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Risk attitudes and asset diversification: Evidence from Ghana

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Abstract

Attitudes toward risk influence an individual's decision-making with significant implications for economic outcomes and yet there is limited understanding of the relationship between risk attitude and economic decision-making in developing countries. This paper estimates the influence of risk aversion on asset diversification using data from a large nationally representative sample of Ghanaian households. The results show weak association between risk aversion and asset diversification. Furthermore, relatively stronger positive associations are found for rural compared with urban households, but these positive associations disappear after controlling for locality fixed effects. These findings highlight the importance of addressing rural–urban disparities.

KEYWORDS
assets, diversification, Ghana, household enterprises, risk aversion

1 | INTRODUCTION

Since the seminal works of Arrow (1965) and Pratt (1964) on measurement of risk aversion, risk attitude (i.e. whether individuals are risk averse, risk neutral or risk loving) of individuals has been of great research interest in the growing fields of behavioural economics and finance. Attitudes toward risk influence an individual's decision-making with significant implications for economic outcomes. Risk attitude has been found to influence entrepreneurial development, parental investment in children's education, investment in financial services and decision to take up self-employment among others, with lasting impact on economic development, poverty and inequality (Caliendo et al., 2010; Cardenas & Carpenter, 2008; Tabetando, 2019).

Some areas of decision-making that risk attitudes are likely to affect have received little attention in the empirical literature. One such area is diversification of assets. Activity, asset and income diversification are a prominent feature of the poor in many developing countries especially those in rural Africa (Asravor, 2018; Guatam & Andersen, 2016). Agriculture remains the mainstay of many developing countries. However, income from agriculture in Africa is subject

to extreme levels of volatility because agriculture is largely rain-fed and prices of food crops are highly volatile. Thus, diversification is seen as a crucial strategy to help poor households cope with shocks to income and smoothen consumption especially in the absence of well-developed credit and insurance markets (Bardhan & Udry, 1999). In spite of the prevalence of diversification within sub-Saharan Africa, the existing empirical evidence on the effectiveness of livelihood diversification to improve welfare is mixed (Loison, 2015). This may not be surprising given the complexity of the relationships among the degree of variability of income, risk attitude of individual agents, wealth and variety of assets available (Bardhan & Udry, 1999; Loison, 2015; Rosenzweig & Binswanger, 1992).

The theoretical framework of Rosenzweig and Binswanger (1992) shows that the relationship between asset portfolio and risk attitudes is influenced by preferences and constraints. According to Bardhan and Udry (1999) these constraints include the availability, completeness and efficiency of credit, and savings and insurance markets. Given the importance of these environmental factors, the rural–urban disparity in many African countries in terms of sources of employment and livelihoods, and availability and development of financial and related institutions suggest that motivation for diversification and types of assets diversified into will be different by geography. Specifically, the reasons for and methods of diversification between rural and urban areas are likely to be different. Diversification in rural areas is likely to be survival-led where push factors such as harsh economic conditions force households to explore alternative livelihoods while it is likely to be opportunity-led in urban areas where pull factors such as the availability of different types of assets with varying returns drive diversification (Asmah, 2011; Bezu & Holden, 2014; Dimova & Sen, 2010; Lay & Schüler, 2008). In addition to the influence of these environmental factors on risk attitude and the relationship between risk attitude and asset diversification, the behavioural economics literature shows that risk attitude is influenced by personality traits such as age, gender, education and wealth (Abito & Salant, 2019; Bhargava et al., 2017; Jaspersen et al., 2019).

While a growing body of empirical papers has paid attention to the measurement and determinants of risk attitudes, much of the empirical research on the impact of risk attitudes on various economic outcomes comes from developed countries (Outreville, 2013). These studies generally find that a higher degree of risk aversion is associated with greater diversification in financial assets (Barasinska et al., 2011; Mariotti et al., 2015; Wei et al., 2019). However, these findings may not be applicable to developing country settings for several reasons. To begin with, due to the underdeveloped nature of the savings and investment markets, a large proportion of households in developing countries do not hold financial assets. These households rather invest in a broad range of physical assets such as household and agricultural assets to minimise the variances in income and reduce their risk exposure. Secondly, credit markets are less developed in low-income countries, and this can make individuals more risk averse. Thirdly, households in developing countries face more severe variance in their incomes than their counterparts in advanced countries (Haq, 2015). Indeed, as Treibich (2015) points out, cultural contexts and factors may impact on parameters of risk aversion, and as such, measurements and findings from one country context may not necessarily be applicable in other countries.

On the other hand, the literature on the relationship between risk aversion and diversification in developing countries has tend to focus on livelihood diversification strategies of rural and smallholder farmers (Asravor, 2019; Jin et al., 2020; Loison, 2015; Sulewski et al., 2020). Most of these studies use relatively small sample sizes and also study particular types of households.

This paper contributes to this literature by using data from a nationally representative sample of Ghanaian households to estimate the association between risk attitude and diversification of assets and sources of income. Two measures of risk aversion are used: hypothetical lottery questions that elicit risk preference and a direct question asking respondents to indicate their preference between a relatively high-risk high-return business and a low-risk low-return business. Diversification is measured as a count of broad range of assets: household belongings, livestock and ownership of household enterprises. The use of a large nationally representative sample allows this paper to compare and contrast the risk attitude-diversification between rural and urban areas. The paper finds limited evidence of an association between risk aversion and asset diversification for the overall sample. The association between risk aversion and diversification is highly dependent on the measure of risk aversion used. When the

sample is divided into rural and urban households, the findings show that only rural households diversify into holding more assets. However, the positive associations disappear when geographic characteristics are accounted for using enumeration area fixed effects. Similar results emerge when the total assets are disaggregated into number of household belongings, different types of livestock and ownership of different types of household enterprises. The results rather show that age of the household head, occupation and demographic characteristics of households are the most important predictors of diversification.

This paper contributes to the emerging research on diversification as a coping strategy against risk. Existing literature in this area has largely focussed on diversification in financial assets in developed countries (Barasinska et al., 2011; Campbell, 2006; Gomes & Michaelides, 2005; Mariotti et al., 2015; Wei et al., 2019). The preponderance of this evidence shows that risk aversion is positively related to diversification in financial portfolios (Blume & Friend, 1975; Morin & Suarez, 1983). Unlike this strand of literature, this paper focusses on the relationship between risk aversion and diversification of non-financial assets. This is because financial markets are less developed in this context and many individuals and household have relatively limited set of financial portfolios to choose from and tend to diversify into physical assets. In addition, there is limited data on financial portfolios in a developing country like Ghana.

The paper is more closely related to papers that focus on the relationship between risk aversion and diversification in developing countries (Asravor, 2019; Jin et al., 2020; Krause, 2019; Sulewski et al., 2020). Many of these papers focus on small sections of the population with relatively small sample sizes (Alemayehu et al., 2018; Asravor, 2019; Hillesland, 2019; Jin et al., 2020). These studies mostly examine the relationship between risk aversion and livelihood strategies of farmers with evidence showing that risk averse farmers are more likely to mitigate risk by diversifying in crop and livestock. Unlike most of these papers, this paper finds limited evidence of an impact of risk attitude on diversification. However, it is consistent with the findings of Krause (2019) who also finds limited effect of risk aversion on diversification using a sample of 248 women from villages in Guatemala. This paper differs from Krause (2019) in the use of a large nationally representative survey that captures the general population with different occupations and characteristics. As such, the paper is able to study the behaviour of a general population that can be reasonably expected to have diverse risk attitudes.

The rest this paper is structured as follows. Section 2 presents the study's methodology. Section 3 presents the findings. Section 4 discusses the findings and concludes the paper.

2 | METHODOLOGY

2.1 | Data

The primary source of the data for the paper is the seventh round of the Ghana Living Standards Survey (GLSS 7). The GLSS is a nationally representative survey of Ghanaian households conducted for the purposes of measuring and tracking progress on living conditions and poverty in Ghana. Among other types of information, the GLSS collects information on household membership and relationships, education, health, employment, incomes and their sources, household assets, household enterprises, credits, savings and use of financial services, migration, remittances and detailed household consumption expenditures. The GLSS 7 was conducted in 2016/2017 (Ghana Statistical Service, 2017).

The GLSS 7 was used because it is the only round to date that collected information necessary to measure risk attitudes, the key independent variable used in the present study. The sample used for this analysis includes all 14,009 households interviewed for the GLSS 7.

2.2 | Measurement of risk attitude

Measuring risk attitudes is one of the major empirical challenges of analysis of risk attitudes. Different studies have used different approaches to uncover risk attitudes. Earlier studies focussed on laboratory experiments involving

portfolio allocation between risky and riskless assets (Friend & Blume, 1975). Others employed the use of questionnaires with questions directly eliciting risk preferences (Lewellen et al., 1977) and from observing individuals' behaviour (Cohn et al., 1975). More recently, methods such as risk-taking scales (Weber et al., 2002), actual risk-taking behaviours (e.g. smoking and seat-belt use), and Likert scales (Dohmen et al., 2011) have been used.

This paper follows the approach of Holt and Laury (2002) and Barasinska et al. (2011) in the use of hypothetical questions on lotteries and preferences over investments with different risk attributes to derive two measures of risk attitude. The choice of this method is dictated purely by availability of information in the GLSS. Two measures of risk attitude are derived from the risk attitude module of GLSS 7. For the first measure of risk attitude, the GLSS 7 asks respondents the following questions on their choices over hypothetical investments:

Suppose you want to invest some money. Which option do you prefer?

OPTION 1: Investing in a business where I cannot lose money but has low profits.

OPTION 2: Investing in a business where there is a small chance I can lose money but potentially brings high profits.

A respondent who chooses option 1 is classified as risk averse, while the one who chooses option 2 is classified as not risk averse since that individual is willing to risk losing some money to gain greater profits. This will be subsequently referred to as the investment measure.

The second measure of risk aversion uses the following hypothetical lottery questions:

Q1: *"Imagine you have a choice between the following two options. OPTION 1: You receive 4 Ghana Cedis for sure. OPTION 2: I flip a 1 Cedi Coin. If it shows the Shell, you get 12 Ghana Cedis. If it's the coat of arms, you get 1 Ghana Cedi. Which option do you prefer?"*

Q2: *"Imagine you have a choice between the following two options. OPTION 1: You receive 4 Ghana Cedis for sure. OPTION 2: I flip a 1 GH Cedi Coin. If it shows the Shell, you get 16 Ghana Cedis. If it's the coat of arms, you get 1 Ghana Cedi". Which option do you prefer?*

The expected values of the lotteries in Q1 and Q2 are GH Cedi 6.5 and GH Cedi 8.5, respectively. Therefore, an individual who prefers OPTION 1 of Q1 or Q2 is risk averse. Using these questions, the study defined an indicator variable for risk aversion. That is, a respondent will be classified as risk averse if he/she chooses option 1 for both Q1 and Q2. Similarly, an individual will also be defined as risk averse if he/she chooses OPTION 1 in Q1 and OPTION 2 in Q2.[1] An individual who chooses option 2 in both Q1 and Q2 is classified as not risk averse. This will be subsequently referred to as the lottery measure. The investment-based measure is the preferred measure of risk aversion. This is simply because the question from which this measure was generated is simpler and more likely to have been easily understood by respondents.

The unit of analysis is the household. In the GLSS, each household is asked to identify whether a member owns each of type of assets. In some cases, such as household belongings and household enterprises, the owner of the asset is identifiable at the individual level. In other cases, for instance, livestock, it is not possible to identify owners within the household. For ease of adding up the total number of assets, the analysis was conducted at the household level. This approach has limitations. Previous research has showed that men and women from the same household may own assets separately and may also have different levels of risk aversion (Hillesland (2019). Household level measure of assets and risk aversion will be difficult to interpret in such instances. To address this concern, for assets where ownership is identifiable at the individual level (household belongings and enterprises), results from individual-level regressions have been reported in Appendix B. These regressions included an interaction between gender and risk aversion measure to understand how gender affects the relationship between risk aversion and asset diversification.

To measure risk aversion at the household level, the risk aversion of the head of the household is used to as a proxy. For households with multiple adult members, this could be potentially problematic because risk attitude of the head may not necessarily be representative of the overall risk attitude of the household. Therefore, an alternative measure of risk aversion at the household level is used: the fraction of adult household members that are risk averse. The results from this second definition are largely consistent with the main results and are reported in the Appendix.

2.3 | Estimation

To understand the association between risk attitude and asset diversification, four different measures of diversification were used. The first measure is a composite measure of number of different types of assets (livestock and household assets) and income sources (the number of different types of household enterprises) of the household. The three other measures of diversification segregates number of assets into the three broad classes of assets that make up the composite measure of diversification: number of different livestock owned by the household, number of different household belongings and the number of different household enterprises owned. The diversification measures used here includes both productive and non-productive assets. The livestock and ownership of different types of household enterprises can be classified as productive assets that are geared towards the generation of additional incomes for households. The household belongings include clocks, mobiles phones, refrigerators, televisions, etc. The full list of assets included in each category is included in the Appendix.

A separate regression is run for each measure of diversification using the following estimating equations:

$$assets_{he} = \beta_1 + \beta_2 riskatt_{he} + \beta_3 age_{he} + \beta_4 sex_{he} + \beta_5 edu_{he} + \beta_6 occ_{he} + \beta_7 hhsize_{he} + \beta_8 children_{he} + \beta_9 adults_{he} + \beta_{10} mstatus_{he} + \varepsilon_{he} \quad (1)$$

where *he* denotes household *h* in Enumeration Area (EA) *e*, *assets* is a composite figure for all different types of assets owned by the household. The *riskatt* is risk attitude; *age*, *sex*, *edu*, *occ*, and *mstatus* denote, age group, sex, education, occupation and marital status of the head of the household, respectively; *region* denote region of residence, and ε is the error term. The *hhsize* refers to the number of household members, which is commonly used in the literature to measure dependency at the household level. The *children and adults* denote the number of children in the household and the number of working adults respectively. The choice of covariates in the equations is influenced by existing research (Kim & Lee, 2012; Treibich, 2015; Krause, 2019). Because of the count nature of the outcome variables, equation 1 was estimated using Poisson regression models and marginal effects were reported.

Also, as earlier discussed, because of the rural–urban disparity in availability of financial markets and products, it is expected that the relationship between diversification and risk aversion will differ between rural and urban areas. In particular, the association between risk aversion and diversification is likely to be stronger in rural areas than in urban areas. This is because although urban households are more likely to have better access to financial markets, previous research from Ghana (Aryeetey, 2004) and elsewhere (Copeland, 2022) show that urban households are more likely to diversify into non-physical financial assets (for example, bank accounts, stocks, mutual fund and retirement accounts) while rural households tend to diversity into the type of physical assets considered in this paper. Therefore, for each outcome variable and definition of risk aversion, separate regressions are run for rural and urban samples as well as the combined sample.

Segregating the diversification measure will provide insights into the specific assets that drive household diversification. It should be noted that in all regressions, the two distinct measures of the variable *riskatt* were used. Estimations were carried out using Stata version 15, using the *svy* suite that readily allows for adjustment of standard errors to account for the complex sampling approach of the GLSS. Specifically, all estimations adjust standard errors by clustering at the enumeration area level.

There is a possibility that unobserved variables at the community level can influence availability and type of assets. For instance, geography and local ecology could influence the availability of financial services and therefore the ability to diversify asset portfolio. To control for these effects, as robustness check, equation 1 was also estimated controlling for enumeration area fixed effects. The enumeration areas are small geographic units that form the basis for sampling of households. The results of these estimations are reported in the Appendix.

TABLE 1 Descriptive statistics

VARIABLES	Urban	Rural	All
Number of observations	**5775**	**7751**	**13,526**
Gender of household head			
Male	64.31%	71.62%	68.50%
Age group of household head			
Under 20 years	.57%	.57%	.57%
20–29 years	15.83%	13.28%	14.36%
30–39 years	26.81%	22.98%	24.61%
40–49 years	21.92%	21.49%	21.68%
50–59 years	16.90%	17.47%	17.23%
60–69 years	10.16%	12.02%	11.23%
70 + years	7.81%	12.19%	10.32%
Marital Status			
Never married	19.15%	7.90%	12.70%
Married	57.12%	68.44%	63.65%
Separated/divorce/widowed	23.64%	23.66%	23.65%
Religion			
Christian	73.80%	62.77%	67.48%
Islam	20.38%	17.52%	18.74%
Other	5.82%	19.71%	13.78%
Occupation			
Unemployed/not in labour force	19.00%	20.82%	20.04%
Managers/professionals	10.79%	4.26%	7.05%
Technicians/machine operators	10.61%	4.95%	7.37%
Clerical/service workers	25.71%	7.68%	15.38%
Armed forces/elementary occupations	4.12%	2.46%	3.17%
Skilled agric/forestry/fisheries	10.58%	52.43%	34.56%
Craft workers	19.19	7.39%	12.43%
Education			
None	14.61%	39.79%	29.04%
Primary/JHS/middle school	53.30%	49.28%	51.00%
Secondary	14.15%	5.37%	9.12%
Tertiary	17.94%	5.56%	10.85%
Risk aversion			
% risk averse (lottery questions measure)	79.03%	78.75%	82.65%
% risk averse (preferred investment measure)	79.32%	85.12%	78.40%
Average household size	3.54 (2.36)	4.67 (3.08)	4.19 (2.85)
Average number of children in household	.42 (.69)	.63 (.86)	.54 (.80)
Average number of working adults in household	1.37 (.90)	1.62 (1.18)	1.51 (1.08)
Average total assets	35.59 (33.75)	35.33 (38.36)	35.44 (36.47)

(Continues)

TABLE 1 (Continued)

VARIABLES	Urban	Rural	All
Number of observations	**5775**	**7751**	**13,526**
Average total household belongings	33.91 (32.20)	27.26 (28.68)	30.10 (12.98)
Average total livestock	1.06 (4.52)	7.67 (16.13)	4.84 (12.98)
Average number of household enterprises	.62 (.69)	.41 (.65)	.50 (.67)

3 | RESULTS

3.1 | Descriptive statistics

Table 1 presents the descriptive statistics. Information is presented by rural and urban households and for the total sample. The total sample consists of 13,526 households, and this is made up of 5775 urban households and 7751 rural households. The reduction from the 14,009 households interviewed for the GLSS7 is because there was no response to the risk attitude questions for 483 households. For personal characteristics, information on the household head was used. Majority of households in Ghana (69%) are headed by males and this proportion is greater in rural households (72%) compared to urban households (64%). As expected, only a small fraction of households (less than 15%) is headed by individuals below 30 years, and this is similar between rural and urban households. Majority of household heads (64%) are married with a larger proportion of rural household heads (68%) being married compared to urban households (57%). With regards to wealth, the percentage of the total sample across the different wealth quintiles is fairly similar However, a large percentage of rural household heads belong to the poorest wealth quintile (35%) while about 41% of urban households belong to the richest wealth quintile.

About two-thirds of household heads are Christian and a fifth of them are unemployed or not in the labour force, this is similar across rural and urban households. Educational attainment is generally low: about 30% have no formal education and just over half have only primary education while only 11% have tertiary education. Low educational attainment is more prevalent in rural areas: (40%) compared to urban (15%) having no formal education at all. The table shows that the level of risk aversion is very high among the sample. Using the investment-based measure, 82.7% of the household heads are risk averse while for the lottery-based measure, 78.4% are risk averse. This indicates that the alternative measures of risk aversion used give very similar rates of risk aversion.

Generally, the average household has about four members with about .5 members less than 5 years and 1.5 adult working members. These figures are higher for rural households compared to urban households.

In terms of the outcome variables, the average number of different assets owned by households is 35.4. Generally, household belongings make up the highest number (an average of 30.10 belongings) followed by number of different livestock (4.84) and number of different household enterprises (.5). The rural and urban comparison shows differences in household asset ownership by location. The table shows that urban households own more household belongings (33.91) compared to rural households (27.26) while, as expected, rural households own more livestock (7.67) compared to urban households (1.06).

3.2 | Effects of risk aversion on asset diversification

Tables 2–5 present the main results showing the relationship between risk aversion and asset diversification. Each table presents results for the two measures of risk aversion and for each measure, and separate regressions results are reported for the urban sample, rural sample and combined sample.

TABLE 2 Effect of risk aversion on asset diversification (composite measure)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	−1.733*(1.032)	−.311(.965)	−1.067(.699)	−.156(1.089)	2.686**(1.090)	.667(.782)
Gender						
Male (ref)						
Female	1.611(1.013)	−4.646***(.946)	−.964(.693)	1.345(1.018)	−4.491***(.938)	−1.009(.695)
Age group						
Less than 20 years (ref)						
20–29 years	11.806***(2.503)	10.184***(2.624)	11.216***(1.785)	11.668***(2.486)	9.793***(2.573)	11.091***(1.754)
30–39 years	18.645***(2.573)	16.836***(2.722)	18.357***(1.847)	18.849***(2.567)	16.455***(2.669)	18.349***(1.819)
40–49 years	21.559***(2.649)	18.598***(2.822)	20.979***(1.927)	21.599***(2.614)	18.211***(2.763)	20.941***(1.892)
50–59 years	21.899***(2.678)	17.601***(2.900)	20.704***(1.986)	21.900***(2.657)	17.358***(2.871)	20.717***(1.966)
60–69 years	18.166***(2.877)	15.469***(2.929)	17.509***(2.062)	18.101***(2.843)	15.540***(2.854)	17.774***(2.011)
70 years +	19.795***(2.883)	13.960***(2.927)	17.758***(2.046)	19.960***(2.849)	13.679***(2.868)	17.855***(2.012)
Education						
None (ref)						
Primary/JHS/Middle	3.351***(1.156)	4.725***(.931)	4.858***(.787)	3.662***(1.142)	4.671***(.913)	4.942***(.780)
Secondary	8.026***(1.477)	7.619***(1.607)	9.185***(1.155)	8.306***(1.460)	7.916***(1.546)	9.371***(1.151)
Tertiary	11.828***(2.132)	12.371***(2.224)	13.354***(1.780)	11.742***(2.127)	13.055***(2.174)	13.278***(1.785)
Occupation						
None						
Managers/professionals	2.654(1.742)	6.451**(2.586)	3.753**(1.586)	2.975*(1.737)	5.830**(2.525)	3.897**(1.595)
Technicians/machine operators	3.642***(1.306)	1.923(2.349)	2.992**(1.298)	3.294**(1.314)	1.745(2.364)	2.712**(1.304)

(Continues)

TABLE 2 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Clerical/service workers	1.572(1.133)	3.727(2.368)	2.672**(1.207)	1.415(1.142)	3.519(2.384)	2.444**(1.220)
Armed forces/ elementary occupations	−2.209(1.596)	−2.844(3.356)	−1.955(1.588)	−2.389(1.599)	−2.754(3.403)	−2.173(1.593)
Skilled agric/forestry/ fisheries	−.829	−2.514	−3.154**	−.990	−2.800	−3.446***
Craft workers	(1.953)1.878	(1.888)1.256	(1.276)2.193*	(1.942)1.697	(1.920)1.028	(1.292)2.003
	(1.148)	(1.963)	(1.209)	(1.168)	(1.965)	(1.218)
Marital status						
Never married (ref)						
Married	19.372***(.826)	21.165***(.897)	20.667***(.673)	19.256***(.841)	21.001***(.895)	20.431***(.681)
Separated/widowed	11.119***(1.062)	10.006***(1.030)	10.842***(.791)	10.949***(1.062)	9.909***(1.019)	10.634***(.790)
Num. of children	1.271*(.723)	−.584(.833)	−.217(.699)	1.245*(.712)	−.261(.836)	.090(.678)
Num. of working adults	2.762***(.880)	1.320*(.680)	1.660***(.608)	2.700***(.865)	1.445**(.705)	1.790***(.621)
Household size	6.785***(.532)	5.481***(.348)	6.086***(.320)	6.783***(.535)	5.454***(.356)	6.064***(.324)
Observations	**5688**	**7625**	**13, 313**	**5775**	**7751**	13,526

Notes: The table presents results from Poisson regression models. The outcome variable is the number of different assets owned by the household. For each risk aversion measure, results are presented for rural, urban and for the total sample. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE 3 Effect of risk aversion on asset diversification (livestock)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	Urban	Rural	All	Urban	Rural	All
Risk aversion						
Not risk averse (ref)						
Risk averse	.086(.114)	−.853*(.447)	−.364*(.219)	.331***(.109)	.599(.464)	.537**(.220)
Gender						
Male (ref)						
Female	−.288***(.090)	−2.754***(.289)	−1.443***(.143)	−.314***(.088)	−2.774***(.289)	−1.471***(.141)
Age group						
Less than 20 years (ref)						
20–29 years	.624***(.183)	.473(2.141)	.455(.957)	.618***(.179)	.264(2.076)	.336(.933)
30–39 years	.525***(.146)	1.266(2.139)	.570(.955)	.534***(.141)	1.073(2.073)	.463(.929)
40–49 years	.548***(.127)	1.535(2.166)	.563(.963)	.561***(.123)	1.321(2.102)	.461(.938)
50–59 years	.854***(.169)	1.745(2.168)	.835(.972)	.826***(.163)	1.616(2.112)	.741(.951)
60–69 years	.743***(.174)	.837(2.178)	.381(.974)	.734***(.166)	.781(2.110)	.338(.946)
70 years +	.639***(.183)	1.287(2.196)	.518(.981)	.657***(.180)	1.136(2.135)	.454(.958)
Education						
None (ref)						
Primary/JHS/Middle	−.199(.125)	−2.027***(.372)	−1.114***(.202)	−.192(.127)	−2.051***(.367)	−1.119***(.199)
Secondary	−.424***(.159)	−2.576***(.681)	−1.883***(.286)	−.428***(.158)	−2.447***(.662)	−1.846***(.281)
Tertiary	−.395**(.155)	−3.188***(.732)	−2.183***(.329)	−.395**(.154)	−3.147***(.717)	−2.166***(.322)
Occupation						
Unemployed						
Managers/professionals	.109(.182)	.361(1.094)	−.203(.435)	.086(.184)	.431(1.079)	−.161(.437)
Technicians/machine ops	.027(.128)	−2.663***(.803)	−1.385***(.320)	−.018(.127)	−2.623***(.807)	−1.390***(.321)
Clerical/service workers	.007(.113)	−1.271*(.653)	−1.218***(.287)	−.030(.115)	−1.172*(.654)	−1.216***(.289)

(Continues)

TABLE 3 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Armed forces/elementary	.106	−1.511	−.911**	.065	−1.513	−.924**
	(.196)	(.983)	(.400)	(.197)	(.990)	(.403)
Skilled agric/forestry/fisher	1.112***(.252)	.031(.577)	.977***(.285)	1.004***(.244)	−.027(.586)	.902***(.291)
Craft workers	.134(.135)	−2.303***(.656)	−1.266***(.296)	.118(.138)	−2.311***(.659)	−1.254***(.299)
Marital status						
Never married (ref)						
Married	.445**(.185)	4.459***(.293)	2.289***(.182)	.443**(.182)	4.446***(.287)	2.270***(.181)
Separated/widowed	.310(.188)	2.234***(.344)	1.267***(.199)	.292(.184)	2.267***(.346)	1.261***(.198)
No. of children	.140*(.077)	−.130(.181)	−.036(.096)	.127*(.076)	−.044(.187)	.005(.099)
No. of working adults	.121**(.055)	.012(.176)	.012(.092)	.136**(.054)	.028(.183)	.027(.097)
Household size	.134***(.029)	.961***(.084)	.505***(.044)	.133***(.029)	.943***(.086)	.496***(.045)
Observations	**5688**	**7625**	**13,313**	**5775**	**7751**	**13,526**

Notes: The table presents results from Poisson regression models. The outcome variable is the number of different livestock owned by the household. For each risk aversion measure, results are presented for rural, urban and for the total sample. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE 4 Effect of risk aversion on asset diversification (household belongings)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	Urban	Rural	All	Urban	Rural	All
Risk aversion						
Not risk averse (ref)						
Risk averse	−1.858*(1.009)	.487(.777)	−.723(.644)	−.456(1.043)	2.099**(.938)	.252(.721)
Gender						
Male (ref)						
Female	1.776*(.990)	−2.176***(.814)	.276(.654)	1.525(.994)	−2.004**(.803)	.259(.654)
Age group						
Less than 20 years (ref)						
20–29 years	11.578***(2.437)	8.820***(1.846)	10.375***(1.481)	11.428***(2.422)	8.563***(1.855)	10.291***(1.464)
30–39 years	18.316***(2.504)	14.567***(1.933)	17.116***(1.545)	18.503***(2.498)	14.312***(1.940)	17.153***(1.531)
40–49 years	21.194***(2.594)	16.098***(1.998)	19.719***(1.612)	21.200***(2.559)	15.851***(1.995)	19.707***(1.591)
50–59 years	21.259***(2.593)	14.926***(2.083)	19.235***(1.663)	21.248***(2.572)	14.748***(2.104)	19.259***(1.651)
60–69 years	17.479***(2.788)	13.766***(2.130)	16.623***(1.742)	17.385***(2.756)	13.817***(2.126)	16.829***(1.713)
70 years +	19.288***(2.842)	11.689***(2.104)	16.755***(1.759)	19.416***(2.812)	11.501***(2.099)	16.840***(1.738)
Education						
None (ref)						
Primary/JHS	3.646***(1.123)	7.105***(.838)	6.623***(.756)	3.952***(1.109)	7.066***(.821)	6.709***(.750)
Secondary	8.617***(1.444)	10.387***(1.437)	11.372***(1.086)	8.898***(1.428)	10.574***(1.390)	11.527***(1.089)
Tertiary	12.371***(2.076)	15.214***(2.019)	15.404***(1.622)	12.283***(2.073)	15.847***(1.982)	15.321***(1.627)
Occupation						
None						
Managers/professional	2.421(1.680)	5.704**(2.339)	3.642***(1.410)	2.785*(1.680)	5.065**(2.251)	3.775***(1.414)
Technicians/machine	3.400***(1.292)	3.404*(2.042)	3.707***(1.173)	3.122**(1.299)	3.203(2.058)	3.466***(1.175)
Clerical/service	1.097(1.099)	3.407*(2.064)	2.614**(1.081)	.985(1.109)	3.135(2.072)	2.408**(1.087)

(Continues)

TABLE 4 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Armed forces/elem	−2.486(1.574)	−1.505(2.928)	−1.298(1.456)	−2.604*(1.577)	−1.454(2.953)	−1.480(1.455)
Skilled Agric/forestry	−2.563(1.800)	−2.597(1.608)	−4.693***(1.105)	−2.587(1.825)	−2.820*(1.621)	−4.872***(1.116)
Craft workers	1.257(1.124)	2.013(1.686)	2.386**(1.076)	1.102(1.144)	1.779(1.678)	2.202**(1.079)
Marital status						
Never married (ref)						
Married	18.877***(.812)	17.109***(.786)	18.608***(.621)	18.765***(.827)	16.992***(.784)	18.427***(.629)
Separated/widowed	10.878***(1.037)	8.468***(.901)	10.015***(.739)	10.739***(1.039)	8.371***(.889)	9.842***(.740)
No. of children	1.093(.682)	−.483(.687)	−.218(.609)	1.070(.671)	−.264(.688)	.008(.591)
No. working adults	2.433***(.844)	1.299**(.524)	1.573***(.528)	2.352***(.832)	1.405***(.538)	1.667***(.533)
Household size	6.588***(.515)	4.427***(.285)	5.498***(.291)	6.587***(.517)	4.413***(.289)	5.486***(.293)
Observations	**5688**	**7625**	**13,313**	**5775**	**7751**	**13,526**

Notes: The table presents results from Poisson regression models. The outcome variable is the number of different household assets owned by the household. For each risk aversion measure, results are presented for rural, urban and for the total sample. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE 5 Effect of risk aversion on asset diversification (household enterprise)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	.031(.025)	.043*(.023)	.036**(.018)	.027(.024)	.012(.026)	.016(.018)
Gender						
Male (ref)						
Female	.090***(.023)	.042*(.024)	.074***(.017)	.090***(.023)	.044*(.024)	.075***(.017)
Age group						
Less than 20 years (ref)						
20–29 years	−.069(.240)	.239***(.062)	.084(.133)	−.060(.235)	.238***(.062)	.087(.131)
30–39 years	.092(.245)	.299***(.062)	.204(.135)	.102(.239)	.301***(.062)	.209(.132)
40–49 years	.158	.283***	.238*	.171	.284***	.243*
	(.240)	(.063)	(.132)	(.235)	(.063)	(.130)
50–59 years	.110(.246)	.269***(.063)	.210(.135)	.125(.241)	.271***(.063)	.218(.133)
60–69 years	.159(.244)	.235***(.063)	.210(.134)	.186(.239)	.237***(.063)	.225*(.132)
70 years +	.193(.249)	.222***(.066)	.219(.137)	.189(.244)	.234***(.066)	.222(.135)
Education						
None (ref)						
Primary/JHS/middle school	.012(.034)	.106***(.024)	.076***(.021)	.009(.034)	.106***(.024)	.075***(.021)
Secondary	−.089*(.047)	.041(.040)	−.003(.031)	−.092**(.047)	.042(.041)	−.005(.031)
Tertiary	−.204***(.045)	.012(.044)	−.094***(.030)	−.207***(.045)	.010(.044)	−.096***(.030)
Occupation						
Unemployed/not in						
managers/professionals	.065(.045)	.156**(.068)	.108***(.038)	.051(.045)	.157**(.068)	.099***(.038)
Technicians/machine operators	.218***(.038)	.263***(.068)	.246***(.035)	.200***(.039)	.257***(.067)	.233***(.035)

(Continues)

TABLE 5 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Clerical/service workers	.403***(.034)	.644***(.049)	.487***(.028)	.395***(.035)	.652***(.048)	.485***(.028)
Armed forces/elementary occupations	.156**(.065)	.096(.063)	.152***(.052)	.139**(.064)	.096(.060)	.140***(.051)
Skilled agric/forestry/fisheries	−.068*(.038)	.016(.031)	−.057**(.023)	−.088**(.039)	.012(.031)	−.068***(.024)
Craft workers	.468***(.037)	.653***(.053)	.547***(.032)	.456***(.038)	.650***(.052)	.540***(.032)
Marital status						
Never married (ref)						
Married	.196***(.029)	.233***(.028)	.212***(.020)	.197***(.029)	.236***(.028)	.213***(.020)
Separated/widowed	.076**(.038)	.177***(.034)	.118***(.025)	.072*(.038)	.178***(.033)	.116***(.025)
No. of children	.021(.017)	−.005(.013)	.008(.011)	.023(.017)	−.005(.014)	.010(.011)
No. of working adults	.180***(.016)	.084***(.011)	.127***(.010)	.185***(.016)	.086***(.011)	.130***(.010)
Household size	.028***(.007)	.028***(.004)	.028***(.004)	.027***(.006)	.028***(.004)	.028***(.004)
Observations	**5688**	**7625**	**13,313**	**5775**	**7751**	**13,526**

Notes: The table presents results from Poisson regression models. The outcome variable is the number of enterprises owned by the household. For each risk aversion measure, results are presented for rural, urban and for the total sample. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

Table 2 reports results from the composite measure of assets, that is, the sum of all assets. This is the sum of all the assets. Separate results are reported for the hypothetical lottery measure of risk aversion and the investment-based measure. The results show that the relationship between risk aversion and number of assets depends on the measure of risk aversion used. Regardless of the measure used, from the combined sample, risk aversion has no statistically significant impact on the number of assets even though the coefficients have different signs. However, when the sample is divided into rural and urban, the two measures yield different results. Using the preferred investment measure, risk aversion is positively and significantly associated with ownership of 2.7 more assets in the rural sample but no significant association with number of assets in the urban sample. This finding is consistent with the prior expectation based on the theoretical literature. For the lottery measure, risk aversion is associated with ownership of fewer number of assets: 1.7 fewer for the urban sample, which is statistically significant at 10%, and .3 fewer assets in the rural sample and not statistically significant.

The results from disaggregating the assets by type largely follow a similar pattern as those in Table 2. That is, the association between risk aversion and the number of assets owned differs by the measure of risk aversion. Table 3 presents results from using the number of livestock owned as the outcome variable. The preferred measure of risk aversion—the investment measure—shows that there is a positive association for all three samples that are statistically significant for the urban sample and the overall sample. However, using the lottery measure there is a negative association between risk aversion and number of livestock owned (coefficient .364 statistically significant at 10%). Furthermore, while there is negative association for the urban sample (coefficient of −.853 statistically significant at 10% level), there is a positive albeit not statistically significant association for the rural sample.

The results in Table 4 with household belongings are largely very similar to the results in Table 2. First, the direction of the association differs between the two measures of risk aversion for the combined sample: positive for the investment measure and negative for the lottery measure. Secondly, for both measures, the associations for the rural and urban samples are in the opposite direction and consistent with expectation. For the lottery measure, there is positive though not statistically significant association for the rural sample and negative association for the urban sample that is statistically significant at 10%. However, for the investment measure, there is a weak negative and not statistically significant association for the urban but a strong and statistically significant positive association for the rural sample.

Finally, Table 5 shows a positive association between risk aversion and number of household enterprises owned across all samples and measures of risk aversion though not statistically significant in all cases except for the rural sample using the lottery measure.

Taken together, the results show that there is no clear association between risk aversion and number of assets owned. Both the preferred and alternative measures of risk aversion show no strong relationship between risk aversion and asset diversification. The direction and strength of the association is largely dependent on the measure of risk aversion used. When the sample is divided into rural and urban, the association mostly differs between rural and urban samples, with a clearer pattern observed for the investment measure of the risk aversion. This pattern shows that in rural areas, risk aversion is positively associated with number of assets owned. This is largely driven by results on the household belongings.

In terms of the other covariates, the results show that gender, age, education, occupation, marital status, number of adult working members in the household, household size, and number of children in the household are all have significant effect on the number of assets owned by the household. Households headed by females have significantly fewer assets across samples, but especially in rural areas. The number of assets owned by the household is increasing in the age and education of the household head. Household headed by individuals who are married or formerly married own more assets.

3.3 | Robustness analysis

This section presents results from some robustness analysis to the main results. First, as indicated, unobserved community level variables may affect the availability and type of assets, and thus the relationship between risk aversion and diversification. Tables 6–9 present results that control for EA fixed effects to control for these unobserved community-level variables.

TABLE 6 Effect of risk aversion on asset diversification: Fixed effects regressions

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	.304(.737)	−.432(.650)	−.102(.491)	−1.252(.799)	.499(.777)	−.363(.569)
Gender						
Male (ref)						
Female	−3.259***(.571)	−6.374***(.606)	−4.726***(.422)	−3.293***(.567)	−6.232***(.599)	−4.686***(.418)
Age group						
Less than 20 years (ref)						
20–29 years	−.845(2.179)	−3.755**(1.883)	−2.743*(1.498)	−.757(2.133)	−3.429*(1.856)	−2.550*(1.466)
30–39 years	−.469(2.181)	−2.235(1.964)	−1.724(1.537)	−.184(2.133)	−1.830(1.943)	−1.406(1.504)
40–49 years	2.737(2.394)	−2.194(2.117)	−.207(1.648)	2.925(2.336)	−1.839(2.091)	.049(1.614)
50–59 years	2.186(2.361)	−1.532(2.142)	−.171(1.656)	2.404(2.309)	−1.217(2.107)	.050(1.619)
60–69 years	2.539(2.336)	−.463(2.145)	.566(1.650)	2.836(2.288)	−.269(2.114)	.752(1.616)
70 years +	4.472*(2.427)	−.594(2.125)	1.269(1.675)	4.735**(2.378)	−.210(2.096)	1.584(1.642)
Education						
None (ref)						
Primary/JHS/middle school	3.426***(.925)	3.048***(.639)	3.354***(.524)	3.421***(.916)	2.988***(.630)	3.313***(.516)
Secondary	6.111***(1.064)	4.606***(1.029)	5.494***(.718)	6.115***(1.050)	4.741***(1.015)	5.548***(.707)
Tertiary	9.755***(1.158)	9.053***(1.550)	9.614***(.870)	9.630***(1.145)	9.220***(1.531)	9.593***(.857)
Occupation						
Unemployed/not in						
managers/professionals	.942(1.240)	1.948(2.005)	1.350(1.097)	1.006(1.210)	1.673(1.968)	1.256(1.079)
Technicians/machine operators	−.986(1.106)	−1.806(1.451)	−1.403(.933)	−1.078(1.090)	−1.787(1.444)	−1.455(.925)
Clerical/service workers	−1.168(.866)	−1.129(1.314)	−1.269(.783)	−1.168(.852)	−1.077(1.314)	−1.299*(.776)

(Continues)

TABLE 6 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Armed forces/elementary occupations	−4.320***(1.271)	−5.328**(2.169)	−4.918***(1.189)	−4.337***(1.255)	−5.102**(2.110)	−4.875***(1.169)
Skilled agric/forestry/fisheries	−3.143**(1.404)	−4.503***(1.219)	−4.155***(.911)	−3.219**(1.392)	−4.563***(1.205)	−4.236***(.898)
Craft workers	−2.400**(.984)	−5.465***(1.294)	−3.643***(.837)	−2.390**(.963)	−5.573***(1.279)	−3.694***(.826)
Marital status						
Never married (ref)						
Married	2.730***(.735)	.839(.916)	3.156***(.604)	2.756***(.738)	1.025(.895)	3.284***(.598)
Separated/widowed	.942(.747)	.796(.910)	2.128***(.587)	1.014(.744)	.842(.884)	2.205***(.578)
No. of children	−.791(.644)	−1.402**(.638)	−1.248***(.468)	−.815(.635)	−1.509**(.611)	−1.320***(.454)
No. of working adults	3.619***(.610)	4.184***(.740)	3.975***(.533)	3.589***(.604)	4.219***(.735)	3.994***(.529)
Household size	11.845***(.357)	9.917***(.338)	10.512***(.255)	11.863***(.355)	9.898***(.336)	10.500***(.254)
Observations	**5688**	**7625**	**13,313**	**5775**	**7751**	**13,526**

Notes: The table presents results from enumeration area (EA)/cluster fixed effects regression models. The outcome variable is the number of different household assets owned by the household. Each column reports results of a separate regression. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE 7 Effect of risk aversion on diversification in livestock: Fixed effects regressions

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	−.084(.146)	−.650*(.356)	−.399*(.234)	−.060(.160)	−.147(.399)	−.060(.233)
Gender						
Male (ref)						
Female	−.409***(.107)	−2.476***(.313)	−1.711***(.193)	−.407***(.105)	−2.524***(.313)	−1.740***(.194)
Age group						
Less than 20 years (ref)						
20–29 years	.504(.380)	−.837(1.081)	.037(.686)	.512(.373)	−.732(1.032)	.095(.660)
30–39 years	.185(.398)	−1.231(1.060)	−.327(.671)	.187(.389)	−1.195(1.014)	−.303(.645)
40–49 years	.307(.458)	−1.112(1.140)	−.382(.724)	.282(.448)	−1.131(1.097)	−.404(.701)
50–59 years	.628(.477)	−.613(1.137)	.110(.724)	.603(.467)	−.555(1.088)	.123(.697)
60–69 years	.841*(.446)	−.330(1.184)	.477(.756)	.827*(.438)	−.395(1.142)	.399(.734)
70 years +	.737(.449)	1.145(1.210)	1.341*(.788)	.737*(.442)	1.050(1.159)	1.267*(.760)
Education						
None (ref)						
Primary/JHS/middle school	−.499(.337)	−.404(.347)	−.488*(.264)	−.488(.335)	−.483(.347)	−.547**(.264)
Secondary	−.573(.365)	−.831(.540)	−.780**(.324)	−.568(.363)	−.958*(.539)	−.843***(.324)
Tertiary	−.726*(.397)	−1.343**(.641)	−1.070***(.349)	−.693*(.395)	−1.426**(.635)	−1.114***(.347)
Occupation						
Unemployed/not in managers/professionals	−.651**(.288)	−.689(.793)	−1.241***(.408)	−.703**(.284)	−.594(.766)	−1.195***(.398)
Technicians/machine operators	−.472*(.285)	−1.368**(.654)	−1.323***(.379)	−.516*(.281)	−1.296**(.644)	−1.299***(.374)
Clerical/service workers	−.248(.206)	−.090(.693)	−.287(.375)	−.279(.203)	−.018(.689)	−.242(.372)

(Continues)

TABLE 7 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Armed forces/elementary occupations	−.149(.327)	−.665(.821)	−.535(.441)	−.176(.321)	−.495(.803)	−.463(.435)
Skilled agric/forestry/fisheries	1.052***(.354)	−.431(.538)	.075(.387)	1.021***(.350)	−.349(.525)	.136(.377)
Craft workers	−.401*(.233)	−1.666***(.526)	−1.052***(.333)	−.429*(.230)	−1.612***(.521)	−1.022***(.329)
Marital status						
Never married (ref)						
Married	−.707***(.202)	−3.578***(.526)	−3.416***(.356)	−.702***(.199)	−3.459***(.512)	−3.326***(.343)
Separated/widowed	−.687***(.172)	−2.677***(.469)	−2.814***(.280)	−.683***(.170)	−2.606***(.467)	−2.754***(.276)
No. of children	.206(.146)	−.660*(.377)	−.287(.269)	.198(.144)	−.775**(.360)	−.381(.254)
No. of working adults	.577***(.189)	.618*(.341)	.668***(.249)	.580***(.186)	.551(.340)	.615**(.247)
Household size	.453***(.088)	3.067***(.233)	2.261***(.177)	.454***(.087)	3.070***(.231)	2.266***(.176)
Observations	**5688**	**7625**	**13,313**	**5775**	**7751**	**13,526**

Notes: The table presents results from enumeration area (EA)/cluster fixed effects regression models. The outcome variable is the number of different livestock owned by the household. Each column reports results of a separate regression. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE 8 Effect of risk aversion on diversification in household belongings: Fixed effects regressions

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	.391(.711)	.208(.528)	.292(.440)	−1.192(.757)	.682(.640)	−.286(.528)
Gender						
Male (ref)						
Female	−2.920***(.545)	−3.965***(.522)	−3.084***(.388)	−2.955***(.541)	−3.775***(.514)	−3.015***(.384)
Age group						
Less than 20 years (ref)						
20–29 years	−1.491(1.946)	−2.946*(1.756)	−2.857**(1.448)	−1.423(1.910)	−2.725(1.731)	−2.726*(1.421)
30-39 years	−.919(1.961)	−1.123(1.851)	−1.579(1.487)	−.654(1.923)	−.759(1.828)	−1.294(1.458)
40–49 years	2.102(2.116)	−1.185(1.976)	−.025(1.560)	2.298(2.071)	−.816(1.947)	.243(1.529)
50–59 years	1.256(2.128)	−.991(1.980)	−.452(1.570)	1.478(2.086)	−.738(1.949)	−.255(1.539)
60–69 years	1.360(2.083)	−.181(1.940)	−.077(1.561)	1.642(2.047)	.076(1.910)	.175(1.532)
70 years +	3.432(2.206)	−1.756(1.985)	−.199(1.605)	3.680*(2.165)	−1.287(1.952)	.177(1.573)
Education						
None (ref)						
Primary/JHS/middle school	3.912***(.869)	3.401***(.516)	3.800***(.453)	3.896***(.859)	3.421***(.509)	3.817***(.446)
Secondary	6.742***(.990)	5.400***(.922)	6.283***(.678)	6.745***(.976)	5.662***(.912)	6.401***(.670)
Tertiary	10.676***(1.109)	10.444***(1.549)	10.811***(.865)	10.524***(1.095)	10.693***(1.533)	10.839***(.852)
Occupation						
Unemployed/not in						
managers/professionals	1.716(1.214)	2.646(1.883)	2.629**(1.053)	1.833(1.184)	2.282(1.856)	2.490**(1.036)
Technicians/machine operators	−.523(1.044)	−.581(1.265)	−.176(.865)	−.563(1.031)	−.631(1.260)	−.247(.859)
Clerical/service workers	−1.158(.842)	−1.521(1.141)	−1.333*(.712)	−1.126(.827)	−1.544(1.145)	−1.409**(.708)

(Continues)

TABLE 8 (Continued)

VARIABLES	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
	Urban	Rural	All	Urban	Rural	All
Armed forces/elementary occupations	−4.170***(1.248)	−4.638**(1.864)	−4.397***(1.066)	−4.152***(1.232)	−4.580**(1.808)	−4.421***(1.047)
Skilled agric/forestry/fisheries	−3.918***(1.315)	−3.997***(1.004)	−4.080***(.793)	−3.955***(1.309)	−4.139***(.993)	−4.218***(.783)
Craft workers	−2.352**(.944)	−4.255***(1.133)	−3.015***(.765)	−2.312**(.923)	−4.419***(1.128)	−3.097***(.758)
Marital status						
Never married (ref)						
Married	3.375***(.684)	4.284***(.747)	6.448***(.571)	3.396***(.687)	4.348***(.745)	6.483***(.573)
Separated/widowed	1.684**(.713)	3.410***(.773)	4.906***(.558)	1.752**(.711)	3.383***(.751)	4.923***(.551)
No. of children	−1.004*(.590)	−.737(.480)	−.960**(.395)	−1.023*(.581)	−.728(.474)	−.940**(.391)
No. of working adults	2.796***(.583)	3.435***(.569)	3.139***(.441)	2.760***(.577)	3.537***(.574)	3.208***(.442)
Household size	11.359***(.341)	6.826***(.270)	8.225***(.235)	11.377***(.339)	6.805***(.271)	8.210***(.236)
Observations	**5688**	**7625**	**13,313**	**5775**	**7751**	**13,526**

Notes: The table presents results from enumeration area (EA)/cluster fixed effects regression models. The outcome variable is the number of different household assets owned by the household. Each column reports results of a separate regression. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE 9 Effect of risk aversion on diversification in household enterprises: Fixed effects regressions

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	−.003(.022)	.010(.017)	.005(.014)	.001(.025)	−.036(.023)	−.017(.017)
Gender						
Male (ref)						
Female	.070***(.018)	.068***(.018)	.070***(.013)	.069***(.018)	.068***(.018)	.069***(.013)
Age group						
Less than 20 years (ref)						
20–29 years	.141**(.071)	.029(.050)	.077*(.044)	.154**(.071)	.029(.049)	.081*(.044)
30–39 years	.265***(.073)	.119**(.052)	.182***(.045)	.283***(.073)	.124**(.051)	.191***(.045)
40–49 years	.328***	.100*	.199***	.345***	.106**	.208***
	(.074)	(.053)	(.046)	(.073)	(.052)	(.045)
50–59 years	.301***(.076)	.068(.053)	.169***(.047)	.322***(.075)	.073(.052)	.181***(.046)
60–69 years	.339***(.076)	.046(.055)	.164***(.047)	.366***(.075)	.047(.053)	.176***(.046)
70 years +	.303***(.077)	.017(.055)	.127***(.048)	.317***(.077)	.027(.054)	.139***(.047)
Education						
None (ref)						
Primary/JHS/middle school	.013(.026)	.051***(.017)	.043***(.015)	.013(.026)	.050***(.017)	.043***(.014)
Secondary	−.058*(.035)	.036(.034)	−.009(.024)	−.061*(.035)	.037(.034)	−.010(.023)
Tertiary	−.195***(.036)	−.047(.041)	−.127***(.025)	−.201***(.035)	−.047(.041)	−.131***(.025)
Occupation						
Unemployed/not in						
managers/professionals	−.124***(.038)	−.013(.050)	−.041(.029)	−.124***(.037)	−.019(.050)	−.042(.029)

(Continues)

TABLE 9 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Technicians/machine operators	.009(.035)	.139***(.041)	.094***(.026)	.002(.035)	.136***(.041)	.089***(.026)
Clerical/service workers	.238***	.477***	.349***	.237***	.480***	.349***
	(.031)	(.032)	(.022)	(.031)	(.033)	(.022)
Armed forces/elementary occupations	−.001(.044)	−.028(.048)	.012(.033)	−.009(.045)	−.031(.047)	.006(.032)
Skilled agric/forestry/fisheries	−.278***(.037)	−.080***(.024)	−.154***(.020)	−.286***(.037)	−.081***(.024)	−.158***(.020)
Craft workers	.353***(.033)	.452***(.036)	.423***(.024)	.351***(.033)	.453***(.035)	.422***(.024)
Marital status						
Never married (ref)						
Married	.061**(.025)	.132***(.025)	.124***(.018)	.062**(.025)	.135***(.025)	.126***(.018)
Separated/widowed	−.056*(.029)	.063**(.028)	.035*(.020)	−.056*(.029)	.065**(.028)	.036*(.020)
No. of children	.007(.015)	−.007(.012)	−.002(.009)	.010(.015)	−.007(.012)	−.000(.009)
No. of working adults	.246***(.018)	.133***(.012)	.170***(.010)	.250***(.018)	.134***(.012)	.172***(.010)
Household size	.034***(.006)	.024***(.004)	.025***(.004)	.032***(.006)	.023***(.004)	.024***(.003)
Observations	**5688**	**7625**	**13,313**	**5775**	**7751**	**13,526**

Notes: The table presents results from enumeration area (EA)/cluster fixed effects regression models. The outcome variable is the number of different household enterprises owned by the household. Each column reports results of a separate regression. The samples used for this regression are all household heads. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

Tables 6–9 show that controlling for the EA fixed effects alters the results quite dramatically. Table 6, which repeats the results in Table 2, shows no significant association between risk aversion and the number of assets owned regardless of the measure of risk aversion used. Comparing the results in Tables 2 and 6 shows that while the direction of many coefficients remains unchanged, the coefficients are much lower. Similar findings emerge when comparing Tables 7–9 with the corresponding tables, that is, Tables 3–5. In all these comparisons, the results show that controlling for the EA fixed effects reduces the sizes of the coefficients such that they are no longer statistically significant. In many cases, the signs remain unchanged. These findings suggest that community-level factors including availability of financial services affect the relationship between risk aversion and diversification of assets.

The regression analysis presented thus far used the risk aversion of the household head as the risk aversion measure. However, the household head's risk attitude may not be generalised for every member of the household since household members can have different risk attitudes while some assets might be owned at the individual level. To address this, the models were re-estimated by (1) redefining the measure of household risk aversion using the fraction of adult household members who are risk averse as the risk aversion variable and (2) at the individual level for the classes of assets where the individual owner is identifiable. The results of these regressions are reported in Appendices A and B, respectively.

Tables A1 to A4 present results using the fraction of adult household members who are risk averse as the key independent variables. These results do not control for EA fixed effects. The results in Table A1 are very similar to the results in Table 2 even though the magnitudes of some of the coefficients are slightly different. Also, just like in Table 2, the results that differ by the risk aversion measure used with the hypothetical investment measure of risk aversion show stronger association between risk aversion and diversification, especially for the rural sample. The results in Tables A2–A4 are also qualitatively similar to the corresponding results in Tables 3–5.

The individual level regression results are presented in Appendix B. Individual level results are presented only for household belongings (Table B1) and household enterprises (Table B2). Qualitatively, the results are remarkably similar to the results from the household level regressions in Tables 4 and 5, respectively. Firstly, results differ by measure of risk aversion used. Stronger associations are found for the hypothetical investment measure compared with the lottery measure. Secondly, stronger and statistically significant associations are found for the rural areas compared with the urban. This is reassuring for the household level results presented above. However, the results did show that females owned fewer household belongings but more business enterprises. Moreover, additional regressions that include an interaction of gender and risk aversion to understand how gender of the individual affect the relationship are also reported in Tables B3 and B4. The results show that the relationship between risk aversion and assets ownership does not depend on gender, as the interaction between is mostly not statistically significant. In Table B3, the interaction term is negative in the rural and urban subsamples as well as the combined sample across both measures of risk aversion, suggesting that risk averse female owns fewer household belongings compared to their male counterparts, but this is statistically significant in the case of the lottery measure of risk aversion. In Table B4, the coefficient on the interaction term is positive but not statistically significant across location or measure of risk aversion.

4 | DISCUSSION AND CONCLUSION

This paper sought to estimate the relationship between attitudes toward risk on diversification of assets. The paper used data from a large nationally representative sample of Ghanaian households and measured risk aversion using choices of respondents from two hypothetical lottery questions and direct questions asking respondents about their preference between investing in a high-risk high-return versus low-risk low-return business. Diversification is measured using the number of different assets (household belongings, different types of livestock and different household enterprises). The large nationally representative data allow for sub-sample analysis between rural and urban areas as theoretical literature indicates.

The analysis shows that an overwhelming majority of Ghanaian households (78% to 82% depending on the measure used) are headed by risk-averse individuals. The levels of risk aversion are quite similar between rural and

urban areas. Overall, the regression analyses show weak associations between risk aversion and diversification. The strength and direction of the association depends strongly on the measure of risk aversion used. More consistent patterns of results emerge using the preferred measure of risk aversion—the investment measure of risk aversion. Using this preferred measure shows stronger positive association between risk aversion and diversification in the rural sub-sample compared with the urban sub-sample in the composite measure of assets as well as different types of assets. However, when EA fixed effects are introduced to control for potential effects of community level variables, the sizes of the coefficients reduce markedly and are no longer statistically significant. The results are robust to alternative definitions of the household measure of risk aversion. In addition, results from individual level regressions for assets whose ownership are individually identifiable are largely consistent with the household level regressions.

This finding differs from other studies that show that risk aversion has significant positive association with diversification of assets (Barasinska et al., 2011; Mariotti et al., 2015; Wei et al., 2019). Many of these studies are from developed countries setting and tend to use financial assets as outcomes. However, data are not available in many developing countries for such analysis. Indeed, the results are largely consistent with findings from other developing country contexts (Barrett et al., 2001; Krause, 2019). The contrast between results from developing countries and developed countries is quite striking. Previous authors attribute these differences to the fact that liquidity or credit markets are more binding in developing countries (Barrett et al., 2001). Consistent with the theoretical literature, this paper extends the findings by showing that even within the same developing country context, rural–urban differences matter in explaining the link between risk aversion and diversification. Indeed, the fact that the magnitudes of coefficients reduce after controlling for EA fixed effects highlights the importance of local conditions and markets.

The results of this paper show that the main predictors of diversification are socioeconomic characteristics of the head of the household and the demographic structure of the household. Asset diversification increases with the age of the household head while households headed by females had significantly fewer assets. Diversification increases with the household size and the number of adult working members in the households. The individual-level regressions show that while women and male tend to hold different types of assets, gender does not affect the relationship between risk aversion and asset diversification. Again, these findings are largely consistent with findings from previous studies. For instance, using a nationally representative sample from Ghana, Hillesland (2019) finds that although women hold different types of assets from men in terms of their risk characteristics, this appears not to be related to their risk preferences as men and women do have systematically different risk preferences.

The results also show subtle differences in the strength of the association between risk aversion and diversification depending on the types of assets. Using the preferred measure, the strongest difference in the results is seen using the household belongings where risk averse rural households hold about two more assets, but there is no such association in urban areas. For household enterprises, there is a weak positive (and statistically insignificant) association between risk aversion and diversification in both rural and urban areas. Finally, for livestock, the association is positive for both areas, but the coefficient is only statistically significant for urban areas even though the magnitude of the coefficient is smaller. These results indicate that rural and urban areas may diversify into different types of assets.

The results also highlight the need to address the issue of measurement in the risk attitude literature especially in developing countries. Although both measures of risk version used in this paper are not novel, the non-trivial differences in the results obtained from using the alternative measures show that it is important to get the measurement of risk aversion right. In this specific context, it is possible the lottery measure may have been too difficult for the respondents to understand especially in a context with very low education. By contrast, the investment measure appears more straightforward to understand. However, specific careful studies are needed to understand how to measure risk attitudes more accurately in such contexts.

Finally, in terms of policy, the findings of the paper highlight the importance of local conditions on asset diversification even within the same country. In particular, rural–urban gaps in availability of various markets and living conditions continue to exert significant effects on asset acquisitions. Policymakers need to take into consideration the nuances in living conditions in their countries when formulating policies to improve welfare.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the National Data Archive of the Ghana Statistical Service at https://www2.statsghana.gov.gh/nada/index.php/catalog/97 reference ID DDI-GHA-GSS-GLSS7-2017-v1. Reference: Ghana Statistical Service, 2017. Ghana Living Standards Survey (GLSS 7) 2017. Accra: Ghana Statistical Service Available at https://www2.statsghana.gov.gh/nada/index.php/catalog/97.

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ENDNOTE

[1] In principle, respondents who choose option 2 for Q1 and option 2 for Q2 are more risk averse compared to those who choose option 2 for Q1 and option 1 for Q2. Only 2.1% of the sample choose option 2 for Q1 and option 1 for Q2 and they were put together with those who choose option 2 for both questions and simply classified as risk averse.

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APPENDIX A: THE RESULTS IN THIS APPENDIX REPLACES THE RISK AVERSE OF THE HEAD OF THE HOUSEHOLD WITH THE RISK AVERSION OF FRACTION OF ADULT HOUSEHOLD MEMBERS THAT ARE RISK AVERSE

TABLE A1 Effect of risk aversion on asset diversification (composite measure)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Risk aversion fraction	−1.702(1.115)	−.457(1.232)	−1.217(.828)	.538(1.293)	4.112***(1.431)	1.368(.958)
Gender						
Male (ref)						
Female	1.561(1.000)	−4.655***(.939)	−.993(.689)	1.331(1.002)	−4.413***(.940)	−.984(.691)
Age group						
Less than 20 years (ref)						
20–29 years	11.818***(2.499)	10.184***(2.629)	11.218***(1.786)	11.681***(2.480)	9.589***(2.581)	11.049***(1.751)
30–39 years	18.677***(2.569)	16.842***(2.726)	18.371***(1.847)	18.872***(2.563)	16.233***(2.674)	18.316***(1.817)
40–49 years	21.600***(2.643)	18.601***(2.825)	20.991***(1.926)	21.655***(2.618)	18.039***(2.765)	20.926***(1.890)
50–59 years	21.859***(2.675)	17.594***(2.903)	20.681***(1.986)	21.929***(2.657)	17.231***(2.875)	20.710***(1.964)
60–69 years	18.110***(2.880)	15.462***(2.931)	17.474***(2.065)	18.133***(2.835)	15.379***(2.864)	17.766***(2.011)
70 years +	19.802***(2.876)	13.961***(2.930)	17.756***(2.045)	19.957***(2.844)	13.488***(2.871)	17.812***(2.009)
Education						
None (ref)						
Primary/JHS/middle	3.362***(1.153)	4.723***(.931)	4.848***(.787)	3.670***(1.138)	4.696***(.914)	4.957***(.778)
Secondary	8.009***(1.472)	7.623***(1.606)	9.170***(1.153)	8.311***(1.458)	7.837***(1.553)	9.374***(1.149)
Tertiary	11.762***(2.123)	12.364***(2.220)	13.301***(1.784)	11.781***(2.098)	13.074***(2.176)	13.346***(1.747)
Occupation						
None (ref)						
Managers/ professionals	2.716(1.742)	6.458**(2.586)	3.802**(1.591)	2.931*(1.716)	5.701**(2.518)	3.820**(1.578)

(Continues)

TABLE A1 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	Urban	Rural	All	Urban	Rural	All
Technicians/machine operators	3.685***(1.302)	1.927(2.349)	3.023**(1.298)	3.237**(1.313)	1.856(2.376)	2.679**(1.305)
Clerical/service workers	1.576(1.133)	3.736(2.366)	2.689**(1.208)	1.373(1.145)	3.477(2.376)	2.415**(1.220)
Armed forces/ elementary occupations	−2.138(1.585)	−2.855(3.347)	−1.925(1.586)	−2.465(1.592)	−2.703(3.400)	−2.232(1.591)
Skilled agric/forestry/ fisheries	−.827(1.941)	−2.504(1.887)	−3.130**(1.274)	−1.074(1.925)	−2.844(1.926)	−3.511***(1.290)
Craft workers	1.876(1.144)	1.251(1.961)	2.201*(1.209)	1.673(1.169)	1.039(1.970)	1.985(1.220)
Marital status						
Never married (ref)						
Married	19.395***(.827)	21.168***(.897)	20.679***(.675)	19.230***(.848)	20.983***(.896)	20.401***(.685)
Separated/widowed	11.119***(1.062)	10.009***(1.029)	10.845***(.791)	10.916***(1.060)	9.863***(1.020)	10.598***(.790)
Num. of children	1.271*(.726)	−.585(.833)	−.218(.701)	1.240*(.710)	−.274(.837)	.084(.678)
Num. of working adults	2.780***(.880)	1.322*(.679)	1.667***(.608)	2.711***(.872)	1.434**(.705)	1.785***(.619)
Household size	6.770***(.539)	5.481***(.348)	6.082***(.321)	6.783***(.532)	5.459***(.356)	6.068***(.322)
Observations	5688	7625	13,313	5775	7751	13,526

Notes: The table presents results from Poisson regression models. The outcome variable is the number of different assets owned by the household. The risk aversion measure used is the fraction of household members who are risk averse. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE A2 Effect of risk aversion on asset diversification (livestock)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Risk aversion fraction	.029(.138)	−1.254**(.505)	−.580**(.249)	.404**(.184)	.381(.669)	.514(.331)
Gender						
Male (ref)						
Female	−.286***(.090)	−2.765***(.287)	−1.445***(.142)	−.302***(.090)	−2.765***(.289)	−1.458***(.141)
Age group						
Less than 20 years (ref)						
20–29 years	.624***(.183)	.507(2.172)	.473(.967)	.609***(.175)	.330(2.074)	.358(.929)
30–39 years	.523***(.145)	1.298(2.170)	.584(.965)	.529***(.138)	1.128(2.069)	.481(.925)
40–49 years	.546***(.127)	1.572(2.196)	.580(.973)	.556***(.121)	1.369(2.099)	.470(.934)
50–59 years	.860***(.169)	1.751(2.198)	.836(.982)	.849***(.163)	1.678(2.107)	.773(.946)
60–69 years	.747***(.174)	.828(2.208)	.375(.984)	.742***(.166)	.848(2.106)	.367(.942)
70 years +	.644***(.182)	1.320(2.226)	.534(.991)	.666***(.180)	1.197(2.132)	.472(.954)
Education						
None (ref)						
Primary/JHS/middle	−.206(.125)	−2.031***(.371)	−1.117***(.202)	−.206(.127)	−2.043***(.368)	−1.114***(.199)
Secondary	−.428***(.160)	−2.569***(.675)	−1.890***(.286)	−.431***(.159)	−2.461***(.670)	−1.846***(.282)
Tertiary	−.399**(.154)	−3.190***(.744)	−2.206***(.330)	−.387**(.153)	−3.181***(.714)	−2.153***(.318)
Occupation						
None (ref)						
Managers/Professionals	.108(.181)	.360(1.103)	−.185(.440)	.059(.177)	.450(1.084)	−.194(.432)
Technicians/Machine Operators	.027(.127)	−2.657***(.797)	−1.383***(.319)	−.029(.127)	−2.627***(.807)	−1.398***(.321)
Clerical/Service Workers	.009(.113)	−1.257*(.651)	−1.218***(.287)	−.033(.114)	−1.176*(.654)	−1.222***(.289)

(Continues)

TABLE A2 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	Urban	Rural	All	Urban	Rural	All
Armed Forces/ elementary occupations	.105(.195)	−1.521(.975)	−.906**(.399)	.050(.193)	−1.541(.979)	−.941**(.401)
Skilled Agric/forestry/ fisheries	1.116***(.252)	.057(.574)	.983***(.283)	.993***(.245)	−.031(.586)	.895***(.292)
Craft workers	.136(.134)	−2.307***(.651)	−1.266***(.295)	.116(.138)	−2.315***(.658)	−1.263***(.299)
Marital Status						
Never married (ref)						
Married	.446**(.185)	4.467***(.292)	2.296***(.181)	.437**(.185)	4.443***(.288)	2.267***(.181)
Separated/Widowed	.310*(.188)	2.230***(.342)	1.265***(.198)	.283(.188)	2.266***(.346)	1.258***(.198)
Num. Children	.143*(.076)	−.138(.182)	−.039(.097)	.134*(.076)	−.040(.187)	.009(.100)
Num. working adults	.119**(.055)	.015(.175)	.014(.091)	.132**(.054)	.033(.183)	.027(.097)
Household size	.134***(.029)	.962***(.083)	.505***(.044)	.134***(.028)	.943***(.086)	.497***(.045)
Observations	5688	7625	13,313	5775	7751	13,526

Notes: The table presents results from Poisson regression models. The outcome variable is the number of livestock owned by the household. The risk aversion measure used is the fraction of household members who are risk averse. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE A3 Effect of risk aversion on asset diversification (household assets)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Risk aversion fraction	−1.787(1.086)	.713(.980)	−.689(.748)	.227(1.251)	3.704***(1.191)	.979(.882)
Gender						
Male (ref)						
Female	1.721*(.978)	−2.160***(.809)	.253(.651)	1.497(.978)	−1.936**(.806)	.268(.649)
Age group						
Less than 20 years (ref)						
20–29 years	11.589***(2.433)	8.822***(1.846)	10.372***(1.481)	11.436***(2.415)	8.331***(1.888)	10.245***(1.465)
30–39 years	18.350***(2.500)	14.558***(1.933)	17.123***(1.545)	18.522***(2.493)	14.074***(1.972)	17.118***(1.532)
40–49 years	21.238***(2.587)	16.094***(1.996)	19.725***(1.612)	21.258***(2.562)	15.663***(2.021)	19.695***(1.592)
50–59 years	21.218***(2.590)	14.939***(2.081)	19.218***(1.663)	21.269***(2.571)	14.598***(2.129)	19.245***(1.652)
60–69 years	17.419***(2.791)	13.777***(2.128)	16.596***(1.744)	17.403***(2.747)	13.623***(2.160)	16.808***(1.715)
70 years +	19.294***(2.835)	11.690***(2.103)	16.747***(1.757)	19.408***(2.807)	11.280***(2.122)	16.790***(1.738)
Education						
None (ref)						
Primary/JHS/middle	3.657***(1.120)	7.109***(.837)	6.619***(.755)	3.958***(1.106)	7.082***(.820)	6.719***(.748)
Secondary	8.599***(1.440)	10.382***(1.438)	11.368***(1.085)	8.904***(1.427)	10.504***(1.379)	11.532***(1.088)
Tertiary	12.302***(2.070)	15.227***(2.027)	15.377***(1.621)	12.315***(2.050)	15.922***(1.986)	15.385***(1.599)
Occupation						
None (ref)						
Managers/ professionals	2.488(1.681)	5.690**(2.353)	3.674***(1.412)	2.761*(1.663)	4.924**(2.236)	3.717***(1.400)
Technicians/machine operators	3.447***(1.288)	3.396*(2.046)	3.728***(1.173)	3.075**(1.299)	3.319(2.071)	3.435***(1.177)

(Continues)

TABLE A3 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Clerical/service workers	1.101(1.098)	3.392(2.060)	2.624**(1.081)	.949(1.112)	3.098(2.068)	2.383**(1.088)
Armed forces/ elementary occupations	−2.410(1.563)	−1.485(2.933)	−1.278(1.454)	−2.666*(1.570)	−1.368(2.964)	−1.528(1.454)
Skilled agric/forestry/ fisheries	−2.559(1.787)	−2.612(1.609)	−4.679***(1.102)	−2.661(1.809)	−2.862*(1.629)	−4.932***(1.113)
Craft workers	1.256(1.120)	2.019(1.688)	2.392**(1.076)	1.085(1.144)	1.791(1.684)	2.191**(1.082)
Marital status						
Never married (ref)						
Married	18.900***(.814)	17.105***(.787)	18.612***(.623)	18.748***(.835)	16.976***(.786)	18.403***(.632)
Separated/widowed	10.879***(1.037)	8.463***(.900)	10.017***(.739)	10.713***(1.036)	8.328***(.890)	9.812***(.740)
# of children in household	1.094(.685)	−.483(.686)	−.217(.610)	1.064(.669)	−.282(.690)	.001(.590)
# of working adults in household	2.452***(.844)	1.295**(.523)	1.577***(.528)	2.366***(.838)	1.388***(.536)	1.662***(.532)
Household size	6.572***(.522)	4.427***(.285)	5.495***(.292)	6.585***(.516)	4.419***(.289)	5.489***(.292)
Observations	5688	7625	13,313	5775	7751	13,526

Notes: The table presents results from Poisson regression models. The outcome variable is the number of household assets owned. The risk aversion measure used is the fraction of household members who are risk averse. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE A4 Effect of risk aversion on asset diversification (household enterprise)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Risk aversion fraction	.041(.030)	.053*(.028)	.046**(.021)	.039(.029)	.037(.031)	.032(.022)
Gender						
Male (ref)						
Female	.091***(.023)	.044*(.024)	.075***(.017)	.091***(.023)	.044*(.024)	.075***(.017)
Age group						
Less than 20 years (ref)						
20–29 years	−.069(.241)	.239***(.062)	.084(.133)	−.059(.235)	.235***(.062)	.086(.131)
30–39 years	.091(.245)	.298***(.062)	.203(.134)	.103(.239)	.298***(.063)	.208(.132)
40–49 years	.157(.240)	.283***(.063)	.237*(.132)	.172(.234)	.281***(.064)	.243*(.130)
50–59 years	.110(.246)	.270***(.063)	.211(.135)	.127(.240)	.270***(.064)	.218(.133)
60–69 years	.159(.244)	.237***(.063)	.211(.133)	.188(.239)	.234***(.064)	.225*(.132)
70 years +	.192(.249)	.223***(.066)	.219(.137)	.191(.243)	.231***(.067)	.222(.135)
Education						
None (ref)						
Primary/JHS/middle	.012(.034)	.106***(.024)	.076***(.021)	.010(.034)	.106***(.024)	.075***(.021)
Secondary	−.089*(.047)	.041(.040)	−.003(.031)	−.092**(.047)	.041(.041)	−.005(.031)
Tertiary	−.203***(.045)	.013(.044)	−.094***(.030)	−.206***(.045)	.011(.044)	−.096***(.030)
Occupation						
None (ref)						
Managers/professionals	.064(.045)	.155**(.068)	.107***(.038)	.050(.045)	.156**(.068)	.098**(.038)
technicians/machine operators	.217***(.038)	.262***(.068)	.246***(.035)	.199***(.039)	.259***(.067)	.233***(.035)
Clerical/service workers	.403***(.034)	.643***(.048)	.487***(.028)	.395***(.035)	.652***(.048)	.484***(.029)
Armed forces/elementary occupations	.154**(.065)	.098(.063)	.151***(.052)	.137**(.064)	.097(.061)	.139***(.051)

(Continues)

TABLE A4 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Skilled agric/forestry/fisheries	−.069*(.039)	.016(.031)	−.058**(.023)	−.089**(.039)	.012(.031)	−.069***(.024)
Craft workers	.469***(.037)	.655***(.053)	.548***(.032)	.456***(.038)	.651***(.052)	.540***(.032)
Marital status						
Never married (ref)						
Married	.196***(.029)	.233***(.028)	.211***(.020)	.195***(.029)	.236***(.028)	.212***(.020)
Separated/widowed	.076**(.038)	.176***(.034)	.118***(.025)	.071*(.038)	.177***(.033)	.115***(.025)
Num. of children	.021(.017)	−.005(.013)	.008(.011)	.024(.017)	−.005(.014)	.010(.011)
Num. of working adults	.180***(.016)	.084***(.011)	.127***(.010)	.185***(.016)	.085***(.011)	.130***(.010)
Household size	.028***(.007)	.028***(.004)	.028***(.004)	.027***(.006)	.028***(.004)	.028***(.004)
Observations	5688	7625	13,313	5775	7751	13,526

Notes: The table presents results from Poisson regression models. The outcome variable is the number of different household enterprises owned. The risk aversion measure used is the fraction of household members who are risk averse. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

APPENDIX B: INDIVIDUAL-LEVEL REGRESSIONS

TABLE B1 Effect of risk aversion on asset diversification (household belongings)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	−.034(.096)	.034(.059)	.007(.059)	.046(.124)	.180***(.069)	.122(.077)
Gender						
Male (ref)						
Female	−1.597***(.081)	−1.499***(.069)	−1.559***(.054)	−1.605***(.081)	−1.507***(.066)	−1.568***(.053)
Age group						
Less than 20 years (ref)						
20–29 years	2.551***(.088)	1.674***(.048)	2.136***(.053)	2.537***(.087)	1.671***(.049)	2.126***(.053)
30–39 years	3.822***(.093)	2.369***(.058)	3.154***(.058)	3.833***(.091)	2.372***(.058)	3.162***(.057)
40–49 years	4.492***(.118)	2.695***(.078)	3.674***(.075)	4.474***(.115)	2.694***(.076)	3.668***(.073)
50–59 years	4.833***(.148)	2.837***(.092)	3.932***(.091)	4.837***(.149)	2.816***(.090)	3.927***(.091)
60–69 years	5.026***(.160)	2.994***(.117)	4.134***(.104)	5.023***(.158)	2.983***(.115)	4.125***(.102)
70 years +	4.727***(.237)	2.565***(.126)	3.687***(.131)	4.760***(.232)	2.565***(.124)	3.702***(.127)
Education						
None (ref)						
Primary/JHS/middle	.687***(.117)	.528***(.055)	.668***(.060)	.716***(.115)	.519***(.054)	.675***(.059)
Secondary	1.060***(.158)	.674***(.123)	.971***(.098)	1.081***(.160)	.662***(.120)	.978***(.100)
Tertiary	1.733***(.157)	1.364***(.133)	1.589***(.103)	1.727***(.157)	1.354***(.136)	1.576***(.105)

(Continues)

TABLE B1 (Continued)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Occupation						
None						
Managers/ professionals	2.510***(.148)	2.085***(.185)	2.166***(.108)	2.572***(.147)	2.076***(.188)	2.207***(.108)
Technicians/machine operators	2.381***(.143)	1.413***(.122)	1.879***(.096)	2.375***(.141)	1.406***(.122)	1.874***(.096)
Clerical/service workers	2.302***(.121)	1.485***(.121)	1.935***(.085)	2.306***(.118)	1.486***(.121)	1.941***(.084)
Armed forces/ elementary occupations	1.529***(.202)	.576***(.151)	1.104***(.136)	1.548***(.198)	.637***(.156)	1.133***(.134)
Skilled agric/forestry/ fisheries	1.693***(.205)	.896***(.072)	1.136***(.079)	1.701***(.214)	.886***(.072)	1.133***(.080)
Craft workers	2.348***(.132)	1.503***(.108)	1.924***(.088)	2.357***(.128)	1.501***(.108)	1.936***(.086)
Marital status						
Never married (ref)						
Married	1.324***(.084)	1.012***(.068)	1.123***(.056)	1.319***(.082)	1.018***(.067)	1.120***(.054)
Separated/widowed	1.737***(.150)	1.072***(.098)	1.384***(.096)	1.713***(.145)	1.077***(.097)	1.372***(.093)
Num. of children	.221***(.049)	.091***(.030)	.169***(.030)	.219***(.048)	.087***(.030)	.164***(.029)
Num. of working adults	−.967***(.067)	−.375***(.033)	−.654***(.038)	−.969***(.066)	−.378***(.033)	−.659***(.037)
Household size	−.089***(.022)	.026**(.012)	−.025*(.013)	−.091***(.022)	.023**(.012)	−.026**(.013)
Observations	**14,460**	**23,267**	**37,727**	**14,721**	**23,684**	**38,405**

Notes: The table presents results from Poisson regression models. The outcome variable is the number of household assets owned. The results are presented at the individual level. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE B2 Effect of risk aversion on asset diversification (household enterprise)

	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	.001(.011)	.017**(.008)	.009(.007)	.014(.011)	.019**(.009)	.017**(.007)
Gender						
Male (ref)						
Female	.130***(.013)	.066***(.011)	.101***(.008)	.130***(.012)	.066***(.010)	.101***(.008)
Age group						
Less than 20 years (ref)						
20–29 years	.495***(.072)	.274***(.032)	.391***(.035)	.501***(.072)	.269***(.033)	.388***(.035)
30–39 years	.601***	.285***	.449***	.606***	.278***	.445***
	(.073)	(.034)	(.036)	(.073)	(.035)	(.036)
40–49 years	.610***(.074)	.292***(.035)	.456***(.036)	.614***(.074)	.284***(.035)	.451***(.037)
50–59 years	.616***(.075)	.295***(.034)	.461***(.037)	.620***(.075)	.287***(.035)	.455***(.037)
60–69 years	.612***(.075)	.259***(.035)	.441***(.037)	.625***(.075)	.250***(.035)	.441***(.037)
70 years +	.586***(.076)	.244***(.040)	.417***(.039)	.585***(.075)	.242***(.039)	.413***(.039)
Education						
None (ref)						
Primary/JHS/middle	−.002(.016)	.025***(.009)	.014(.009)	−.004(.016)	.024***(.008)	.013(.009)
Secondary	−.063***(.023)	−.036**(.018)	−.046***(.014)	−.069***(.022)	−.042**(.017)	−.051***(.014)
Tertiary	−.112***(.026)	−.051**(.022)	−.078***(.018)	−.113***(.026)	−.058***(.022)	−.080***(.017)
Occupation						
None						
Managers/professionals	.440***(.051)	.254***(.038)	.352***(.033)	.435***(.048)	.267***(.038)	.354***(.031)

(Continues)

TABLE B2 (Continued)

VARIABLES	Lottery measure of risk aversion			Hypothetical investment measure of risk aversion		
	Urban	Rural	All	Urban	Rural	All
Technicians/machine operators	.524***(.047)	.302***(.030)	.421***(.028)	.526***(.046)	.305***(.031)	.425***(.028)
Clerical/service workers	.709***(.034)	.420***(.023)	.572***(.021)	.707***(.033)	.426***(.023)	.574***(.020)
Armed forces/elementary occupations	.592***(.042)	.257***(.031)	.441***(.027)	.591***(.041)	.263***(.030)	.443***(.026)
Skilled agric/forestry/ fisheries	.323***(.054)	.187***(.024)	.264***(.024)	.318***(.053)	.192***(.024)	.264***(.024)
Craft workers	.741***(.034)	.437***(.023)	.597***(.021)	.738***(.034)	.445***(.023)	.600***(.021)
Marital status						
Never married (ref)						
Married	.093***(.015)	.110***(.017)	.097***(.011)	.092***(.015)	.110***(.017)	.097***(.011)
Separated/widowed	.082***(.019)	.113***(.020)	.093***(.013)	.081***(.019)	.114***(.019)	.093***(.013)
Num. of children	.014**(.006)	−.001(.004)	.007**(.003)	.015**(.006)	−.001(.004)	.008**(.003)
Num. of working adults	−.023***(.006)	−.006*(.003)	−.014***(.003)	−.022***(.006)	−.007*(.004)	−.013***(.003)
Household size	−.000(.002)	.004***(.001)	.002(.001)	−.000(.002)	.004***(.001)	.002(.001)
Observations	**14,345**	**23,114**	**37,459**	**14,597**	**23,529**	**38,126**

Notes: The table presents results from Poisson regression models. The outcome variable is the number of household enterprises owned. The results are presented at the individual level. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE B3 Effect of risk aversion on asset diversification (household belongings, with interaction terms)

	Lottery measure of risk aversion			Hypothesis investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**Urban**
Risk aversion						
Not risk averse (ref)						
Risk averse	.040(.137)	.187*(.096)	.110(.089)	.103(.149)	.206*(.112)	.151(.104)
Gender						
Male (ref)						
Female	−1.586***(.146)	−1.271***(.114)	−1.460***(.098)	−1.643***(.156)	−1.483***(.132)	−1.605***(.112)
female*risk averse	−.164(.166)	−.331**(.131)	−.234**(.111)	−.105(.168)	−.065(.132)	−.060(.117)
Age group						
Less than 20 years (ref)						
20–29 years	.459***(.083)	.460***(.068)	.446***(.054)	.460***(.082)	.457***(.067)	.445***(.054)
30–39 years	1.947***(.162)	1.513***(.102)	1.743***(.102)	1.983***(.156)	1.510***(.103)	1.765***(.100)
40–49 years	2.688***(.192)	1.873***(.119)	2.329***(.119)	2.680***(.185)	1.872***(.118)	2.330***(.116)
50–59 years	3.063***(.212)	1.977***(.131)	2.576***(.127)	3.079***(.209)	1.951***(.134)	2.578***(.127)
60–69 years	3.026***(.222)	2.056***(.156)	2.589***(.141)	3.055***(.217)	2.051***(.155)	2.604***(.139)
70 years +	2.406***(.255)	1.422***(.141)	1.902***(.146)	2.434***(.248)	1.421***(.143)	1.917***(.144)
Education						
None (ref)						
Primary	1.240***(.144)	.920***(.067)	1.111***(.070)	1.264***(.142)	.909***(.066)	1.116***(.070)
Secondary	1.715***(.176)	1.029***(.157)	1.461***(.115)	1.723***(.176)	1.030***(.154)	1.462***(.117)
Tertiary	2.884***(.200)	3.014***(.253)	2.900***(.153)	2.871***(.199)	2.975***(.260)	2.876***(.154)
Occupation						
None (ref)						
Managers/ professionals	2.931***(.203)	3.239***(.336)	2.953***(.172)	3.012***(.200)	3.207***(.323)	3.006***(.169)

(Continues)

TABLE B3 (Continued)

	Lottery measure of risk aversion			Hypothesis investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**Urban**
Technicians/machine operators	2.758***(.175)	2.058***(.180)	2.543***(.135)	2.757***(.174)	2.018***(.178)	2.530***(.134)
Clerical/service workers	2.059***(.128)	1.198***(.125)	1.835***(.095)	2.059***(.127)	1.189***(.125)	1.831***(.094)
Armed forces/ elementary occupations	1.265***(.204)	.290*(.154)	.885***(.145)	1.279***(.201)	.343**(.161)	.909***(.143)
Skilled agric/forestry/ fisheries	1.370***(.203)	.636***(.062)	.841***(.071)	1.378***(.209)	.626***(.063)	.839***(.073)
Craft workers	2.206***(.127)	1.407***(.126)	1.954***(.091)	2.214***(.125)	1.400***(.125)	1.960***(.090)
Marital status						
Never married (ref)						
Married	1.448***(.115)	1.407***(.095)	1.416***(.080)	1.437***(.111)	1.405***(.094)	1.406***(.078)
Separated/widowed	2.341***(.224)	1.446***(.130)	1.957***(.147)	2.310***(.216)	1.450***(.130)	1.940***(.143)
Num. of children	.208***(.045)	.090***(.024)	.169***(.026)	.205***(.045)	.090***(.024)	.168***(.025)
Num. of working adults	−.611***(.050)	−.220***(.024)	−.366***(.029)	−.608***(.050)	−.221***(.025)	−.367***(.029)
Household size	−.069***(.019)	.014(.009)	−.019*(.010)	−.069***(.019)	.012(.009)	−.020*(.010)
Constant	−.088(.246)	−.659***(.128)	−.546***(.127)	−.165(.230)	−.646***(.145)	−.564***(.128)
Observations	**14,460**	**23,267**	**37,727**	**14,721**	**23,684**	**38,405**

Notes: The outcome variable is the number of household enterprises owned. The results are presented at the individual level. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE B4 Effect of risk aversion on asset diversification (household enterprise)

	Lottery measure of risk aversion			Hypothesis investment measure of risk aversion		
VARIABLES	**Urban**	**Rural**	**All**	**Urban**	**Rural**	**All**
Risk aversion						
Not risk averse (ref)						
Risk averse	−.003(.014)	.016(.011)	.006(.009)	.025*(.014)	.016(.013)	.025**(.010)
Gender						
Male (ref)						
Female	.087***(.022)	.050***(.012)	.069***(.013)	.119***(.021)	.051***(.016)	.093***(.014)
Female*risk averse	.012(.024)	.003(.015)	.009(.015)	−.030(.023)	.002(.019)	−.021(.016)
Age group						
Less than 20 years (ref)						
20–29 years	.031***	.046***	.037***	.033***	.046***	.037***
	(.011)	(.009)	(.008)	(.011)	(.009)	(.008)
30–39 years	.152***(.018)	.072***(.016)	.115***(.013)	.153***(.018)	.070***(.017)	.115***(.013)
40–49 years	.169***(.024)	.079***(.019)	.126***(.015)	.166***(.023)	.075***(.019)	.123***(.015)
50–59 years	.163***(.025)	.076***(.017)	.122***(.016)	.162***(.025)	.072***(.017)	.119***(.016)
60–69 years	.107***(.028)	.017(.018)	.065***(.016)	.118***(.027)	.014(.018)	.069***(.016)
70 years +	.031(.026)	−.011(.019)	.015(.016)	.027(.025)	−.009(.019)	.014(.016)
Education						
None (ref)						
Primary	.006(.024)	.049***(.009)	.041***(.010)	.003(.023)	.049***(.009)	.039***(.010)
Secondary	−.060**(.028)	−.037**(.017)	−.034**(.015)	−.066**(.027)	−.041**(.017)	−.038***(.014)
Tertiary	−.117***(.028)	−.053**(.022)	−.077***(.017)	−.121***(.028)	−.060***(.022)	−.080***(.017)
Occupation						
None (ref)						
Managers/professionals	.107***(.023)	.119***(.027)	.115***(.019)	.104***(.021)	.128***(.027)	.117***(.017)

(Continues)

TABLE B4 (Continued)

VARIABLES	Lottery measure of risk aversion			Hypothesis investment measure of risk aversion		
	Urban	Rural	All	Urban	Rural	All
Technicians/machine operators	.134***(.025)	.147***(.040)	.142***(.021)	.136***(.025)	.146***(.039)	.145***(.021)
Clerical/service workers	.450***(.014)	.501***(.021)	.471***(.011)	.448***(.014)	.504***(.021)	.471***(.011)
Armed forces/elementary occupations	.220***(.032)	.086***(.023)	.167***(.023)	.220***(.032)	.089***(.022)	.168***(.023)
Skilled agric/forestry/ fisheries	.003(.019)	.027***(.008)	.013(.008)	−.003(.019)	.028***(.008)	.011(.008)
Craft workers	.495***(.019)	.556***(.023)	.519***(.015)	.492***(.019)	.568***(.022)	.522***(.015)
Marital status						
Never married (ref)						
Married	.075***(.013)	.104***(.014)	.089***(.010)	.075***(.013)	.105***(.014)	.089***(.010)
Separated/widowed	.105***(.027)	.128***(.020)	.118***(.017)	.105***(.027)	.130***(.019)	.118***(.017)
Num. of children	.000(.007)	−.007*(.004)	−.003(.004)	.001(.006)	−.007*(.004)	−.003(.004)
Num. of working adults	−.010**(.005)	−.001(.003)	−.004(.002)	−.008*(.005)	−.002(.003)	−.003(.002)
Household size	.003(.002)	.003***(.001)	.002**(.001)	.002(.002)	.003***(.001)	.002**(.001)
Constant	−.084***(.028)	−.125***(.014)	−.118***(.014)	−.102***(.029)	−.126***(.016)	−.131***(.015)
Observations	14,460	23,267	37,727	14,721	23,684	38,405

Notes: The outcome variable is the number of household enterprises owned. The results are presented at the individual level. For each risk aversion measure, results are presented for rural, urban and for the total sample. Standard errors are reported in parentheses. All standard errors were clustered at the enumeration area level.

***$p < .01$.

**$p < .05$.

*$p < .1$.

APPENDIX C: ASSETS USED IN THE ANALYSIS

Household belongings

1. Furniture (stuffed)
2. Furniture (not stuffed)
3. Sewing machine
4. Coal pot (kerosene stove)
5. Electric stove
6. Gas stove
7. Refrigerator
8. Freezer
9. Air conditioner
10. Fan
11. Radio
12. Radio cassette
13. CD player
14. Home theatre
15. VCD/DVD/mp3/mp4 player/ipod
16. Desktop computer
17. Laptop
18. Printer
19. Computer accessories
20. Digital camera
21. Satellite dish
22. Washing machine
23. Television
24. Video camera
25. Electric iron
26. Bicycle
27. Motor
28. Car
29. House
30. Land
31. Shares
32. Boat
33. Outboard motor
34. Microwave
35. Food processor/blender
36. Vacuum cleaner
37. Rice cooker
38. Toaster
39. Kettle
40. Heater
41. Box iron
42. Mobile phone
43. Tablet
44. Generator

45. Jewelry
46. Clothes
47. Clock/watch
48. Cooking utensils
49. Plantation
50. Bed

Livestock

1. Draught animals
2. Cattle
3. Sheep
4. Goats
5. Pigs
6. Rabbits
7. Other livestock
8. Chicken
9. Guinea fowl
10. Turkey
11. Duck
12. Ostrich
13. Other poultry
14. Sea fishing
15. Fish farm
16. Snail farm
17. Grass cutter
18. Bee keeping
19. Dogs
20. Cats
21. Guinea pig
22. Dove
23. Other animal

Household enterprise

1. Household enterprise