The Nexus of Risk-Preferences and Poverty in Indonesia

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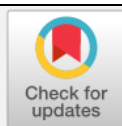[4] Center for Fintech and Banking, Center of Excellence in Science and Technology,
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ABSTRACT

This research aims to identify the relationship between poverty and risk preference in Indonesia empirically. This research employs the Indonesia Family Life Survey 2014 (IFLS5) using the Ordinary Least Square (OLS) and quantile regression approach, one of the most extended longitudinal data, to support this research design. The result reveals that poor households are more risk-averse than others across income levels. Moreover, poor people are poorly educated and mostly come from rural and disaster-prone areas. This evidence suggests that poor people from rural communities and disaster-prone regions should be prioritized and empowered to move from poverty zones due to their relatively high vulnerability.

1. Introduction

According to research in the social sciences, people's choices and behaviors are frequently impacted by the social groups with which they identify (Akerlof & Kranton, 2000; Benjamin et al., 2010). Akesaka et al. (2021) assess the effect of income changes on the estimated risk preference of senior citizens in the United States and Japan. They uncover evidence of a fleeting but regular variance in individuals' preferences about risk. This change in risk preference over time suggests that optimal decisions may become suboptimal. The World Bank estimates that 685 million people, or over 9.1 percent of the global population, lived in poverty in 2017 (Aguilar et al., 2022). Poor households often have difficulty escaping the poverty trap, as suggested in previous studies (e.g., Dercon, 2009). One of the factors influenced is the relatively high-risk aversion among poor people.

According to behavioral economics research, an individual's experience with scarcity may impact how well they make decisions (Mullainathan & Shafir, 2013; Shah et al., 2015). There is a persistent argument that people experiencing poverty are distinct from the rest of society in several ways, including risk aversion. It is widely believed that people experiencing poverty are risk-averse compared to the rest of society. People experiencing poverty will choose low-risk, low-return occupations that will keep them in poverty if they have a severe aversion to risk. However, there is no distinct pattern in the empirical and experimental data.

One of the reasons why so many individuals live in poverty is because of their own risk-averse choices. There is a lot of concern about economic development, mainly if it is associated with preferences. Individuals who significantly avoid financial risk tend to avoid business activities that can threaten their financial condition. Some empirical evidence suggests that poor people have low savings rates (Hubbard et al., 1995) and insufficient investment in child education planning (Behrman & Srinivasan, 1998).

Ng (2013), which study using IFLS4 data related to risk preferences in Indonesia, concluded that women tend to avoid risk more than men. There is also evidence that the more prosperous adult persons are less risk-averse and less impatient. The higher level of education and the younger age of the respondents are more patient and risk-averse. Sanjaya (2013) found that risk preferences in Indonesia are influenced by welfare and demographic factors, and time preferences also play an essential role as a determinant. The effect of economic shocks and their determining characteristics is not expected to impact people's preferences for risk.

Moreover, most poverty assessments correlate highly with education and income status. Education can help a family climb out of poverty directly by increasing household income, increasing the productivity of self-employed workers, or enabling access to higher-paid jobs (Iqbal, 2006). Daniel (1995) and Gray (1997), as cited in Gorman (2000), suggest that marital status differences in earnings contend that married individuals are more productive than unmarried individuals and therefore receive greater rewards. Several studies indicate that married workers indeed engage in tremendous effort. Married individuals report devoting more effort to their work as to Bielby & Bielby (1988), as cited in Gorman (2000). Since formal insurance coverage of damages caused by natural disasters is limited, especially in developing countries. Thus, informal insurance mechanisms naturally play a significant role as safety nets among people experiencing poverty in addition to public disaster risk management schemes (Banerjee & Duflo, 2011).

Indonesia is a country with a total land area of 1,811,570 km², which the population counts as equal to 3.51% of the world's population. This country also has 1300 different ethnic groups and more than 1000 different languages throughout the 17,000 islands (WORKSOL, 2022). In addition, according to Asian Development Bank (2022), 10.1 percent of the Indonesian

population still lived below the national poverty line in 2021. Therefore, this current research chooses to focus on Indonesia since this country fits the setting of this current research, which is attributed as one of the most culturally diverse countries with a relatively high poverty rate compared to the peer country.

This current research contribution to the body of knowledge includes the following features. First, this current research complements previous studies by documenting the relationship between risk preference and poverty (e.g., Carvalho et al., 2016) in one of the world's most culturally diverse yet fourth most populated countries. Second, this current research analysis examines the role of education, sociocultural background, and informal insurance (rotating saving and credit association) concerning poverty. This current research argues that using a unique set of sociocultural and environmental would shed new light in the literature on the effect of risk preference on poverty.

This current research adopts the following approach to examine whether risk preference can affect poverty. First, this current research focus on Indonesia, the fourth most populated country in the world, and its poverty rate accounts for almost 9.1 percent of the total population, and second, this current research incorporates education and sociocultural variables in this current research main variables since the recent update reported that the poorest group typically experienced a low level of education (Badan Pusat Statistik, 2020, as cited in Annur, 2022).

This current research's main finding reveals that risk preference is positively associated with income level. This result supports the literature, which suggests that poor people are most likely risk averse. Then perform a further test to check the robustness result using quantile regression. The result remains the same after implementing regression across quantile income. In addition, educational level positively correlates with income, suggesting that a higher educational level could promote a better income level across the group.

2. Literature Review

Sen (1999) states that governmental and non-governmental organizations use many metrics to measure poverty. Measurements can be either absolute—referring to a particular standard—or relative—depending on the situation. It is generally accepted that poverty is multifaceted, consisting of social, natural, and economic components positioned within more extensive socio-political processes. The capacities approach asserts that comprehending poverty requires capturing the perspectives of the impoverished.

Several advantages and disadvantages exist when measuring poverty by income (Haughton & Khandker, 2009). There is a potential that income will be underreported, that short-term shocks may influence it, that certain aspects of income are difficult to survey, and that the connection between income and welfare can be ambiguous. However, researchers sometimes cite a few advantages to using income as a proxy for poverty. These advantages include that it is simple to measure, indicates the degree of control a household has over its financial situation, and requires less money to collect data.

Previous research has discovered that people experiencing poverty have a higher risk tolerance—whether in experiments, surveys, or real life, they are more likely to engage in dangerous activities or choices. Elijah & Uffort (2007) find that in uncontrolled environments, poor people appear to choose to live as part of the underground economy. Many poor households are involved in high-risk activities, especially entrepreneurship-related ones (Banerjee & Duflo, 2011). At the same time, even in the rural sector, most people do not specialize, and people experiencing poverty do not have multiple sources of income to protect

themselves from shocks that happen only to them. In this instance, diversification raises predicted gains while lowering the likelihood of exceptionally high gains. The absence of diversification can consequently be seen as a risky decision that was probably made because it increases the probability that the minimums will be covered.

On the other hand, prior research has concluded that economically disadvantaged individuals prefer to choose a lower level of risk and conform to an income smoothing such as Morduch (1995) proposed. Tanaka et al. (2008) also mention that these kinds of behavior, including Binswanger (1980), revealed no noticeable differences. Additionally, certain preference reversals are associated with income and changes in the size of stakes, such as has been documented by Bosch-Domenech & Benach (2005).

Prior research has outlined some structural factors that may contribute to persistent, cross-generational poverty traps (Genicot & Ray, 2017; Galor & Özak, 2016). Low self-efficacy may be present in those who live in persistent poverty. This situation may have significant implications on a variety of economically significant outcomes, including test scores (Krishnan & Krutikova, 2013), investment in education (Bernard et al., 2014), and savings behavior (Ghosal *et al.*, 2016). The culture-of-poverty view proposes that the poor's norms, values, and attitudes deviate from others and shape their preferences and behaviors (Lewis, 1966). The human capital view suggests that these behaviors reflect a lack of human capital due to a lack of education, work experience, and financial literacy (e.g., Lusardi & Mitchell, 2014).

More recently, Banker et al. (2020) suggest that poor people may continue to define themselves by their poverty because of the permanence of scarcity. Additionally, they present an identity-based theoretical framework that explains behavior in people who experience temporary poverty while simultaneously arguing that similar changes in identity salience may not significantly affect behavior in really impoverished people. Visser et al. (2020) find that income is crucial in technology adoption, with lower incomes (both experimental and real world) and lower wealth reducing spending on insured and uninsured tech. They discover that insurance is insufficient to combat the behavioral reasons connected to asset restrictions and risk preferences that limit the adoption of contemporary farm technologies. Based on the studies mentioned earlier, people living in poverty tend to prefer a relatively lower level of risk.

3. Research Methodology
3.1. Data Description

This research uses Indonesian Family Life Survey 2014 (IFLS-5) data to assess the relationship between risk-time preferences and poverty. IFLS is a longitudinal survey data free of access and provided by RAND in collaboration with Indonesian domestic research institutions. Although respondents only came from 13 provinces in Indonesia, the sample represented 83% of the entire population of Indonesia.

The IFLS was first released in 1993 and continued in 1997, 2000, 2007, and most recently in 2014. Survey instruments related to the risk of the IFLS were only conducted in the IFLS4 released in 2007 and continued in 2014. IFLS consists of two instrument blocks, namely household blocks and community blocks. Household blocks measure the daily lives of individuals and households, such as consumption, welfare, health, education, employment, and so on. At the same time, community blocks contain information related to environmental/rural activities, such as health and education facilities in an area. Table 1 provides more detailed information describing all variables used in this research.

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Table 1. Variable Description

Variable	Description	Source
Dependent		
Poverty	Poverty is proxied by the overall income obtained by respondents from the main job, which is the most time-consuming work.	IFLS-5
Independent		
Risk Preference	Risk preference, scoring 0-4 taken by calculating each possible choice of risk taken in games 1 and 2 in the "risk-taking and time" section of the IFLS. A higher score indicates higher risk-taking and vice versa.	IFLS-5
Education	Education attainment, scoring 1-4 taken by the total education level of individuals obtained from IFLS. A higher score means a higher education level.	IFLS-5
Control Variable		
Rural (=1)	Dummy variable, 1= rural area and 0 and vice versa.	IFLS-5
Disaster (how often)	Disaster experience, indicating the frequency of having natural disaster experiences obtained from IFLS.	IFLS-5
Javanese (=1)	Dummy variable, 1=java, and 0 others	IFLS-5
Moslem (=1)	Dummy variable, 1=moslem, and 0 others	IFLS-5
Age	Number of age	IFLS-5
Male (=1)	Dummy variable, 1=male, and 0 female	IFLS-5
Married (=1)	Marital status, 1=married, and 0 others	IFLS-5
Rotating Saving and Credit Association (=1)	Rotating Saving and Credit Association (ROSCA) participation, 1=participated 0 vice versa	IFLS-5

The risk aversion variable is constructed adopted from Sanjaya (2013). This variable is measured by calculating each possible choice of risk taken in games 1 and 2 in the "risk-taking and time" section of the IFLS (see **Figure 1**). As a result, the range of risk preferences ranges from high risk averse to very risk lover preferences (see **Table 2**). A higher risk aversion (RA) score refers to higher risk preference (see **Table 2**).
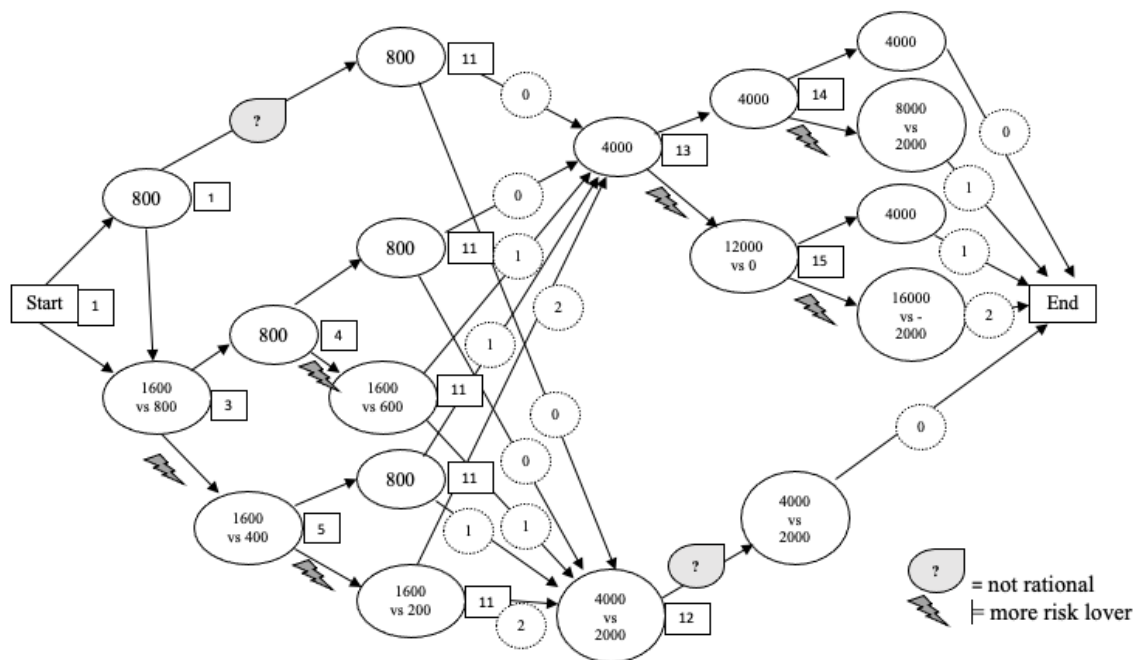
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Figure 1. The respondent may take the possible path
Source: Adopted from Sanjaya (2013), outcomes are in thousands of Rupiahs

Table 2. Example of respondents' path

| Path | Game 1 | | Game 2 | | RA= Score 1 + Score 2 |
	Choice	Score 1	Choice	Score 2	
1	SI01=2; **SI03=2;** **SI05=2**	2	SI11; **SI13=2; SI15=2**	2	4
2	SI01=2; SI03=1; **SI04=2**	1	SI11=1; **SI13=2;** SI15=1	1	2
3	SI01=2; SI02=2; **SI03=2**; SI05=1	1	SI11=2; SI12=1	0	1
4	SI01=2; SI03=1; SI04=1	0	SI11=2; SI12=2; SI13=1; SI14=1	0	0
. . .	. . .	. . .	. . .	. . .	. . .

Source: adapted from Sanjaya (2013)

Note: there are two mistranslations in question SI12: first, "1. Still picks option 1" should be read "1. Still picks option 2"; second, "2. Switches to option 2" should be read "2. Switches to option 1". Bold type means that the respondent took the risky choice.

Table 3 reports the mean value of each variable used in this research. The lowest income group, on the bottom and second quantile (poor group), appears to have a relatively risk-averse behavior compared to the other groups. The education level of this group is also relatively low

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compared to the other groups. This evidence aligns with the BPS - Statistics Indonesia data, which reported that almost 66,71 percent of poor households do not or at least hold an elementary school degree (Badan Pusat Statistik, 2020, as cited in Annur, 2022). In addition, rural areas have become the dominant location of residence for people experiencing poverty. This phenomenon fits with the World Bank report that found 61.9% of the poor people in Indonesia live in rural areas (World Bank, nd). Concerning exposure to disasters, the lowest income group appears to be more often affected by disasters than the other groups. An interesting piece of evidence relates to individual participation in the rotating of saving and credit associations (ROSCA, in Indonesian: *Arisan*). Higher-income levels are more likely associated with higher participation in ROSCA and vice versa.

Table 3. Summary Statistic

Variables	Bottom Quantile	Second Quantile	Third Quantile	Fourth Quantile	Fifth Quantile	Full sample	
						Mean	Std. Dev
Income (in a million Rupiah)	2.02	5.67	12.5	23.6	42.5	2.98	3.42
Risk averse (0-4, lower more risk averse)	0.80	0.81	0.87	0.96	1.09	0.86	1.05
Education (1-4, higher more educated)	1.76	1.94	2.13	2.45	3.07	2.23	1.13
Rural (=1)	0.52	0.46	0.41	0.31	0.25	0.41	0.49
Disaster (how often)	0.68	0.61	0.63	0.57	0.38	0.61	3.15
Javanese (=1)	0.49	0.46	0.47	0.43	0.39	0.44	0.5
Moslem (=1)	0.9	0.9	0.9	0.89	0.87	0.9	0.3
Age	41.35	39.37	37.85	36.33	38.63	37.16	14.78
Male (=1)	0.39	0.56	0.69	0.7	0.71	0.47	0.5
Married	0.73	0.77	0.8	0.8	0.86	0.73	0.45
ROSCA (=1)	0.33	0.32	0.32	0.31	0.39	0.33	0.47
Number of observation	3479	3423	3317	3387	3401	17007	17007

Notes: the numbers represent the mean values of each variable

3.2. Method

To test the research baseline on the effect of risk preference on poverty, this research estimates the following models using the usual least squares regression approach as shown below:

$$Pov_t = \alpha + \beta_1\, RiskPref + \beta_2\, Educ + \beta_3\, control + \varepsilon_t$$

Pov is a poverty measurement proxied by household income level, and RiskPref is risk preference, measured by a hypothetical question based on IFLS 4 questionnaire data. Educ is educational level indicates the higher value of this indicator means the higher educational level. This research also put a set of control variables into baseline regression model, including several dummy variables such as geographical aspect (1=rural, 0=otherwise), gender (male=1,

0=otherwise), participation in informal insurance (ROSCA or *arisan*), age, and intensity of household's natural disaster experience (disaster).

In addition, this research also performs a robustness check using the income quantile approach as a proxy of poverty (the lowest quantile represents the poorest groups) in the full sample. Total income is the overall income obtained by respondents from the main job, the most time-consuming work obtained from the IFLS-TK section of the questionnaire (book 3A).

4. Results and Discussion

Social group characteristics influence people's choices. More specifically, poor people tend to avoid risk or prefer less risky. As a preliminary result, **Figure 2** shows the results related to the frequency distribution of risk preferences by calculating any possible decision respondents took in the risk preferences segment of IFLS5. It can be seen that most people in Indonesia are still very dominant in risk-averse attitudes. This preliminary evidence aligns with many cases in emerging economies, including Indonesia.
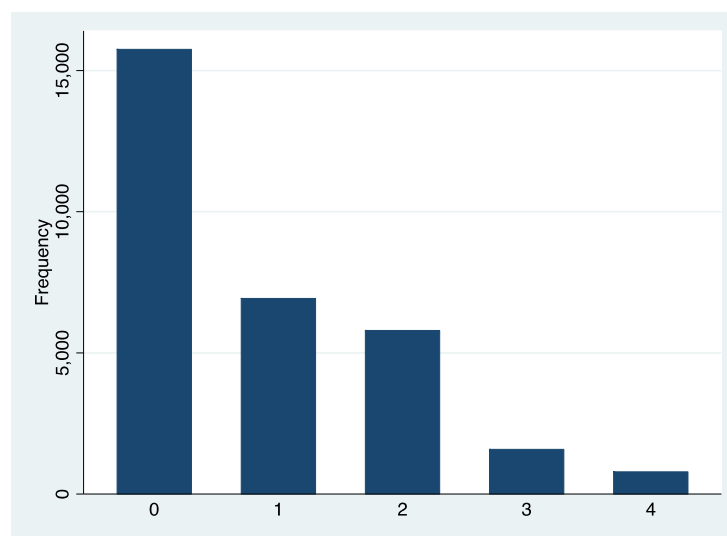

Figure 2. Risk Aversion (RA) Frequency Distribution *
Source: estimation results based on IFLS5
* risk aversion values ranging from 0-4; a higher value indicates more risk lover

Furthermore, baseline regression using the OLS model shows that a risk-taking attitude has a positive and significant relationship with income. In other words, the more risky choices taken will positively impact income. This evidence is consistent in the quantile regression with additional information that there is a likelihood of a non-linear relationship between risk preferences across income levels. Meanwhile, the level of education also appears to have a positive effect on income (OLS), and there is an increasing effect across income groups (quantile group). The presence of shock factors associated with increasingly repetitive disaster exposures turned out to have a negative impact on income (OLS), and people experiencing poverty seemed to be most affected, in terms of decreasing income, if they were hit by disaster.

Furthermore, risk aversion in the lowest income group has a much stronger effect than the OLS model. It means that increasing risk attitude (more risk lovers) in the lowest income groups will positively impact total income more positively than other income groups. The poor people's characteristics that tend to avoid risk are also in line with the relatively low level of their education compared to other income groups.

In addition, people who live in rural areas and the frequency of disasters appear to negatively and significantly affect income. They also bring a relatively more negative effect on income received in low-income groups. Moreover, ROSCA or *arisan*, a form of self-insurance, impacts income levels positively and greatly impacts low-income groups. People experiencing poverty, statistically concentrated in rural areas, also tend to have low incomes.

Table 4. OLS and Quantile Regression Result

	Quantile Income			
	(1)	(2)	(3)	(4)
	OLS	Quantile 25	Quantile 50	Quantile 75
Risk aversion (0-4, higher more risk lover)	0.0383***	0.0431***	0.0292***	0.0441***
	(0.0084)	(0.0122)	(0.0088)	(0.0082)
Education (1-4, higher more educated)	0.3416***	0.3383***	0.3537***	0.3595***
	(0.0118)	(0.0127)	(0.0092)	(0.0086)
Rural (=1)	-0.3393***	-0.3925***	-0.3276***	-0.2180***
	(0.0386)	(0.0276)	(0.0199)	(0.0187)
Disaster (how often)	-0.0084**	-0.0160***	-0.0047	-0.0057
	(0.0030)	(0.0044)	(0.0032)	(0.0030)
Age (years)	0.0784***	0.0887***	0.0647***	0.0554***
	(0.0056)	(0.0059)	(0.0043)	(0.0040)
Age^2	-0.0009***	-0.0010***	-0.0008***	-0.0006***
	(0.0001)	(0.0001)	(0.0000)	(0.0000)
Married (=1)	0.1109***	0.1320***	0.0952***	0.0918***
	(0.0307)	(0.0358)	(0.0258)	(0.0243)
ROSCA (=1)	0.1783***	0.2024***	0.1362***	0.0987***
	(0.0248)	(0.0299)	(0.0215)	(0.0202)
Constant	13.4638***	12.5808***	13.9300***	14.7253***
	(0.1468)	(0.1338)	(0.0963)	(0.0905)
R-square	0.46			
Observation	17.007	17.007	17.007	17.007

Notes: Standard errors in parentheses * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

To test the validity of the quantile regression model, this research perform a homoskedasticity test to see the stability of the variance of the variables. The result shows that the chi-square value is smaller than 5 percent, indicating heteroscedasticity in the OLS model. Thus, the unstable variance can be overcome by using quantile regression analysis. Although quantile models can be used as a solution to heteroscedasticity, in **Figure 3**, it can be seen that only age and rural variables that are significantly different from OLS are related to the interval of statistical confidence levels. In other words, our quantile regression suggests that age positively correlates with income level. In addition, people who live in rural areas are more likely poorer than those who live in the urban area.
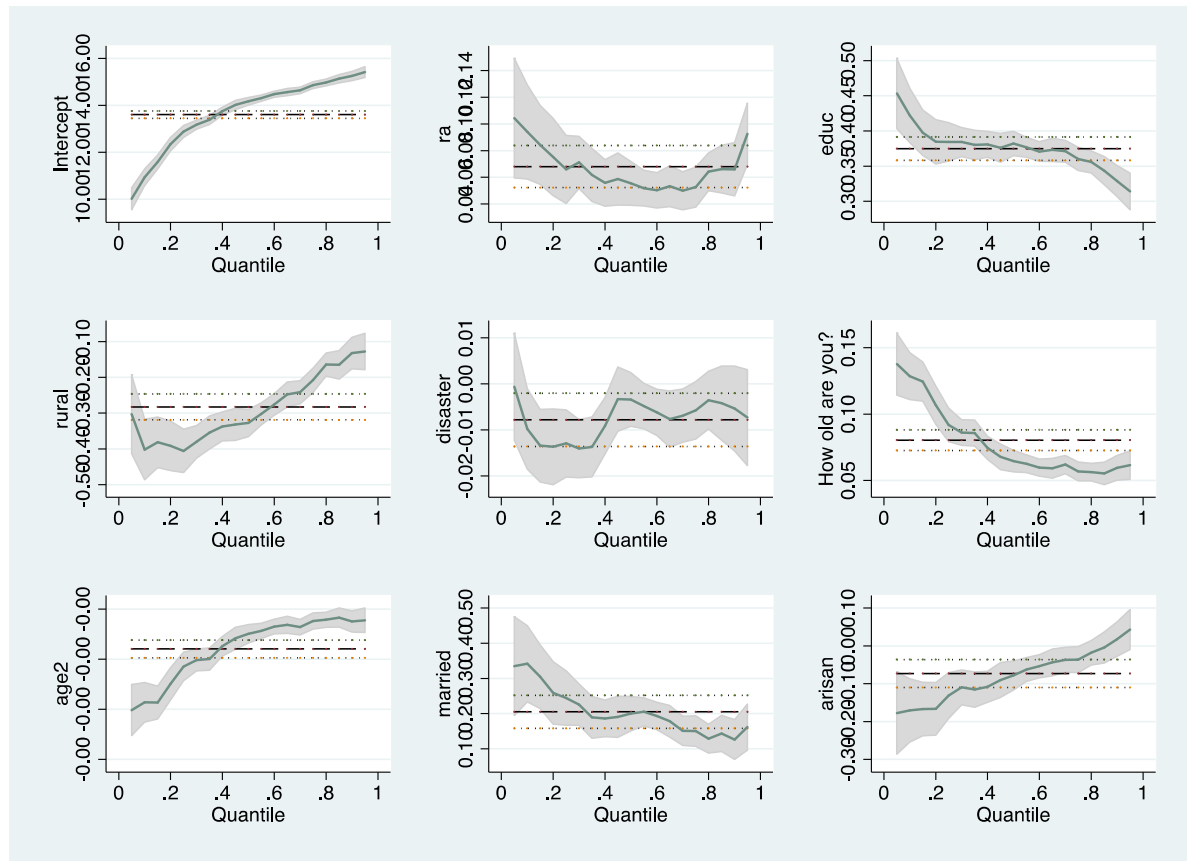
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Figure 3. OLS–Quantile regression confidence interval comparison
Notes: dots and solid lines are OLS and quantile regression confidence intervals

5. Conclusion

This research investigates the relationship between risk preference and poverty in one of the world's most culturally diverse countries. It classifies poverty based on the overall income obtained by respondents originating from the main job, which is the most time-consuming work. This research extends the basic analysis by employing quantile regression analysis representing different income groups and analyzing the IFLS data as one of the longest longitudinal surveys conducted by RAND. The results provide important insight into the relationship between poverty and risk preference. The results find that a higher positive effect regarding the increase in risk preferences in the lowest income group indicates that poor households should change their perspective regarding their preference. The increase in risk preference certainly needs to be built through improving the quality of education due to this group's relatively low level of education. The results of the research are useful for policymakers and researchers. The government needs to promote the empowerment of poor people in rural and disaster-prone areas considering that people who live under these circumstances are more vulnerable compared to those in urban areas and less experienced in natural disaster events. The positive role of self-insurance (ROSCA or *Arisan*) should promote further as informal insurance to mitigate any potential negative impact of shocks, especially for the lowest-level income people. In addition, this research also suggests further research to improve the proxy of poverty with more validity than merely measured by income level. Real per capita expenditure and the value of total asset ownership could be used as a better alternative.

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7. Declaration of Conflicting Interests

The authors have declared no potential conflicts of interest concerning this article's research, authorship, and/or publication.

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