Why Not Insure Prices?

Experimental Evidence from Peru

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Motivation

- Low take-up of index microinsurance covering production risk (Platteau, De Bock, and Gelade 2017; Carter et al. 2017)
  - How to increase take-up? Premium discounts (Mullally, Boucher, and Carter 2010)
  - Risk in agriculture: from production risk and price risk
- Test expected utility theory predictions in the field (Boyd and Bellemare 2020)
  - Bellemare, Lee and Just (2020) only test Sandmo's prediction, experimentally

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- Do farmers produce less under price uncertainty?
- Do they produce the same under certainty and uncertainty if price risk is insured?
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  1. Price risk (baseline)
  2. Price risk + compulsory insurance at actuarially-fair price
  3. Price risk + non-compulsory insurance + random discounts (0%, 50%, 100%)
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- Filter questions & final questionnaire

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Experimental Design

- For the 3 games: choose production level (0-20 arrobas, not framed crop)
- 20 rounds per game. Round $\approx$ Ag season. No storage. Start each independent round with 25 PEN
- Certain rounds (p=7 PEN): 1/3. Uncertain rounds: 2/3, four price distributions (scenarios), 1/4 each one
  - If realized price below 7, with insurance p=7

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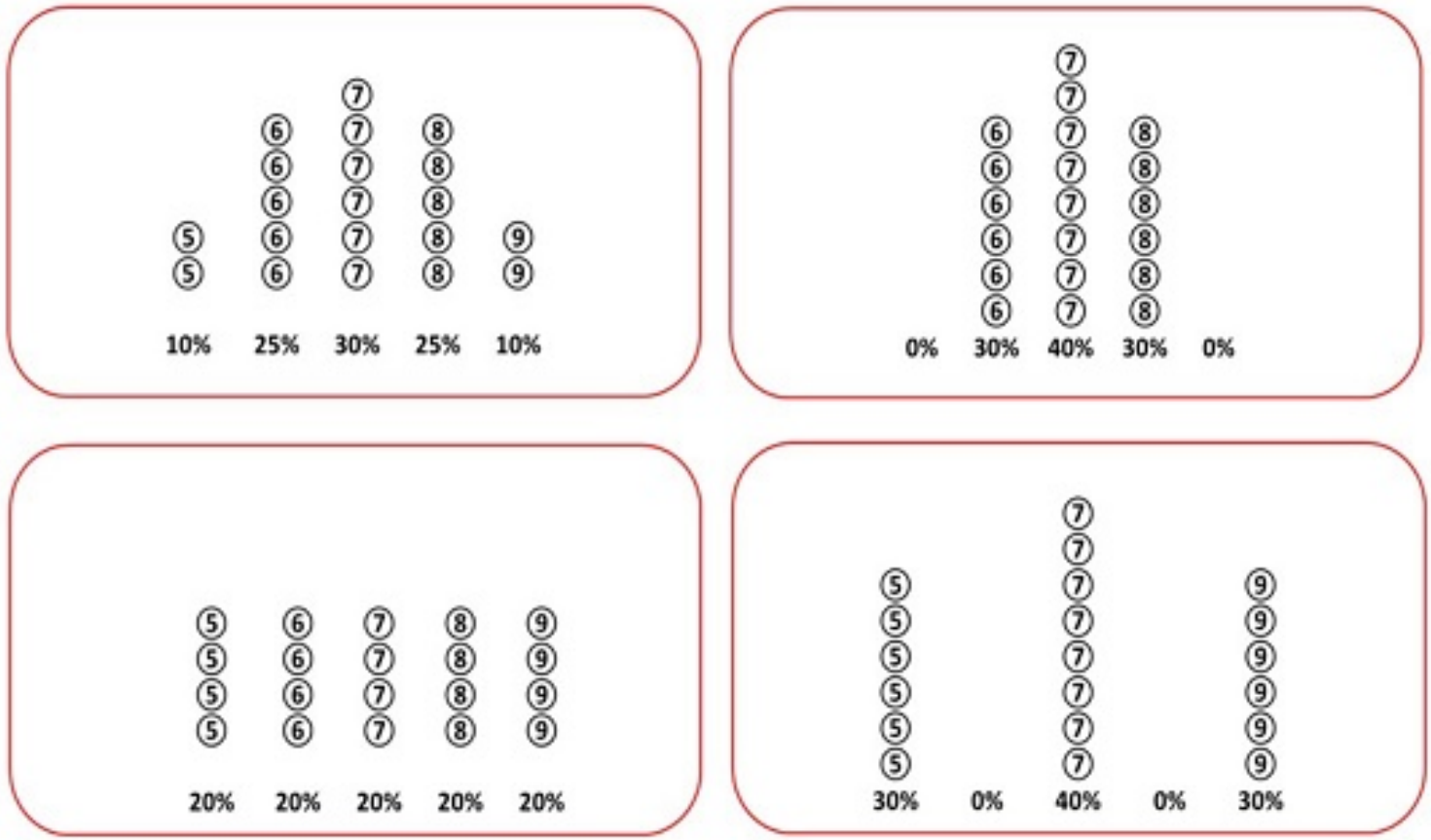

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- Game I (baseline, BLJ 2020):

$$\pi = px - c(x) - F$$

$$c(x) = 2x^{1.4}; F = 15$$

- Game II (compulsory insurance):

$$\pi = (p - m + D)x - c(x) - F$$

- Game III (non-compulsory insurance + discounts):

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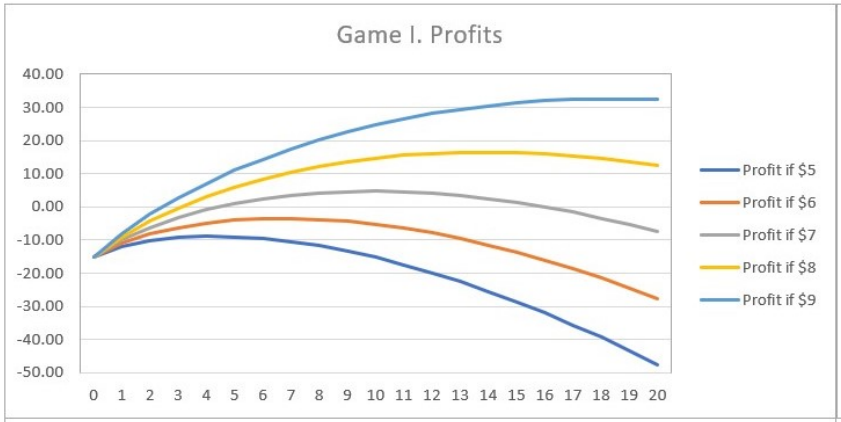

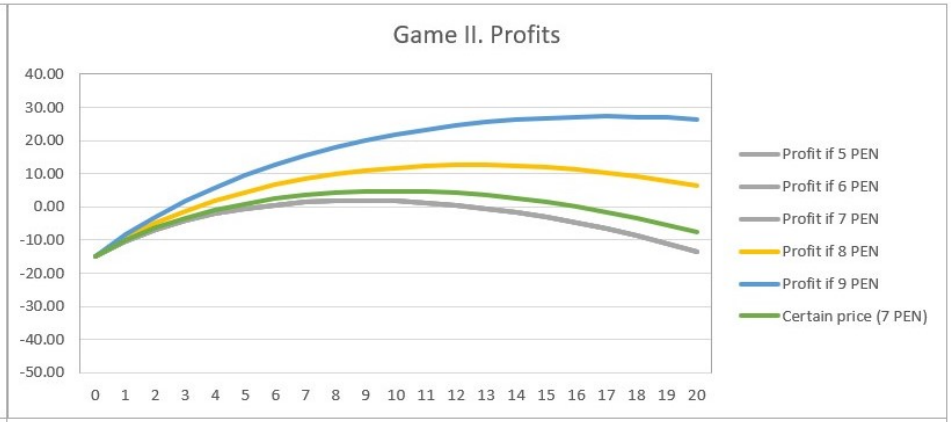

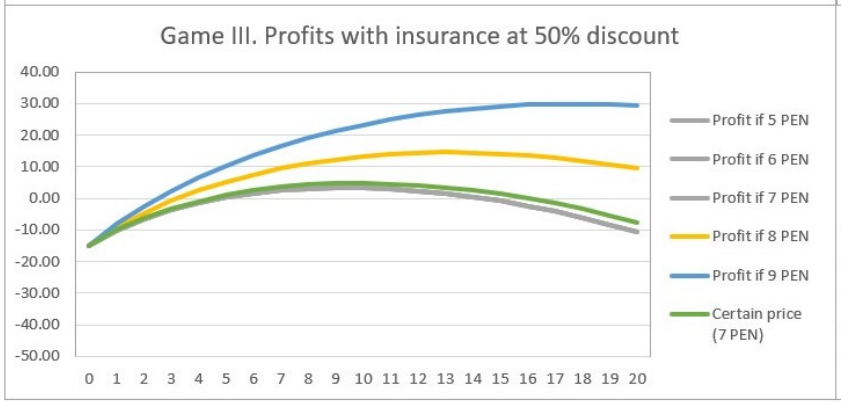

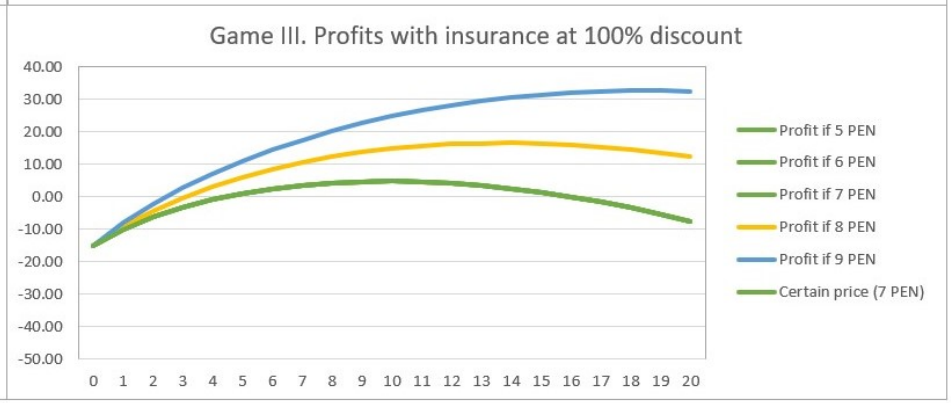

Empirical Strategy

- Game I and Game II:

$$y_{it} = \alpha_1 + \beta_1 I(\sigma_t > 0) + \delta_1 R_i + \kappa_1 h_i + \tau_1 t_t + \theta_1 X_i + \upsilon_{1i} + \varepsilon_{1it}$$

- Game III:

$$y_{it} = \alpha_3 + \beta_3 I(\sigma_t > 0) + \gamma_3 d_{it} + \delta_3 R_i + \kappa_3 h_i + \tau_3 t_t + \theta_3 X_i + \upsilon_{3i} + \varepsilon_{3it}$$

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Summary stats

- Average production around 10
- Average price 7
- 2/3 of the rounds had uncertain prices

- Insurance take-up with 0% discount: 70%
- Insurance take-up with 50% discount: 82%
- Insurance take-up with 100% discount: 95%

Results - Game I

Price Risk Effects on Production without insurance (Game I)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Output choice (0-20)					
Uncertain price round (1=Yes)	-0.157	-0.158	-1.378***	-1.383***		
	(0.216)	(0.213)	(0.466)	(0.463)		
Standard deviation of Price Distribution			0.979***	0.982***		
			(0.327)	(0.326)		
Price Distribution 1					-0.645**	-0.645**
					(0.260)	(0.259)
Price Distribution 2					-0.149	-0.153
					(0.322)	(0.315)
Price Distribution 3					0.066	0.060
					(0.270)	(0.272)
Price Distribution 4					0.107	0.116
					(0.285)	(0.280)
Additional random compensation for paticipation (1-10)	0.086	0.030	0.088	0.029	0.089	0.029
	(0.087)	(0.062)	(0.087)	(0.062)	(0.088)	(0.062)
Risk-aversion (CRRA)	-0.226		-0.237		-0.234	
	(0.284)		(0.282)		(0.282)	
Round order number, as played	0.031*		0.032*		0.032*	
	(0.016)		(0.017)		(0.017)	
Constant	7.598*	9.248***	7.365	9.265***	7.296	9.264***
	(4.592)	(0.471)	(4.607)	(0.464)	(4.624)	(0.465)
Eckel-Grossman lottery played after the 3 games (1=Yes)	Yes	Yes	Yes	Yes	Yes	Yes
Three games order dummies	Yes	Yes	Yes	Yes	Yes	Yes
Other control variables	Yes	No	Yes	No	Yes	No
Observations	1,860	1,860	1,860	1,860	1,860	1,860
Number of subjects	93	93	93	93	93	93

*** p<0.01, ** p<0.05, * p<0.1. Notes: Clustered standard errors at the subject level in parentheses. All regressions include random effects. Other control variables include: sex (1=male), age, years of education, altitude (m.a.s.l.), household income from agriculture (%), feeling hungry (1=Yes), weather preference (1-10), dependence ratio, number of big animals, number of small animals, years cultivating potato, potato area (ha), distance to the closest market (hours), indigenous (1=Yes), mestizo or non-white (1=Yes), family receives the CCT (1=Yes), number of economic activities done by the household, potato monocropping (1=Yes), potato harvest for self-consumption (%), number of crops planted by the household, number of potato varieties planted, currently has a credit (1=Yes), has had non-health insurance (1=Yes), when price is low, sells potato at the market price (1=Yes), and actual price of potato received last season.

Results - Game II

Price Risk Effects with compulsory insurance (Game II)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Output choice (0-20)					
Uncertain price round (1=Yes)	0.058	0.057	-0.251	-0.246		
	(0.175)	(0.175)	(0.387)	(0.386)		
Standard deviation of Price Distribution			0.245	0.240		
			(0.266)	(0.264)		
Price Distribution 1					-0.022	-0.020
					(0.214)	(0.214)
Price Distribution 2					-0.109	-0.103
					(0.258)	(0.259)
Price Distribution 3					0.317	0.300
					(0.227)	(0.226)
Price Distribution 4					0.043	0.051
					(0.224)	(0.219)
Additional random compensation for paticipation (1-10)	0.068	0.080*	0.069	0.080*	0.068	0.079*
	(0.058)	(0.048)	(0.058)	(0.048)	(0.058)	(0.048)
Risk-aversion (CRRA)	0.045		0.048		0.043	
	(0.264)		(0.265)		(0.267)	
Round order number, as played	0.009		0.009		0.009	
	(0.012)		(0.011)		(0.011)	
Constant	7.461**	9.901***	7.432**	9.905***	7.403**	9.909***
	(3.214)	(0.632)	(3.207)	(0.632)	(3.226)	(0.633)
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Results - Game III

Price Risk ITT Effects with available insurance (Game III)

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Output choice (0-20)					
Discount (0%, 50%, or 100%)	0.003	0.003	0.003	0.003	0.003	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Uncertain price round (1=Yes)	0.466*	0.467*	0.155	0.123		
	(0.244)	(0.243)	(0.358)	(0.358)		
Standard deviation of Price Distribution			0.249	0.275		
			(0.236)	(0.236)		
Price Distribution 1					0.296	0.291
					(0.258)	(0.257)
Price Distribution 2					0.592**	0.581**
					(0.288)	(0.286)
Price Distribution 3					0.499*	0.493*
					(0.291)	(0.289)
Price Distribution 4					0.513*	0.534*
					(0.302)	(0.301)
Additional random compensation for paticipation (1-10)	0.054	0.006	0.053	0.006	0.055	0.007
	(0.053)	(0.051)	(0.053)	(0.051)	(0.053)	(0.051)
Risk-aversion (CRRA)	0.023		0.027		0.027	
	(0.282)		(0.281)		(0.281)	
Round order number, as played	0.007		0.007		0.007	
	(0.012)		(0.012)		(0.012)	
Constant	13.052***	9.867***	13.001***	9.854***	12.995***	9.852***
	(3.134)	(0.676)	(3.125)	(0.671)	(3.117)	(0.673)
Eckel-Grossman lottery played after the 3 games (1=Yes)	Yes	Yes	Yes	Yes	Yes	Yes
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- With compulsory insurance, production under price uncertainty gets closer to the production levels under price certainty
- With non-compulsory insurance, production is larger than production under price certainty (moral hazard)
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