

# Experimentally Validated General Risk Attitude among Different Ethnic Groups – The Case of Dak Lak, Vietnam

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# How to Measure Risk Attitudes?

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## Experimental measure:

- Effective but context-specific (Charness et al., 2013; Lönnqvist et al., 2015)
- Incentivized but expensive and time-consuming
- Hard to apply in large-scale studies (Dohmen et al., 2011)

## Survey-based measure:

- Cheaper to use, easier to respond and associated with personality factors and real-life risk-taking behaviors (Lönnqvist et al., 2015)
- Validated by a incentivized risk experiment (Dohmen et al., 2005, 2011; Hardeweg et al., 2013; Vieider et al., 2015)

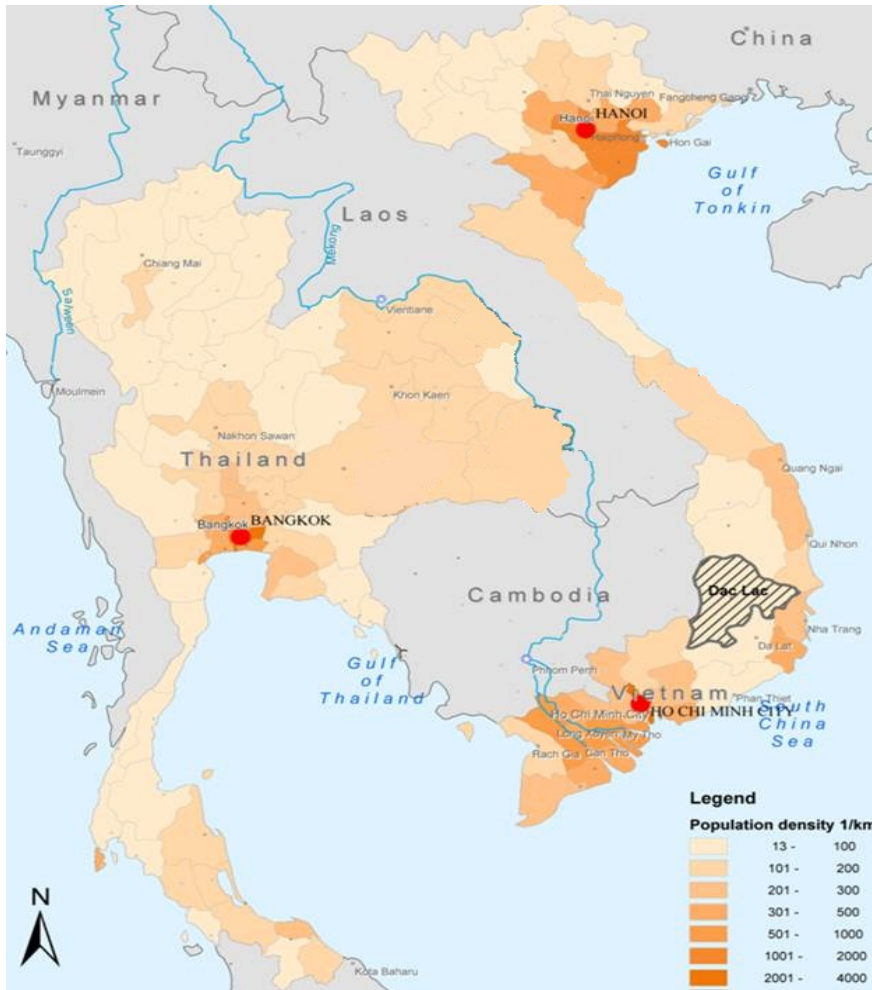
# Study population

679 observations (2010)

- Household survey
- Risk experiment

## Sampling design

- Stratifying in 3 stages
- Two agro- ecological zones: lowland and the mountain
- Communes: selected by weight of rural population
- Villages: chosen by the probability proportional to the population size
- 10 households: randomly selected in each village



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*Take the complex sampling design into regression analyses (Wooldridge 2002)*

One ethnic majority (Kinh) and 53 ethnic minorities; 14% of the population

Ethnic minorities in Vietnam:

- Poorer
- More vulnerable to shocks
- Less productively using resources
- Different languages and cultures
- Strongly influenced by own traditions

(e.g. Van de Walle, D. and Gunewardena, D., 2001; Montalvo & Reynal-Querol, 2005; Imai et al., 2011a,b; Nguyen et al., 2012; Do & Bauer, 2016)

# Challenges to Measure Risk Attitudes among Ethnic Minorities

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Ethnic minorities are believed to be strongly influenced by their own traditions that deviate from the “homo oeconomicus” assumption (Montalvo & Reynal-Querol, 2005; Nguyen et al., 2012)

Economic resource limitation or nutritional scarcity interferes the cognitive function, leading to bias or errors in decision making (e.g. Shah et al., 2012; Shofield, 2014)

A complex task can make the players with lower education confused or less consistent (e.g. Cook, 2015; Charness & Viceisza, 2015)

# Research objectives

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- (1) To test for the experimental validity of a simple survey-based risk measure among a ethnically diverse rural population in Vietnam
- (2) To verify whether this experimental validity holds for separate ethnic groups: ethnic minorities and ethnic majority (Kinh)

**Measure 1:**  
**Survey-based risk item (WTR)**

“Are you **generally** a person who is fully prepared to take risks, or do you try to avoid taking risks? Please choose a number on a scale from **zero (unwilling to take risks)** to **ten (fully prepared to take risks)**”.

In Vietnamese:

*Ông/ bà là người luôn sẵn sàng chấp nhận đối mặt với rủi ro hay tìm cách né tránh rủi ro ?  
(Vui lòng chọn một con số trên thang từ 0 đến 10 phù hợp với mức độ chấp nhận rủi ro của ông bà)?*

0	1	2	3	4	5	6	7	8	9	10
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0 = unwilling to take risks

10 = fully prepared to take risks

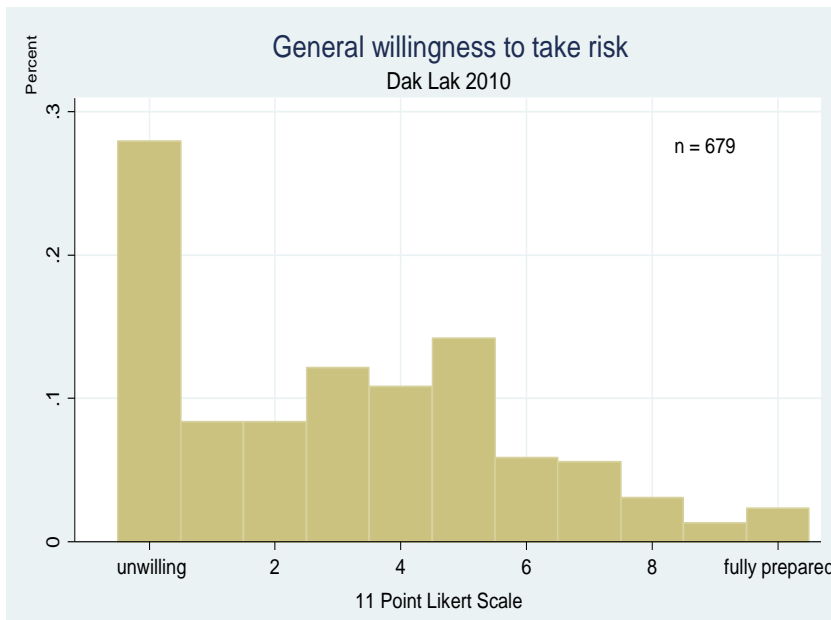
**Measure 2: Risk experiment (SR: switching row)**  
 (Holt - Laury type)

Row	Certain Amount (1,000 VND)	Choose the Certain Amount	Lottery (50% : 50%) (1,000 VND)
1	0		300 : 0
2	10		300 : 0
3	20		300 : 0
...	...		....
16	150		300 : 0
17	160		300 : 0
18	170		300 : 0
19	180		300 : 0
20	190		300 : 0

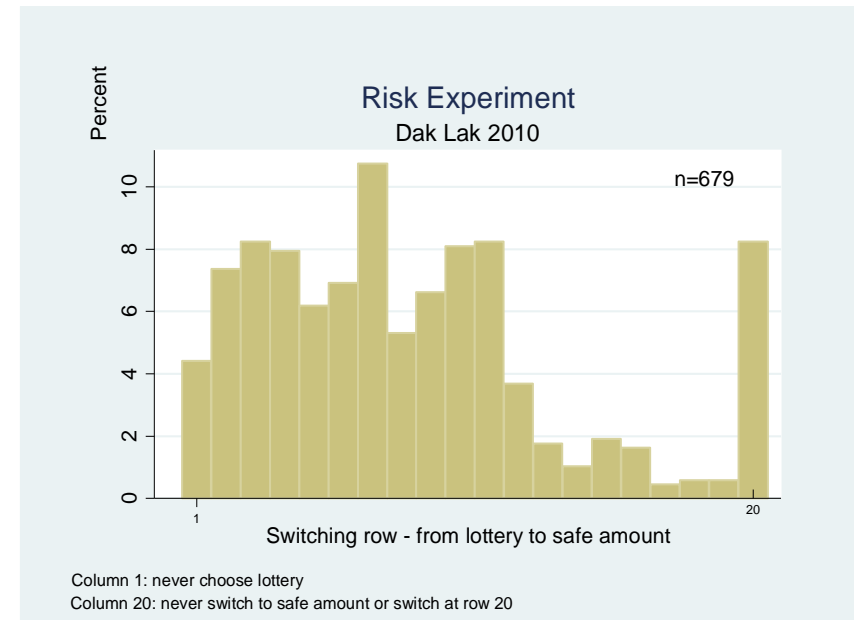


# Frequency Distributions

## Survey-based item



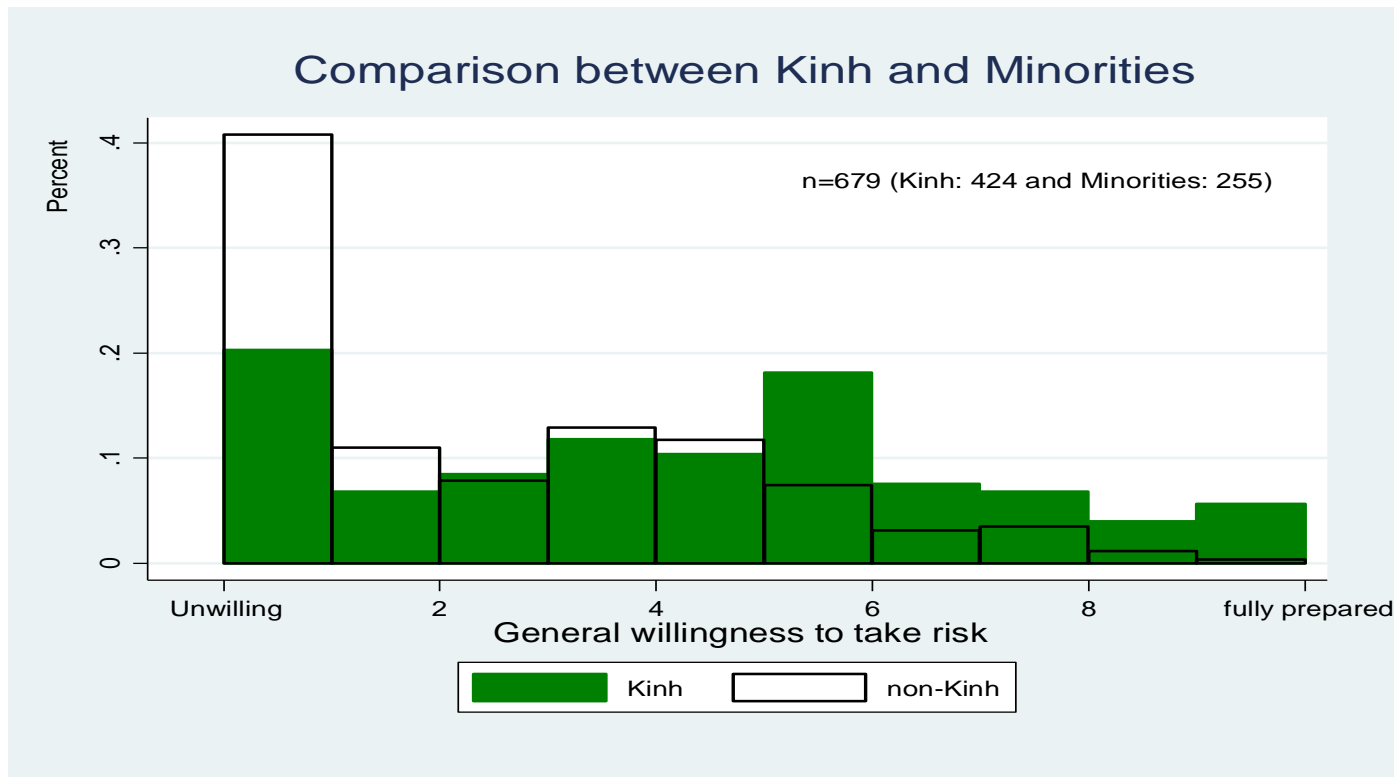
## Risk experiment



Source: Household survey and Risk Experiment (conducted once the Questionnaire is completed), 2010, Dak Lak

# Comparison between Kinh and Ethnic Minorities

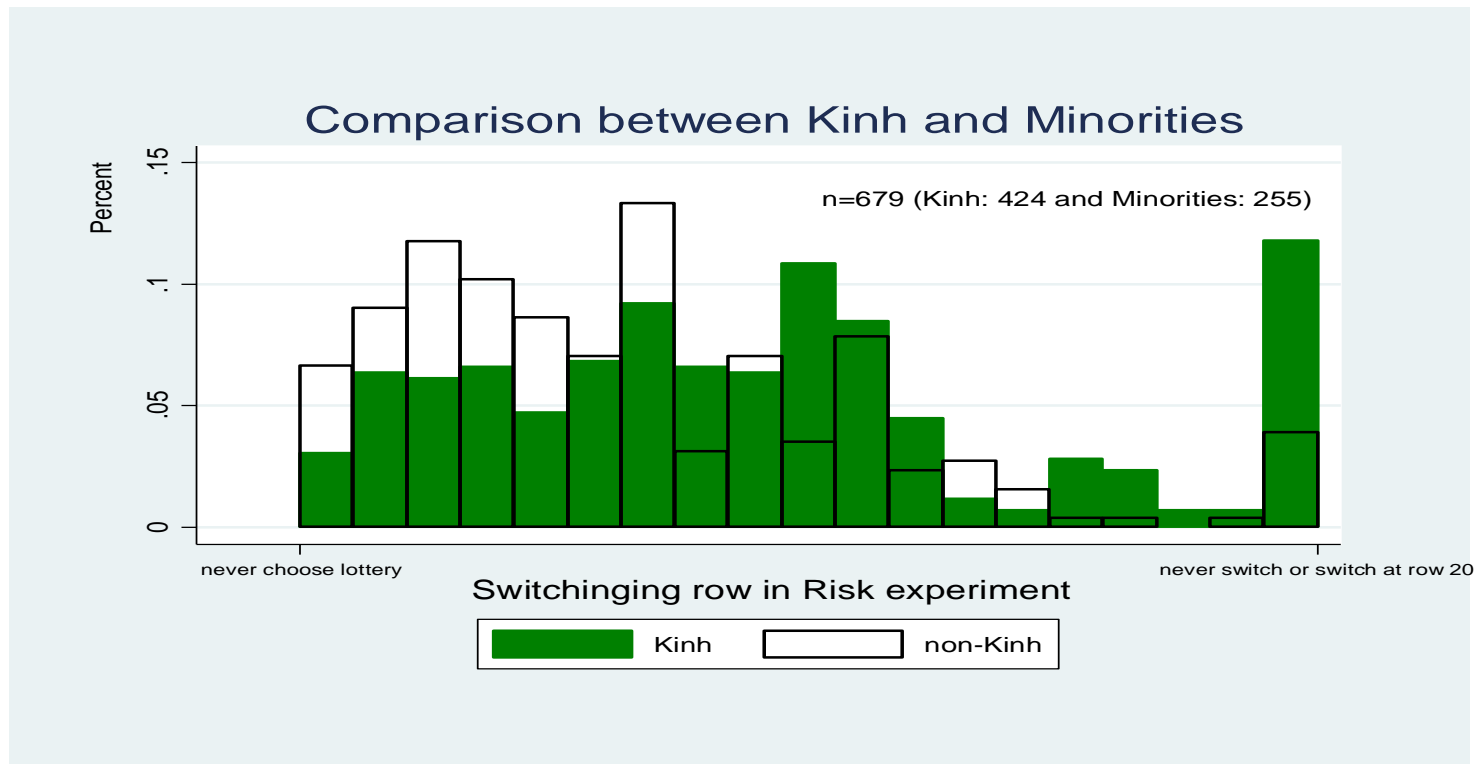
## Survey-based item



Source: Household survey data 2010, Dak Lak

# Comparison between Kinh and Ethnic Minorities

## Risk experiment



Source: Risk Experiment, 2010, Dak Lak

# Empirical strategy

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$$\text{Eq1: } \mathbf{WTR}_i = \boldsymbol{\beta}\mathbf{X}_i + \mathbf{u}_i$$

$$\text{Eq2: } \mathbf{SR}_i = \mathbf{WTR}_i + \eta\mathbf{X}_i + \boldsymbol{\varepsilon}_i$$

**Where:**  $\mathbf{WTR}_i$  : survey-based risk attitude ( 0 to 10)

$\mathbf{SR}_i$ : experiment switching row (1 to 20)

$\mathbf{X}_i$ : vector of individual characteristics, household characteristics, and subjective opinions

$\boldsymbol{\beta}, \eta$  : vectors of coefficients

$\mathbf{u}_i, \boldsymbol{\varepsilon}_i$  : error terms

## Model estimations:

- Interval regression (Intreg)
- Ordered probit (Oprobit)
- OLS regression

*All regressions take features of a complex sampling design into account*

# Explanatory variables

Variables	Full sample		
	Observations	Mean	Spearman Rank (corr. with WTR)
Female	679	0.46	-0.067*
Age (years)	679	44.45	0.067*
Height (cm)	679	159.28	0.115***
Daily Consumption/AE (PPP USD)	679	4.33	0.393***
Education (schooling years)	678	6.49	0.263***
Dependency ratio	679	0.88	0.083**
Household size	679	0.59	-0.106***
Married	679	5.51	-0.091**
Self-employed	679	0.56	0.206***
Membership	679	0.15	0.088**
Health impairment	679	0.25	-0.164***
Optimism	654	0.33	0.259***

**Note:** Spearman's correlation coefficient to statistically measure the strength of a monotonic relationship between paired data. . Significance levels: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01  
 Organization for Economic Cooperation and Development adult equivalents Aes :  $AE = 1 + .7(\text{adults} - 1) + .5 * \text{children}$

# Comparison between Kinh and Minorities

Variables	Minorities	Kinh	Mean
	255 Obs	424 Obs	Diff.
Female	0.46	0.46	
Age (years)	41.84	46.03	***
Height (cm)	158.97	159.47	
Consumption/AE (PPP USD)	2.97	5.15	***
Education (schooling years)	4.71	7.56	***
Dependency ratio	0.70	0.53	***
Household size	5.98	5.23	***
Married	0.86	0.89	
Self-employed	0.05	0.22	***
Membership	0.46	0.61	***
Health impairment	0.24	0.25	
Optimism	0.20	0.41	***

**Note:** Difference in means under t-test and pr-test. ♦ prtest (test for the same proportion of each group) is used for dummy variables. Significance levels: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Multivariate correlates of the survey-based measure (Eq1)

DV: WTR	Intreg1	Intreg2	Intreg3	Oprobit	OLS
Age (years)	0.0002 [0.012]	0.019 [0.012]	0.030** [0.013]	0.010** [0.004]	0.024*** [0.009]
Height (cm)	0.077** [0.030]	0.061** [0.029]	0.052* [0.028]	0.017* [0.009]	0.033* [0.018]
<b>Majority</b>	<b>2.265***</b> [0.379]	<b>0.887**</b> [0.361]	<b>0.671*</b> [0.351]	<b>0.218*</b> [0.112]	<b>0.486*</b> [0.257]
Consumption		2.338*** [0.281]	1.589*** [0.300]	0.518*** [0.098]	1.109*** [0.222]
Membership			0.977*** [0.231]	0.311*** [0.075]	0.645*** [0.165]
Impairment			-0.870** [0.353]	-0.272** [0.111]	-0.645*** [0.236]
Optimism			0.892*** [0.261]	0.290*** [0.086]	0.667*** [0.192]
Control‡	<i>gender</i>	<i>gender</i>	<i>all</i>	<i>all</i>	<i>all</i>
Constant	-11.201** [4.910]	-11.689** [4.802]	-10.492** [4.687]		-5.681* [3.030]
Lnsigma	1.249*** [0.036]	1.186*** [0.037]	1.145*** [0.039]		
Pseudo R2	0.025	0.050	0.061	0.065	0.236
Observations	679	679	647	647	647

Note: Control‡: gender, education, married status, dependency ratio in household, household size and self-employment in non-farming; Significance levels; \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. standard errors in brackets

## Multivariate Correlates of WTR compare between Kinh and Minorities

DV: WTR	Intreg	Oprobit	OLS	Intreg	Oprobit	OLS
	Majority (Kinh)			Ethnic minorities		
Age (years)	0.049*** [0.015]	0.016*** [0.005]	0.039*** [0.011]			
Height (cm)				0.099** [0.044]	0.035** [0.015]	0.057** [0.024]
Consumption	1.840*** [0.391]	0.597*** [0.126]	1.419*** [0.294]	1.464*** [0.482]	0.501*** [0.167]	0.814*** [0.298]
Dependency ratio	-0.635** [0.252]	-0.212*** [0.079]	-0.543*** [0.177]			
Membership	1.031*** [0.306]	0.320*** [0.098]	0.730*** [0.234]	0.936** [0.437]	0.336** [0.147]	0.580** [0.264]
Health impairment	-0.919** [0.428]	-0.291** [0.133]	-0.747** [0.309]			
Optimism	0.759** [0.298]	0.240** [0.094]	0.574** [0.231]	1.223*** [0.404]	0.444*** [0.150]	0.920*** [0.270]
<i>Other control variables</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>
Constant	-7.006 [5.777]		-3.958 [3.968]	-17.305** [7.416]		-8.885** [4.059]
Log sigma	1.152*** [0.050]			1.081*** [0.066]		
Pseudo R <sup>2</sup>	0.042	0.044	0.173	0.064	0.069	0.229
Observations	409	409	409	238	238	238



# Comparison Multivariate Correlates of WTR and Correlates of SR (Eq1)

Variables	SR			WTR		
	Intreg3	Oprobit	OLS	Intreg3	Oprobit	OLS
Age (years)				0.030** [0.013]	0.010** [0.004]	0.024*** [0.009]
Height (cm)	0.084** [0.037]	0.016** [0.007]	0.079** [0.033]	0.052* [0.028]	0.017* [0.009]	0.033* [0.018]
<b>Majority</b>	<b>1.603***</b> [0.466]	<b>0.291***</b> [0.090]	<b>1.434***</b> [0.408]	<b>0.671*</b> [0.351]	<b>0.218*</b> [0.112]	<b>0.486*</b> [0.257]
Consumption				1.589*** [0.300]	0.518*** [0.098]	1.109*** [0.222]
Self-employed	2.176*** [0.672]	0.384*** [0.112]	1.985*** [0.571]			
Membership				0.977*** [0.231]	0.311*** [0.075]	0.645*** [0.165]
Impairment	-1.722*** [0.442]	-0.328*** [0.085]	-1.594*** [0.390]	-0.870** [0.353]	-0.272** [0.111]	-0.645*** [0.236]
Optimism	0.753** [0.385]	0.169*** [0.067]	0.653** [0.338]	0.892*** [0.261]	0.290*** [0.086]	0.667*** [0.192]
<i>Other control variables</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>	<i>all</i>
Constant	-6.636 [6.594]		-5.812 [5.889]	-10.492** [4.687]		-5.681* [3.030]
Insigma	1.714*** [0.040]			1.145*** [0.039]		
Pseudo R2	0.021	0.022	0.118	0.061	0.065	0.236
Observations	647	647	647	647	647	647

## Results (Eq2): Experimental Validation of Survey-based Measure (full sample)

DV: SR	Intreg1	Intreg2	Intreg3	Oprobit	OLS
<b>WTR</b>	<b>0.565***</b> [0.097]	<b>0.438***</b> [0.099]	<b>0.338***</b> [0.099]	<b>0.068***</b> [0.019]	<b>0.296***</b> [0.088]
Height (cm)		0.076** [0.036]	0.073** [0.036]	0.014** [0.007]	0.069** [0.032]
<b>Majority</b>		<b>2.163***</b> [0.471]	<b>1.437***</b> [0.478]	<b>0.261***</b> [0.093]	<b>1.290***</b> [0.418]
Self-employed			2.165*** [0.689]	0.386*** [0.116]	1.985*** [0.585]
Health impairment			-1.510*** [0.435]	-0.290*** [0.085]	-1.404*** [0.385]
<i>Control</i> ♠	no	gender, age	all	all	all
Constant	6.589*** [0.394]	-5.310 [6.039]	-4.740 [6.332]		-4.132 [5.662]
Lnsigma	1.732*** [0.042]	1.712*** [0.042]	1.703*** [0.042]		
Pseudo R2	0.012	0.018	0.025	0.027	0.136
Observations	679	679	647	647	647

**Note:** Control ♠. gender, age, log consumption, education, dependency ratio of the household, household size, married status, membership of social or political organizations, being optimistic about future wellbeing. Significance levels; \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. Standard errors in brackets

Results (Eq2): Experimental Validation of Survey-based Measure (separate ethnic groups)

DV: SR (switching row in Risk experiment)	Intreg	Oprobit	OLS	Intreg	Oprobit	OLS
	Majority (Kinh)			Ethnic minorities		
<b>WTR</b>	<b>0.237*</b> [0.123]	<b>0.043*</b> [0.021]	<b>0.197*</b> [0.107]	<b>0.677***</b> [0.153]	<b>0.162***</b> [0.034]	<b>0.623***</b> [0.140]
Height (cm)	0.079* [0.045]	0.014* [0.008]	0.075* [0.040]			
Self-employed	2.518*** [0.779]	0.429*** [0.121]	2.260*** [0.647]			
Health impairment	-1.439** [0.603]	-0.261** [0.104]	-1.331** [0.520]	-1.645** [0.647]	-0.378** [0.159]	-1.550** [0.605]
<i>Control</i> ♣	all	all	all	all	all	all
Constant	-2.807 [8.575]		-2.63 [7.511]	-2.195 [8.027]		-1.639 [7.092]
Log sigma	1.786*** [0.047]			1.502*** [0.070]		
<i>Pseudo R</i> <sup>2</sup>	0.016	0.018	0.094	0.028	0.033	0.149
<i>Observations</i>	409	409	409	238	238	238

**Note:** Control ♣: gender, age, height, log consumption, education, married status, dependency ratio of the household, household size, self-employed, membership, being optimistic about future wellbeing. Significance levels; \* p<0.1; \*\* p<0.05; \*\*\* p<0.01. Standard errors in brackets.

# Conclusions

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- The survey-based measure is validated by risk experiment among the heterogeneous population that strengthens the methodology applied in previous studies (e.g. Dohmen et al., 2011; Hardeweg et al., 2013)
- Two measures are complements rather than substitutes
  - A multi-dimensional index to more effectively measure risk attitudes
- Significant heterogeneities in risk attitudes, especially in ethnicity
- Ethnic minorities are more risk-averse than Kinh people
  - Further studies to investigate the explanatory power of risk attitudes for economic outcome variations

**Thank you very much for your attention!**