Types	**Simple Definition**	**Conservative Definition**
Expected Utility Agent (EUT)	27%	55%
Discontinuous Preferences for Certainty Agent (DPC)	35%	21%
Player Agent	38%	24%
N	571	571

Table 20: Agent Types re-classified considering Gneezy Agents

Considering this new specification we run the same Tobit regression as we did in Section 4, and we report the results both for the simple and the conservative definitions of our agents.

Under the simple definition we confirm all the results obtained before. In particular, in Table 21 we notice that DPC agents are willing to pay 4131 FCFA more for an insurance presented with Premium Rebate Frame and they are willing to pay more than Players for this insurance frame.

Using the conservative definition, we notice that both agents with Discontinuous Preferences for Certainty and EUT are willing to pay more for an insurance presented with Premium Rebate Frame. Players are acting as in the previous specification: they are willing to pay less than agents with Discontinuous Preferences for Certainty and EUT for an insurance presented with Premium Rebate Frame.

D: CARA Utility Function

In this section we assume that our agents use a CARA utility function, instead of a CRRA utility function in evaluating the lottery choices, and we explore the consequences of the use of a CARA utility function on our DPC games. We remind that with a CRRA utility function, $u(x) = \frac{x^{1-\gamma}}{1-\gamma}$, the marginal effect of an increase in the outcome on the risk aversion is null. This implies that if we multiply or divide by the same constant, all the outcomes of the game, the risk aversion remains unchanged. In case of a CARA utility function, $u(x) = 1 - e^{-\gamma x}$, the marginal effect of an increase in the risk aversion on the relative risk aversion is equal to γ. This implies that if we multiply or divide by the same constant all the outcomes of the game, the risk aversion will change.

In Table 22 we report the ranges of risk aversion obtained with a CRRA utility function (Column 1) and the ranges of risk aversion obtained with a CARA utility function (Column 2 and 3) for both games. Assuming a CARA utility function we notice that the ranges are extremely close to zero for all pairs. Moreover we can see that the ranges of the Risky vs Risky Game are slightly different from the ranges of the Risky vs Degenerate Game.

Due to the small value of the ranges, in order to facilitate the comparison between the two games, we simply multiply the coefficients for 100.000. Column 2 and 4 of Table 23 respectively report the average CARA ranges for the Risky vs Risky and the Risky vs Degenerate game. We notice that the main difference between the ranges of the two games lies between pair 3 of the Risky vs Risky game and pair 4 of the Risky vs Degenerate game. In particular, the ranges of the CARA specification show that it is possible to consider expected utility maximizer people switching at pair 3 in the Risky vs Risky game and then switching at pair 4 in the Risky vs Degenerate game. In our empirical investigation we account for these agents through the conservative definition.

E: Alternative Behavioral Explanations

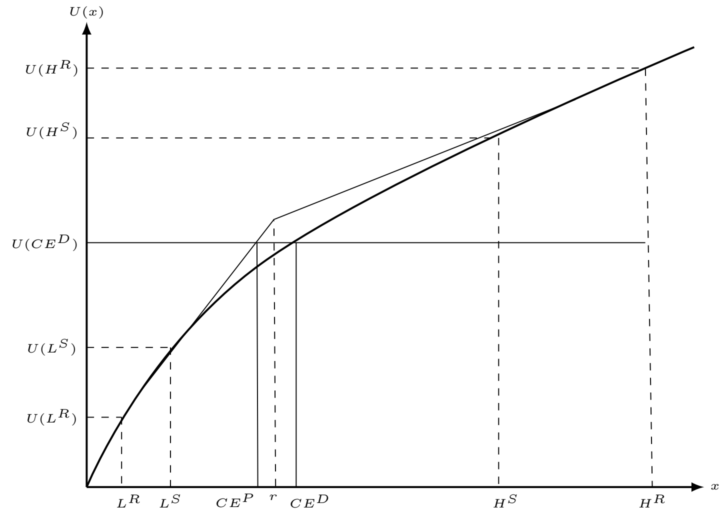
Prospect theory and, in particular loss aversion and probability weighting are natural alternative candidates for explaining departure from expected utility maximization. In the following sections we discuss alternative theories in the context of our experiments.

Loss Aversion

In this section we explore whether loss aversion may provide a satisfactory framework to account simultaneously for a disproportionate preference for a certain payoff and a higher willingness to pay under the premium rebate contract.

Let's consider first the risk aversion games. The disproportionate preference for the degenerate lottery in RD game may be compatible with loss aversion, provided the reference point that defines losses and gains is appropriately chosen. Indeed loss aversion can explain that agents behave as if very risk averse in the vicinity of the reference point. To see it, consider the situation illustrated in Figure 1. The

Figure 1: Prospect Theory: Loss Aversion



function $U(.)$ depicts the preferences of an EU maximizer indifferent between the riskier lottery (L^R, H^R) and the safer lottery (L^S, H^S) in RR game. The certainty equivalent for both lottery is CE^D. By definition, if the safer lottery is replaced by CE^D, as we did in RD game, an agent would be indifferent between CE^D and the riskier lottery. Suppose now that the individual has preferences captured by the function $V(.)$ which captures loss aversion in a very stylized way: at the reference point r, a marginal decrease in income has a greater impact on $V(.)$ than a marginal increase in income. The indifference between the safer and the riskier lottery is compatible with the preferences represented by the function $V(.)$. However, when faced with the choice between CE^D and the riskier lottery, an individual with utility $V(.)$ would strictly prefer CE^D to the riskier lottery since $CE^D > CE^P$, where CE^P is the certain equivalent associated to the riskier lottery for an agent using a value function $V(.)$.

Loss aversion may thus be compatible with a disproportionate preference for the degenerate lottery, provided the reference point is precisely between the low and the high outcome of the risky lottery.

Turning to the results of the insurance game, prospect theory alone can not explain a preference for premium rebate frame. In particular, assuming as reference point the initial monetary endowment of the agents, agents will never perceive a loss. Agents may therefore perceive some outcomes as losses as long as the reference point is greater than the low yield, but the net losses are exactly the same under both frames. For loss aversion to play a role, it must be that agents have separate mental accounts over gains and losses and value them individually. For example, if agents have a reference point r , such that $m \leq r < y_b + I$, and apply separate mental account for losses and gains, they might get more utility from the insurance product under premium rebate frame. The idea is that they perceive $y_b + I'$ and $y_b + I$ as gains but π as a loss. To illustrate it, we assume the simplistic loss aversion utility function used above (where $\lambda > 1$):

$$u(x) = \begin{cases} (x - r) & if x \geq r \\ -\lambda(-(x - r)) & if x < r \end{cases} \tag{10}$$

If agents use the liquid endowment, m , as their reference point, the utility levels reached with the standard and the premium rebate insurance contract are:

$$\begin{aligned} V_{I,S} &= p_b u(-\pi) + p_b u(y_b + I) + (1 - p_b)u(y_g) + (1 - p_b)u(-\pi) \\ &= -\lambda\pi p_b + p_b(y_b + I) + (1 - p_b)y_g \end{aligned} \tag{11}$$

$$\begin{aligned} V_{I,PR} &= p_b u(0) + p_b u(y_b + I') + (1 - p_b)u(-\pi) + (1 - p_b)u(y_g) \\ &= p_b(y_b + I') - \lambda\pi(1 - p_b) + (1 - p_b)y_g \end{aligned} \tag{12}$$

The comparison of the value of both contracts reveals that the premium rebate contract provides a higher utility level (loss aversion implies $\lambda > 1$).

In conclusion, loss aversion could be an alternative explanation for our set of results provided that individuals who are loss averse have a reference point which is between the low and the high outcome in the lottery game. in other words, this reference point should be such that the premium is perceived as a loss and the indemnity as a gain. However, since our games are framed in a way that subjects always experiment gains, it seems quite extreme to impose a reference point different from zero.

Probability Weigthing

In this section we use cumulative prospect theory (CPT) and the one-parameter form of Drazen Prelec's (1998) weighting function to re-estimate our first two games where we elicit the discontinuity of the preferences. Two distinctive features of CPT must be considered. First, cumulative prospect theory segregates value into gain and losses, with separate weighting function for losses and gains. Second, cumulative prospect theory applies decision weights to cumulative distribution functions rather than single events. This represents the main difference between prospect theory (PT) and CPT.[17] In particular in PT the utility of an alternative $X = (p_1, x_1; ...p_n, x_n)$, where outcome X_i occurs with probability

[17] The theory of rank dependent utility has been first introduced by Quiggin (1982) and then integrated in the prospect theory by Khaneman and Tversky (1992). The result is the cumulative prospect theory that is a version of rank dependent utility where decision weights are not just ranked, but also sign dependents.

p_i is defined as $U(X) = \sum_i \pi(p_i)u(x_i)$. The decision weights $\pi(p_i)$ are a function of the objective probabilities, and they are not required to sum to 1. This can give rise to violations of stochastic dominance. For instance, a prospect that offers 200$ with probability $\pi(0.8) = 0.65$ and 0$ with probability $\pi(0.4) = 0.27$, will be preferred to a prospect that offers 210$ with probability $\pi(0.4) = 0.27$, 200$ with probability $\pi(0.4) = 0.27$ and 0$ with probability $\pi(0.2)$, but this behavior constitutes a violation of stochastic dominance since the second prospect dominates the first one. In CPT the violation of the stochastic dominance is solved introducing decision weights not only depending on the probability, but also on the rank of the outcomes. More formally, consider a chance prospect $X = (p_1, x_1; ...p_n, x_n)$ with outcomes ordered in increasing order of preferences $u(x_1) < ... < u(x_n)$. The rank dependent utility associated to X will be $RDU(X) = \sum_i \pi(p_i, X)u(x_i)$ where the probability weighting is represented by $\pi(p_i, X) = w(p_i + ... + p_n) - w(p_{i+1} + ... + p_n)$. The decision weight $\pi(p_i, X)$ is a difference between two functions that no longer depend only on p_i , but also on the rank of outcome x_i in relation to other outcomes, and, thus, on the whole distribution of outcomes, X . The dependence on the rank of x_i comes because different probability values enter into the two summations, depending on the rank of x_i. In particular, the first expression is the sum over the probabilities of all outcomes that are at least as great as x_i; the second expression is the sum over the probabilities of all outcomes that are greater than x_i.

For instance, consider the risky lottery in our first game. In CPT the probability weighting associated to the high outcome corresponds to $\pi(1/2)$ that is around 0.4, as estimated in the literature by Abdellaoui (2000). This implies that the probability weighting associated to the low outcome is equal to $1-\pi(1/2) = 0.6$. In the following analysis we assume that there is not a reference point generating losses in the games (see previous Section for explanations). We use a CRRA utility function, $u(x) = \frac{x^{1-\alpha}}{1-\alpha}$, and the one parameter Prelec's (1998) probability weighting function, $\pi(p) = e^{-(-lnp)^\theta}$ for $0 < p \leq 1$ and $\theta > 0$, with $\pi(0) = 0$, $\pi(1) = 1$. The parameter θ represents the concavity/convexity of the weighting function. In particular, if $\theta < 1$, the weighting function is inverted S-shaped, i.e. individuals overweight small probabilities and underweight large probabilities, as shown by Tversky and Kahneman (1992). If $\theta > 1$, then the weighting function is S-shaped, i.e., individuals underweight small probabilities and overweight large probabilities.[18]

To elicit the two parameters of interest, α and θ, we use the series of paired lotteries designed for RR game and RD game.

The switching points in RR game and RD game jointly determine θ and α. For example, suppose a subject switched from lottery R to D at the fourth pair in RD game and at fourth pair in RR game. We

[18]Different weighting functions have been proposed in the literature (Khaneman and Tversky 1979;1992; Lattimore et al., 1992). However, the first axiomatically derived weighting function was the one of Prelec (1998).

will have a system of two equations where the first equation represents the indifference condition for a switching at pair 4 in the first game and the other represents the indifference condition for a switching at pair 4 in the second game. We will be therefore able to find the values of α and θ solving the following system.

$$\begin{cases} \pi(1/2)u(320000) + [1-\pi(1/2)]u(60000) = \pi(1/2)u(240000) + [1-\pi(1/2)]u(80000) \\ \pi(1/2)u(320000) + [1-\pi(1/2)]u(60000) = u(139000) \end{cases} \quad (13)$$

In Table 24 we report all the possible combinations of (θ, α) rationalizing the switching in the RD game and in the RR game. By intersecting these parameter ranges from RR game and RD game, we obtain predictions of (θ, α) for all possible combinations of choices. We notice consistent differences in the weight associated to the probability $1/2$ along all the pair. In particular, we observe that as soon as α increases, the probability associated to the realization of the low outcomes, $1-\pi(p)$, decreases since individuals are underweighting probabilities associated to small outcomes, as observed in the literature about probability weighting and rank dependent utility (Quiggin, 1982; Gonzalez and Wu, 1999; Stott 2006; Khaneman and Tversky 1992). The converse holds as soon as α decreases. In this case agents become more and more pessimistic since they associate higher probabilities to the low outcomes.[19] We notice that there is not probability weighting for individuals switching at the same pair in both games. These individuals are the ones on the diagonal of Table 24. In this new setting, Discontinuous Preferences for Certainty agents are the ones behind the diagonal of Table 24. We notice that in order to rationalize the presence of agents with Discontinuous Preferences for Certainty we need to assume a probability weighting always lower than 1/2. This implies that DPC agents will always associate high probabilities to the realization of low outcomes, with a level of α always lower than 0.2. For instance, consider an agent switching at pair 6 in the Risky vs Risky game and at pair 4 in the Risky vs Degenerate game. We classify this agent as an agent with Discontinuous Preferences for Certainty. His probability weighting function is equal to $\pi(p) = 0.27$ for high outcomes and $1-\pi(p) = 0.73$ for low outcomes, with $\alpha = -0.18$. The presence of this probability weighting function can justify earlier

[19] Some RDU theorists (e.g., Quiggin, 1982) have used the labels pessimistic and optimistic to characterize the nonlinearity of the probability weighting function θ. The pessimistic θ function gives greater weight to lower outcomes (i.e., to outcomes with lower ranks). The easiest way to see it is by an example. Consider the alternative $X = (0.2, x_1; 0.2x_2; 0.6x_3)$ where $u(x_1) < u(x_2) < u(x_3)$. The rank-dependent utility is: $RDU(X) = [\pi(p_1+p_2+p_3) - \pi(p_2+p_3)]\, u(x_1) + [\pi(p_2+p_3) - \pi(p_3)]\, u(x_2) + \pi(p_3)u(x_3)$. In this case with a linear weighting function we would have $RDU(X) = (1-0.8)u(x_1) + (0.8-0.6)u(x_2) + 0.6u(x_3)$, while with a pessimistic weighting function we would have $RDU(X) = (1-0.62)u(x_1) + (0.62-0.36)u(x_2) + 0.36u(x_3)$. It is clear that the pessimistic weighting function takes away a portion of the objective probability weight of the highest outcome, x_3 (.24 out of .6) and transfers most of it (.18) to the lowest outcome, x_1, and some of it (.06) to the second lowest outcome, x_2.

switchings in the Risky vs Degenerate game with respect to the Risky vs Risky one. In particular, in our example, the value of the degenerate lottery associated to pair 4, and estimated with the new combination of curvature and probability weighting is 126.000 CFA and it is still lower than the value of the degenerate lottery estimated if the agent would have switched at pair 6, that is 151.000 FCFA. In conclusion, switching at pair 4 instead of pair 6, this agent is willing to sacrifice money in order to stay with the sure outcome. It follows that the presence of probability weighing can explain the attitude of Discontinuous Preferences for Certainty agents to sacrifice money in order to stay with the sure option, at the condition an agent weights the same probability (1/2) in very different ways along all the pairs, and he is very pessimistic at the same time.

G: Protocol of the Insurance Game

Insurance presented with STANDARD INSURANCE FRAME

"An insurance on cotton production is something you buy before you know your yield. The insurance gives you some money after the harvest, but only in case of bad yield. Let me explain how the insurance works.

The amount of your savings is 50.000 CFA. You decide to buy an insurance before you know your yield. The insurance price is 20.00 CFA.You pay the insurance with your savings. Therefore you remain with 30.000 CFA

- In case of a bad yield [indicate pink ball in the poster]

  You payed the insurance, your savings left are 30.000 CFA [indicate amount in the poster].The cotton revenue [indicate image in the poster] is 44.000 CFA [indicate amount in the poster]. The insurance [indicate image in the poster]gives you 50.000 CFA [indicate amount in the poster] since you had a bad yield.

How much family money [indicate image in the poster] do you have with the insurance in case of bad yield [indicate pink ball in the poster] ?

The family money is composed by:
- 30.000 CFA [indicate amount] that are the savings left after the insurance payment, plus
- 44.000 [indicate] that is the cotton revenue, plus
- 50.000 [indicate] CFA that the insurance gives you since you had a bad yield

Therefore the family money [indicate image] is 124.000 CFA [indicate amount]

- In case of a good yield [indicate orange balls in the poster]

You payed the insurance, your savings left are 30.000 CFA [indicate amount in the poster].The cotton revenue [indicate image in the poster] is 188.000 CFA [indicate amount in the poster]. The insurance [indicate image in the poster] gives you 0 CFA [indicate amount in the poster] since you had a good yield,.

How much family money [indicate image in the poster] do you have with the insurance in case of good yield [indicate orange ball in the poster]?

The family money is composed by:

- 30.000 CFA [indicate amount], that are the savings left after the insurance payment, plus

-188.000 CFA [indicate] that is the cotton revenue, plus

- 0 CFA since the insurance does not give you anything in case of good yield

Therefore the family money [indicate image] is 218.000 CFA [indicate amount]

Insurance presented with PREMIUM REBATE FRAME

An insurance on cotton production is something you buy before you know your yield. The insurance gives you some money after the harvest, but only in case of bad yield.Let me explain how the insurance works.

The amount of your savings is 50.000 CFA . You decide to buy an insurance before you know your yield. The insurance price is 20.000 CFA.You pay the insurance with your savings, BUT only in case of good yield. Therefore you remain with 30.000 CFA in case of good yield and 50.000 CFA in case of bad yield.

- In case of a bad yield [indicate pink ball in the poster]

You do NOT pay the insurance, your savings remain 50.000 CFA [indicate amount in the poster.]The cotton revenue [indicate image in the poster] is 44.000 CFA [indicate amount in the poster]. The insurance [indicate image in the poster] gives you 30.000 CFA [indicate amount in the poster] since you had a bad yield.

How much family money [indicate image in the poster] do you have with the insurance in case of bad yield [indicate pink ball in the poster] ?

The family money is composed by:

- 50.000 CFA [indicate amount], that are all your savings plus

- 44.000 CFA [indicate], that is the cotton revenue plus

- 30.000 [indicate] CFA that the insurance is giving you since you had a bad yield

Therefore the family money [indicate image] is 124.000 CFA [indicate amount]

- in case of a good yield [indicate orange balls in the poster]

You pay the insurance, your savings left are 30.000 CFA [indicate amount in the poster].The cotton revenue [indicate image in the poster] is 188.000 CFA [indicate amount in the poster].The insurance [indicate image in the poster]gives you 0 CFA [indicate amount in the poster] since you had a good yield .

How much family money [indicate image in the poster] do you have with the insurance in case of good yield [indicate orange ball in the poster]?

The family money is composed by:

- 30.000 CFA [indicate amount], that are the savings left after the insurance payment, plus

-188.000 CFA [indicate] that is the cotton revenue, plus

- 0 CFA since the insurance does not give you anything in case of good yield

Therefore the family money [indicate image] is 218.000 CFA [indicate amount]

	(1) Standard Frame	(2) Premium Rebate Frame	(3) ttest:p-value
Age	43.67	44.56	
	(12.34)	(13.29)	
	287.00	284.00	
			0.5
Education	0.99	0.98	
	(2.16)	(2.19)	
	285.00	276.00	
			0.97
Muslim	0.46	0.35	
	(0.50)	(0.48)	
	287.00	284.00	
			0.27
Animist	0.31	0.37	
	(0.46)	(0.48)	
	287.00	284.00	
			0.19
Christian	0.22	0.29	
	(0.42)	(0.45)	
	287.00	284.00	
			0.39
Bwaba	0.41	0.36	
	(0.49)	(0.48)	
	287.00	284.00	
			0.67
Mossi	0.38	0.38	
	(0.49)	(0.49)	
	287.00	284.00	
			0.97
Other Ethnicity	0.21	0.26	
	(0.41)	(0.44)	
	287.00	284.00	
			0.51
Household size	8.78	8.69	
	(5.45)	(5.08)	
	287.00	283.00	
			0.86
Number of Children	4.24	4.34	
	(3.27)	(3.03)	
	287.00	283.00	
			0.69
Years in GPC	10.13	10.59	
	(6.03)	(6.43)	
	285.00	284.00	
			0.51
Years Household Head	15.44	16.33	
	(11.01)	(12.25)	
	286.00	284.00	
			0.35
Total Agricultural Surface 2013	9.81	10.5	
	(6.9)	(7.23)	
	287.00	284.00	
			0.43
Leader	0.07	0.09	
	(0.26)	(0.29)	
	287.00	284.00	
			0.30

P-values are based on specifications including clusters at Cotton Group Level

Table 12: Balanced Randomization

	(1) DPC_S frame	(2) DPC_PR	(3) DPC_p-value	(4) EUT_S Frame	(5) EUT_PR	(6) EUT_p-value	(7) Players_S	(8) Players_PR	(9) Players_p-value
Age	43.04	44.45		45.13	47.11		42.98	42.40	
	(12.51)	(12.74)		(12.49)	(14.12)		(12.06)	(12.58)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.44			0.35			0.73
Education	0.94	0.55		1.27	0.96		0.79	1.25	
	(2.24)	(1.62)		(2.36)	(2.04)		(1.90)	(2.55)	
	94.00	67.00		88.00	97.00		103.00	112.00	
			0.19			0.38			0.22
Muslim	0.54	0.32		0.42	0.35		0.44	0.36	
	(0.50)	(0.47)		(0.50)	(0.48)		(0.50)	(0.48)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.07			0.61			0.50
Animist	0.26	0.30		0.38	0.37		0.30	0.40	
	(0.44)	(0.46)		(0.49)	(0.49)		(0.46)	(0.49)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.73			0.94			0.12
Christian	0.20	0.38		0.20	0.27		0.26	0.24	
	(0.40)	(0.49)		(0.40)	(0.45)		(0.44)	(0.43)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.08			0.37			0.76
Bwaba	0.31	0.37		0.48	0.30		0.44	0.41	
	(0.46)	(0.49)		(0.50)	(0.46)		(0.50)	(0.49)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.61			0.14			0.84
Mossi	0.48	0.38		0.33	0.37		0.34	0.39	
	(0.50)	(0.49)		(0.47)	(0.49)		(0.48)	(0.49)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.44			0.72			0.71
Other Ethnicity	0.21	0.25		0.19	0.32		0.22	0.20	
	(0.41)	(0.44)		(0.40)	(0.47)		(0.42)	(0.40)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.63			0.20			0.78
Household Size	9.29	8.30		8.87	9.03		8.22	8.63	
	(5.83)	(4.87)		(6.00)	(5.07)		(4.51)	(5.24)	
			0.25			0.94			0.53
Number Children	4.51	4.24		4.25	4.42		3.99	4.33	
	(3.86)	(2.66)		(3.13)	(2.97)		(2.77)	(3.32)	
	95.00	70.00		89.00	99.00		103.00	114.00	
			0.57			0.70			0.38
Years in Cotton Group	9.95	10.62		10.62	10.97		9.87	10.24	
	(6.17)	(6.30)		(5.85)	(6.76)		(6.09)	(6.26)	
	95.00	71.00		89.00	99.00		101.00	114.00	
			0.46			0.75			0.67
Years Household Head	14.29	17.34		14.84	17.08		17.04	15.05	
	(11.23)	(12.96)		(10.62)	(12.52)		(11.06)	(11.54)	
	95.00	71.00		89.00	99.00		102.00	114.00	
			0.10			0.18			0.21
Total Agricultural Surface 2013	9.91	10.75		9.88	9.89		9.64	11.00	
	(6.95)	(7.05)		(6.70)	(6.76)		(7.08)	(7.74)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.52			0.99			0.33
Leader	0.08	0.10		0.06	0.07		0.08	0.11	
	(0.28)	(0.30)		(0.23)	(0.26)		(0.27)	(0.31)	
	95.00	71.00		89.00	99.00		103.00	114.00	
			0.70			0.71			0.41

P-values are based on specifications including clusters at Cotton Group Level. Premium rebate frame is indicated by "PR" and Standard frame by "S".

Table 13: Balanced Randomization by Agent Types

	mean	sd	N
HH characteristics			
Age	44.11	12.82	571.00
Education	0.98	2.17	561.00
Religion			
Muslim	0.41	0.49	571.00
Animist	0.34	0.47	571.00
Christian	0.25	0.44	571.00
Ethnicity			
Bwaba	0.39	0.49	571.00
Mossi	0.38	0.49	571.00
Other Ethnicity	0.23	0.42	571.00
Household Characteristics			
Years Household Head	15.89	11.64	570.00
Household size	8.73	5.27	570.00
Number Children	4.29	3.15	570.00
Land Characteristics			
Total Agricultural Surface 2013	10.18	7.07	571.00
Group Characteristics			
Years in cotton Group	10.36	6.23	569.00
Leader	0.08	0.28	571.00

Table 14: Individual Characteristics

		No Insurance		Standard Frame		Premium Rebate Frame	
		bad yield	good yield	bad yield	good yield	bad yield	good yield
pair 1	savings	50.000	50.000	0	0	50.000	0
	family money	**238.000**	**94.000**	**94.000**	**188.000**	**94.000**	**188.000**
pair 2	savings	50.000	50.000	20.000	20.000	50.000	20.000
	family money	**238.000**	**94.000**	**114.000**	**208.000**	**114.000**	**208.000**
pair 3	savings	50.000	50.000	25.000	25.000	50.000	25.000
	family money	**238.000**	**94.000**	**119.000**	**213.000**	**119.000**	**213.000**
pair 4	savings	50.000	50.000	30.000	30.000	50.000	30.000
	family money	**238.000**	**94.000**	**124.000**	**218.000**	**124.000**	**218.000**
pair 5	savings	50.000	50.000	35.000	35.000	50.000	35.000
	family money	**238.000**	**94.000**	**129.000**	**223.000**	**129.000**	**223.000**
pair 6	savings	50.000	50.000	40.000	40.000	50.000	40.000
	family money	**238.000**	**94.000**	**134.000**	**228.000**	**134.000**	**228.000**
pair 7	savings	50.000	50.000	45.000	45.000	50.000	45.000
	family money	**238.000**	**94.000**	**139.000**	**233.000**	**139.000**	**233.000**
pair 8	savings	50.000	50.000	50.000	50.000	50.000	50.000
	family money	**238.000**	**94.000**	**144.000**	**238.000**	**144.000**	**238.000**

Table 15: WTP Game: Graphical Representation

		Risky vs Degenerate Game									
		2	3	4	5	6	7	8	9	Total %	Total freq
Risky vs Risky Game	2	**39.29**	16.67	10.71	3.57	2.38	7.14	9.52	10.71	100	84
	3	10.53	**27.63**	26.32	13.16	7.89	7.89	2.63	3.95	100	76
	4	8.33	19.79	**29.17**	18.75	9.38	6.25	5.21	3.12	100	96
	5	2.25	10.11	17.98	**30.34**	20.22	5.62	7.87	5.62	100	89
	6	1.82	14.55	7.27	12.73	**21.82**	20.00	12.73	9.09	100	55
	7	4.65	6.98	6.98	11.63	18.60	**20.93**	18.60	11.63	100	43
	8	7.81	3.12	9.38	12.50	4.69	20.31	**31.25**	10.94	100	64
	9	9.38	3.12	4.69	6.25	1.56	4.69	10.94	**59.38**	100	64
	Total %	11.38	13.66	15.59	14.36	10.33	10.33	11.21	13.13	100	
	Total freq	65	78	89	82	59	59	64	75		571

Table 16: Cross Tabulation Switching Points

Agent Types	**Simple Definition**	**Conservative Definition**
Expected Utility Agent (EUT)	33%	63%
Discontinuous Preferences for Certainty Agent (DPC)	29%	16%
Player Agent	38%	21%
N	571	571

Table 17: Three Agent Types

	All agents	**DPC**	**Players**	**EUT**
WTP	15.796	15.271	15.576	16.515
	(10.438)	(10.677)	(9.659)	(11.088)
	571	166	217	188
WTP under Standard Insurance Frame	15.052	13.526	15.631	16.011
	(10.356)	(10.540)	(9.642)	(10.875)
	287	95	103	89
WTP under Premium Rebate Frame	16.549	17.605	15.526	16.969
	(10.486)	(10.483)	(9.716)	(11.312)
	284	71	114	99
WTP Premium Rebate-WTP Standard	0.08	0.01	0.9	0.5

The WTP for the insurance is expressed in FCFA. Standard Deviation is in parenthesis.

Table 18: Average WTP for the insurance for the three agent types

	Simple Definition				Conservative Definition			
	Estimated Coefficients		Marginal Impact		Estimated Coefficients		Marginal Impact	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Premium Rebate Frame	105.3	-161.2			-1106.6	-1286.8		
	(1418.2)	(1583.9)			(1905.0)	(2017.1)		
DPC	-2643.8	-3073.1*			-1860.9	-2482.0		
	(1766.9)	(1830.3)			(2435.7)	(2411.9)		
EUT	-249.2	-57.92			-885.7	-799.6		
	(1595.9)	(1709.3)			(1570.7)	(1596.4)		
Players	(.)	(.)			(.)	(.)		
Premium Rebate Frame#DPC	4262.3*	5373.5**	3838.2**	4576.1**	6066.1	7548.2**	4435.5*	5592.7**
	(2563.5)	(2598.0)	(1862.0)	(1816.5)	(3703.4)	(3501.0)	(2694.4)	(2593.4)
Premium Rebate Frame#EUT	1278.7	1947.8	1237.4	1607.1	3183.3	3593.7	1845.2	2055.3
	(2158.1)	(2302.2)	(1884.8)	(1895.5)	(2141.4)	(2244.1)	(1312.0)	(1320.9)
Premium Rebate Frame#Players	(.)	(.)	93.49	-142.8	(.)	(.)	-971.0	-1126.1
			(1259.4)	(1403.8)			(1673.7)	(1768.5)
StartRR	3180.2***	3565.5***			3182.8***	3522.8***		
	(1182.5)	(1247.3)			(1198.0)	(1264.2)		
Controls	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**
Observations	571	561	571	561	571	561	571	561

Standard errors in parentheses and clustered at cotton group level.

Controls used in the estimation: age, years of schooling, religion, ethnie, agricultural surface 2013, household size.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 19: Tobit regression and Estimated Marginal Impact of Premium Rebate Frame on WTP considering the three agent types

	Simple Definition				Conservative Definition			
	Estimated Coefficients		Marginal Impact		Estimated Coefficients		Marginal Impact	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Premium Rebate Frame	108.0	-162.1			-1462.7	-1544.6		
	(1415.6)	(1585.1)			(1704.4)	(1857.4)		
DPC	-1225.7	-1505.7			-161.0	-436.7		
	(1595.5)	(1688.7)			(1892.9)	(1889.9)		
EUT	-1890.9	-1814.6			-2390.2	-2289.4		
	(1828.7)	(1917.2)			(1488.7)	(1585.5)		
Players	(.)	(.)			(.)	(.)		
Premium Rebate Frame#DPC	3840.2	4763.7**	3544.2**	4131.5**	5592.6*	6511.7**	3797.3	4567.5**
	(2337.3)	(2393.0)	(1736.6)	(1712.8)	(3019.4)	(2835.7)	(2385.1)	(2284.0)
Premium Rebate Frame#EUT	1798.0	2641.9	1661.5	2176.1	4071.1**	4437.3**	2287.3*	2543.3*
	(2226.4)	(2348.9)	(1860.6)	(1832.4)	(1988.2)	(2120.7)	(1317.9)	(1298.1)
Premium Rebate Frame#Players	(.)	(.)	95.95	-143.6			-1291.6	-1360.5
			(1257.1)	(1404.8)			(1506.9)	(1639.1)
StartRR	3209.9***	3579.6***			3026.1**	3423.8***		
	(1188.8)	(1254.5)			(1190.2)	(1248.8)		
Controls	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**	**NO**	**YES**
Observations	571	561	571	561	571	561	571	561

Standard errors in parentheses and clustered at cotton group level.

Controls used in the estimation: age, years of schooling, religion, ethnie, agricultural surface 2013, household size.

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 21: Tobit regression and Estimated Marginal Impact of Premium Rebate Frame on WTP: Gneezy Agents

	CRRA (1)	Risky vs Risky CARA (2)	Risky vs Degenerate CARA (3)
3	$1.58 < \gamma$	$1.02(10^{-5}) < \gamma$	$1.11(10^{-5}) < \gamma$
4	$0.99 < \gamma < 1.58$	$6.65(10^{-6}) < \gamma < 1.02(10^{-5})$	$6.76(10^{-6}) < \gamma < 1.11(10^{-5})$
5	$0.66 < \gamma < 0.99$	$4.58(10^{-6}) < \gamma < 6.65(10^{-6})$	$4.53(10^{-6}) < \gamma < 6.76(10^{-6})$
6	$0.44 < \gamma < 0.66$	$3.15(10^{-6}) < \gamma < 4.58(10^{-6})$	$3.08(10^{-6}) < \gamma < 4.53(10^{-6})$
7	$0.15 < \gamma < 0.44$	$1.25(10^{-6}) < \gamma < 3.15(10^{-6})$	$1.12(10^{-6}) < \gamma < 3.08(10^{-6})$
8	$0 < \gamma < 0.15$	$0 < \gamma < 1.25(10^{-6})$	$0 < \gamma < 1.12(10^{-6})$

Table 22: CARA and CRRA

	Risky vs Risky		Risky vs Degenerate	
Pair	CARA (1)	avg CARA (2)	CARA (3)	avg CARA (4)
1	-	-	-	-
2	-	-	-	-
3	$1.02 < \gamma$	+inf	$1.1 < \gamma$	+inf
4	$0.66 < \gamma < 1.02$	0.84	$0.67 < \gamma < 1.1$	0.88
5	$0.45 < \gamma < 0.66$	0.55	$0.45 < \gamma < 0.67$	0.56
6	$0.31 < \gamma < 0.45$	0.38	$0.30 < \gamma < 0.45$	0.37
7	$0.12 < \gamma < 0.31$	0.21	$0.11 < \gamma < 0.30$	0.20
8	$0 < \gamma < 0.12$	0.06	$0 < \gamma < 0.11$	0.06

Table 23: CARA*100.000

		Risky vs Degenerate Game					
		3	4	5	6	7	8
Risky vs Risky Game	**3**						
	α	**1.59**	2.65	4.54	28	30	inf
	$\pi(p)$	**0.50**	0.80	0.97	0.99	1	
	θ	**1.01**	4.12	10.50	91.45	100.233	
	4						
	α	0.28	**1.01**	1.7	3.35	28.8	inf
	$\pi(p)$	0.27	**0.50**	0.72	0.96	1	
	θ	-0.72	**1.03**	3.11	8.95	102.12	
	5						
	α	-0.35	0.24	**0.67**	1.17	24	inf
	$\pi(p)$	0.18	0.34	**0.50**	0.67	0.99	
	θ	-1.45	-0.14	**1.02**	2.59	98.34	
	6						
	α	-0.71	-0.18	0.14	**0.44**	20	inf
	$\pi(p)$	0.14	0.27	0.38	**0.50**	0.99	
	θ	-1.82	-0.72	0.13	**1.01**	98.34	
	7						
	α	-1.02	-0.59	-0.34	-0.16	**0.17**	inf
	$\pi(p)$	0.11	0.20	0.28	0.35	**0.50**	
	θ	-2.12	-1.21	-0.58	-0.06	**1.05**	
	8						
	α	-1.97	-0.70	-0.5	-0.36	-0.15	**0**
	$\pi(p)$	0.10	0.19	0.26	0.31	0.36	**0.50**
	θ	-2.18	-1.34	-0.79	0.41	0.41	**0.99**

$$V(x) = \frac{x^{(1-\alpha)}}{(1-\alpha)}$$
$$\pi(p) = exp[-(-lnp)^{\theta})]$$

Table 24: Parameters estimation