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# Determinants of financial risk attitude among the handloom micro-entrepreneurs in North East India

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## ABSTRACT

The rural non-farm micro-entrepreneurial activities in the informal sector hold significance in generating employment, removing poverty, and income inequality. The handloom industry in India holds a distinctive place in the Indian economy as it is the second largest provider of rural employment after agriculture. The North Eastern states of India accounts for more than 65 percent of the total handloom households in India. However, with only 4.26 percent of the total working looms utilized for commercial purposes, the industry is beset with manifold problems such as obsolete technologies, unorganized production system, low productivity, inadequate working capital, and weak market linkages. Therefore, undertaking financial risk plays here a defining role in overcoming these obstacles. Based on the primary data collected from 332 respondents, the present study analyzes determinants of financial risk attitude of the handloom micro-entrepreneurs using the Ordinal Probit model. Education, access to credit, access to training, and individual's income play a crucial role in influencing the risk aversion of the micro-entrepreneurs. These determinants are found to have a more dominant influence in lowering the risk aversion of female micro-entrepreneurs as compared to the male micro-entrepreneurs. The study suggests for providing vocational education and training programs that focus on entrepreneurship education to the rural female micro-entrepreneurs. Besides, it suggests for the provision and implementation of various financial inclusion programs for easy access to credit with proper follow up programs to ensure the efficient utilization of credit, with a primary focus on the female micro-entrepreneurs.

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## 1. Introduction

The rural non-farm micro-entrepreneurial activities in the informal sector hold significance in generating employment, removing poverty, and income inequality. While meeting the developmental goals, an entrepreneur's risk bearing capacity is regarded as an essential characteristic which distinguishes him/her from the other individuals in the field of entrepreneurship. Attitude towards risk of an entrepreneur plays a crucial role in determining the success in his/her entrepreneurial pursuits (Earle & Sakova,

2000; Knight, 1921; Schumpeter, 1939). For an entrepreneur, both the risks and opportunities are like the two sides of the same coin and every step undertaken in conducting the business can be turned into an opportunity which depends on how efficiently an entrepreneur undertakes and manages the associated business and financial risks involved (Blunch, Canagarajah, & Raju, 2001).

In the face of growing market competition resulting from globalization, micro-entrepreneurs operating in the informal sector are less able to take the advantages of the growing market opportunities as compared to the larger firms (Carr, Chen, & Tate, 2000; Sulisty & Siyamtinah, 2016; Wang & Yang, 2016). The rural non-farm micro-entrepreneurs need to produce high-quality products that cater to the needs of the market with increased bargaining power and greater market accessibility to benefit themselves from the emerging markets (Carr et al., 2000; Wang & Yang, 2016). Micro-entrepreneurs need to undertake financial risks regarding investment, production, and marketing to become innovative and

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generate profit. Hence, it becomes necessary to study the financial risk attitude of the micro-entrepreneurs operating in the rural informal non-farm sector. It bears the importance as the rural informal sector often lacks in formal credit access. Moreover, it is also important to know how the attitude towards financial risk influences the investment, production, and earnings, and thus the overall entrepreneurial performance. Existing data reveal that, in developing countries, a majority of the women are more actively engaged in micro-entrepreneurial activities in the informal sector as compared to the men (Carr et al., 2000). Hence, it is also crucial to study the risk attitude of the micro-entrepreneurs across gender.

The handloom industry in India holds a distinctive place in the Indian informal sector as it is the second largest provider of rural employment after agriculture. However, the removal of trade restrictions in the textile sector from January 1, 2005, infused greater competition among the Asian countries like China, India, Bangladesh, Vietnam, Sri Lanka and others to expand their market share. As a result, the Indian handloom industry, which is a part of the textile industry, faced severe competition. The handloom industry in North East India (known as handloom reservoir) is no exception due to numerous problems such as obsolete technologies, unorganized production system, low productivity, inadequate working capital, conventional product range, weak market linkages. Considering the situation, new approaches to entrepreneurial activities such as modern technology adoption, scaling up of different production activities, employment of skilled personals, improvement of business network, etc., have become crucial for entrepreneurial performance with the increased market challenges (Hazarika, Bezbaruah, & Goswami, 2016). In order to undertake such activities, a significant amount of financial capital is required, and thus, the entrepreneurs need to bear the financial risk.

Attitude towards risk is widely believed to affect the individuals' choices in entrepreneurship (Bortamuly, Goswami, & Hazarika, 2013; Bortamuly, Goswami, Hazarika, & Handique, 2014; Hazarika & Goswami, 2014). There exists heterogeneity in the performance of micro-enterprises such as that in the handloom firms in terms of investment, production, marketing, etc., where the variation in risk attitude, especially for the financial risk at individual level play a major role. Thus, there is a need to study how individual's attitude towards financial risk takes shape and what are the responsible factors for such variations. From a gender perspective, the females dominate the total handloom workforce but have a lower participation rate in entrepreneurial activities in the handloom industry in North East India (Bortamuly et al., 2014, 2013; Hazarika & Goswami, 2014, 2016; Hazarika et al., 2016). Moreover, there exists a gender difference in firm performance in the industry, and male-owned firms exhibit a better performance (Bortamuly & Goswami, 2012; Hazarika & Goswami, 2014). Given the relationship between the entrepreneurial risk and reward, do females' preferences for less risky activities explain their lower participation, smaller returns, and smaller size of their operation? Thus, it is also imperative to understand to what extent the factors differently explain the risk attitude across gender.

Given the above perspectives, the present study attempts to analyze the determinants of attitude towards financial risk of the micro-entrepreneurs in the context of the rural, non-farm, and informal sector. For the operational purpose, the study focuses on an under-researched area of handloom micro-entrepreneurship of North East India, a geographic and economic peripheral but strategically important region of India. The region shares more than 4500 km of the international border (about 90% of its border area) with China (Southern Tibet) in the north, Bhutan to the northwest, Myanmar in the east, and Bangladesh in the southwest. India and these border sharing countries comprise of a market of around 2.81 billion people, which roughly constitutes 40 percent of world's

population (Federation of Indian Chambers of Commerce and Industry, 2014). Hence, North East India has immense potential to become the gateway to international trade, and the region's age-old handloom industry can strive to develop its unrealized economic potentialities. Handloom being a widely established cottage industry of North East India employs a large amount of skilled and unskilled workforce, mainly consisting of female workers. As per the Handloom Census of India 2009–10, the handloom sector provides employment to 4.33 million persons engaged on 2.37 million handlooms across the country. Out of the total employment in the industry, there are 2.16 million weavers (49.87%) and 1.55 million handlooms (42.06%) in North East India. The majority of the looms in the North Eastern states are utilized for domestic purposes with a small proportion being used for both domestic and commercial purposes (Ministry of Textile, 2016). Addressing the manifold problems and giving thrust to the development of handloom micro-entrepreneurial activities among the rural masses of the region can uplift their socio-economic condition. The study attempts to throw light on the financial risk attitude of the handloom micro-entrepreneurs operating in the rural informal set-up of North East India which remains an under-researched context of the handloom industry.

## 2. Overview of handloom industry in North East India

The handloom sector, with 3.5 million looms, provides employment to about 4.23 million people in India. North East India accounts for more than 65 percent of the total handloom households in India. In contrast to the national trend that showed a decline in the number of handloom households by 34 percent, there is an increase of 3.4 percent of the handloom households in North East India, from 1.46 million in 1995–96 to 1.51 million in 2009–10 (NCAER, 2010). The region has a congenial climate for the healthy growth and development of the sericulture industry, covering Mulberry, Oak Tassar, Eri, and Muga silk. North East India holds the unique distinction of being the only region producing these four varieties of silk. The region contributes 15 percent of the India's total silk production and produces 100 percent of Muga, 99 percent of Eri, 60 percent of Oak Tassar, and 1 percent of Mulberry silk in the country. Assam is the 4th largest silk producing state in India (Central Silk Board, 2015).

The micro-entrepreneurial activities in the region are at an early stage characterized by informality and are unorganized with very less commercialization of the handloom merchandise (Hazarika & Goswami, 2014). According to the 2009–10 handloom census conducted by the National Council of Applied Economic Research (NCAER), despite having the highest number of handloom households, North East India accounts for the lowest percentage of looms operating for commercial purpose. Out of the total working looms in the region only 4.26 percent is used entirely for commercial purposes (NCAER, 2010). While the traditional silk producing countries like Japan, Korea, Brazil, and Russia have drastically cut down their production due to different socio-economic reasons, India, taking advantage of the situation, has launched a massive developmental scheme on sericulture. As a result, the export of silk has been registering a steady growth of 30 percent annually for the last few years (Ministry of Textile, 2016). The North East India, given its proximity to the South East Asian markets, has the potential to transform herself into a thriving market hub. With technology upgradation, improvement in design capability, diversification of product lines and value addition, improvement in labor productivity, better access to domestic and export markets, the handloom industry of North East India can compete and make a place for itself in the world market. In order to derive the maximum benefit, the participation of the entrepreneurial community is essential where

their attitude towards risk plays a crucial role towards employing modern approaches in handloom production activities.

### 3. Review of literature

#### 3.1. Risk and entrepreneurial decision making

In the domain of entrepreneurial decision making, risk constitutes to be a vital element. Entrepreneurs often make business and financial decisions under risk and uncertainty. From the economic point of view, the entrepreneurial decision making is viewed as a utility maximization process and heavily depends on the expected benefit. It is a complex phenomenon and believed to be influenced to a larger extent by risk and uncertainty. The associated risk and uncertainty in the entrepreneurship confine to the choice of the industry. It also affects the work effort of the micro-entrepreneurs which is ultimately reflected in the firm performance. In order to simplify the decision-making phenomena, risk and uncertainty are often viewed as a critical element in the context of decision making regarding investment, production, and marketing (Choudhury & Goswami, 2014). Fluctuation in these aspects in the competitive market environment brings more uncertainty to the industry as well as to the firm performance.

Literature suggests that the attitude towards risk is a significant predictor of entrepreneurial success (Earle & Sakova, 2000; Evans & Leighton, 1989; Schumpeter, 1939). It is found that an individual's attitude towards risk depends on his/her perception towards risk. The difference in the risk perception leads to heterogeneity in the risk attitude across individuals that further leads to heterogeneity in entrepreneurial involvement and performance. The entrepreneurial risk and uncertainty are often found in the form of market fluctuations, lack of financial and business knowledge and access, inability in evaluating the costs associated with inputs, and resource limitations (Evers & Mehmet, 1994).

The study focuses on the financial risk attitude of the handloom micro-entrepreneurs. Financial risk can be defined as a combination of different types of risk associated with financial activities. Any variations in the cash-flow, financial outcomes, and firm-value resulting from the influence of market-related factors such as interest rates, input and output prices and market failure lead to financial risk (Blach, 2010). In a narrow sense, it refers to the business risk. It also evolves from the financial leverage or inability to pay interest rates (on loans) in time. Thus, firms that rely most on external financing are likely to face higher financial risks (Gichuki, Njeru, & Tirimba, 2014).

#### 3.2. Factors influencing risk attitude of micro-entrepreneurs

Empirical research in the field of business and entrepreneurship shows that there exist a gender difference in the risk attitude, and typically, the female micro-entrepreneurs are more risk-averse than their male counterpart (Holt & Laury, 2002; Eckel & Grossman, 2008; Neelakantan, 2010; Ivanova Yordanova & Ivanova Alexandrova-Boshnakova, 2011). Studies show that the female micro-entrepreneurs exhibit a higher degree of risk aversion on different financial aspects (Grable, 2000). The more risk-averse attitude of the female micro-entrepreneurs can be explained by their lower level of education and financial knowledge (Adhikari & O'Leary, 2011). It is also found that due to the risk aversion exhibited by the females, the probability to approach banks for loans is less as compared to their male counterpart (Bardasi, Sabarwal, & Terrell, 2011). This demand-side phenomenon highlights the financial risk aversion of the females. Gender biases, inaccessibility to information, family responsibilities, hostile business environment, and psychological factors like lack of

confidence with the consequent insecurity may be its possible causes (Bardasi et al., 2011; Shah, 2013; Singh & Belwal, 2008).

Literature suggests a host of socio-economic and personal determinants such as age, gender, occupation, marital status, income, and expectations which shape one's inclination towards taking financial risks (Adhikary, Pradhan, & Saharia, 2011; Brauw & Eozenou, 2014; Grable, 2000; Lévesque & Minniti, 2006). Literature shows conflicting results for the influence of age on risk attitude. While a few studies suggest a positive relation between age and risk attitude (Brauw & Eozenou, 2014; Lévesque & Minniti, 2006), a few others have found a negative relationship between the two (Adhikary et al., 2011). Adhikary et al. (2011) found that young entrepreneurs are more ambitious and well aware of the importance of modern technologies that motivate them to bear more risk to maximize the profit. In contrast, it is found that, with the increase in age, the accumulated experiences enable one to deal with riskier situations and help him/her to manage the uncertain business issues/challenges (Lévesque & Minniti, 2006). Studies establish that an individual with a higher level of educational attainments is less likely to be risk-averse (Ahn, 2010; Brauw & Eozenou, 2014). An entrepreneur's asymmetric information about future outcomes may lead to personal risk aversion. Hence, education, by directly improving an individual's ability to receive and process information, may lower his/her personal risk aversion. Likewise, through indirect effects via wealth and access to credit, education tends to reduce the risk aversion (Knight, Weir, & Woldehanna, 2003). Similarly, Fairlie and Holleran (2012) found that the initial level of training and supports likely to motivate those entrepreneurs in starting a business who are likely to take more risk. Likewise, the contextual factors such as the family background of self-employment/micro-entrepreneurship positively influence the risk bearing capacity of an entrepreneur (Humbert & Brindley, 2015).

Micro-entrepreneur's family size acts as an important determinant in undertaking risky decisions. Having bigger families with more adult members enables one to take more risks in general as the availability of family labor makes one less vulnerable towards labor shortage (Gong & Yang, 2012). On the contrary, others reveal that a women entrepreneur's family responsibility along with childcare increases her risk aversion and impedes the growth of her firms (Constantinidis, Cornet, & Asandei, 2006). Further, family and friends act as the primary source of support in the start-up stage of a female micro-entrepreneur. Thus, when a family business is taken up by a female entrepreneur by relying on her trusted sources of help, she minimizes the risk of starting up a new enterprise (Brindley, 2005). Another determinant of gender difference in risk attitude is the marital status. Studies show that single women are more risk-averse than single men (Eckel & Grossman, 2008). Married female micro-entrepreneurs with greater family responsibility are found to be more risk adverse (Weber, 2013). In contrast, other studies suggest that the individuals whose spouse is ready to undertake financial risk are more willing to undertake risk than those whose spouse is risk adverse (Grazier & Sloane, 2008). Risk aversion is significantly correlated with household composition, income, and wealth of an individual (Adhikary et al., 2011; Binswanger, 1980, 1981; Yesuf & Bluffstone, 2009). A higher level of income and wealth tend to cushion the negative impacts, and hence, increases one's willingness to take more risk. Risk aversion tends to decrease with increase in competence, capability, confidence, and knowledge (Eckel & Grossman, 2008).

In the context of handloom industry, the financial risk of micro-entrepreneurs lies in investment in raw materials and weaving machinery required to efficiently undertake different handloom activities (Bortamuly & Goswami, 2015; Hazarika et al., 2016). Besides, a very high rate of interest is charged on credit obtained from

the informal financial sources also appears as another source of financial risk for the handloom micro-entrepreneurs (Bhagavatula, Elfring, Tilburg, & Bunt, 2010; Hazarika et al., 2016). Inaccessibility to finance is one of the primary constraints faced by the handloom micro-entrepreneurs in the rural areas of the region. Hence, the micro-entrepreneurs rely mostly on their internal sources of finance like personal savings, family income, and other informal sources like money lenders than the formal sector such as banks to fund their micro-entrepreneurial activities (Hazarika & Goswami, 2014; Hazarika et al., 2016). The attitude of the micro-entrepreneurs towards financial risk plays a significant role in influencing their borrowing decisions from various sources of finance. Hence, it becomes necessary to analyze the financial risk attitude of the handloom micro-entrepreneurs and the roles it plays in determining their entrepreneurial performance.

#### 4. Methodology

##### 4.1. Analytical model

Following the approach of Holt and Laury (2002), the present study uses expected utility theorem characterized by constant relative risk aversion (CRRA) to link the experimental results with economic theory. CRRA is used to measure the risk attitude of the handloom micro-entrepreneurs allowing for parameters that capture the noise. Based on the expected utility model, the form of the CRRA utility function is given as follows.

$$U(y) = y^{1-r}; x > 0 \quad (1)$$

where  $y$  is the choice of winning money, and  $r$  is the coefficient of risk aversion. The specification implies the risk preference for  $r < 0$ , risk neutral for  $r = 0$ , and risk aversion for  $r > 0$ . The natural logarithm is used when  $r = 1$ , and divided by  $(1 - r)$  for increasing the utility when  $r > 1$ .

The dependent variable is derived using the approach of Holt and Laury (2002) involving a discrete category response with ordered alternatives (5 categories from extreme risk-lover to extreme risk-averse). Assuming CRRA, each observed response represents a category of risk aversion in which the true but unobservable risk aversion falls within. The ordered Probit and Logit models have come into relatively extensive use as a framework for analyzing such responses (Brown, Dietrich, Ortiz-Nuñez, & Taylor, 2011; Holt & Laury, 2002).

The present study, to capture the role of socio-economic, demographic, and other important determinants on the risk preference of the handloom micro-entrepreneurs, uses an ordered Probit model as given below.

$$Z_{im}^* = X_i\beta + u_i \quad (2)$$

where  $Z_{im}^*$  is a latent variable measuring the risk attitude of the respondent 'i' in game m, and  $X_i$  is the vector of explanatory variables. The error term ( $u_i$ ) is assumed to be normally distributed.

In the present study, the selection of the determinants of the attitude towards financial risk is based on the subjective expected utility theory (Savage, 1954) and the prospect theory (Kahneman & Tversky, 1979). Driven by these theories and the literature review, a host of personal and contextual determinants are identified to analyze the risk behavior of the handloom micro-entrepreneurs in North East India (Table 1). Within the personal determinants, the present model includes gender, caste, marital status, age, and education (Adhikary et al., 2011; Brauw & Eozenou, 2014; Grable, 2000; Lévesque & Minniti, 2006). Within the contextual determinants, it includes the family size, family business background,

access to training, financial inclusion, bookkeeping maintenance, and income (Adhikary et al., 2011; Fairlie & Holleran, 2012; Grazier & Sloane, 2008; Humbert & Brindley, 2015; Weber, 2013; Yesuf & Bluffstone, 2009).

As gender difference evidenced in risk attitude in previous studies and given that the handloom industry in North East India is dominated by the female workforce, the present study considers gender as one of the important variable (Hazarika & Goswami, 2016; Hazarika et al., 2016). In a low technology based activity like handloom micro-entrepreneurship, a negative relationship between the age and risk-averse attitude is hypothesized. With an increase in age, a micro-entrepreneur tends to accumulate experience that enables one to deal with the riskier environment (Lévesque & Minniti, 2006). Marital status is another variable considered in analyzing an individual's risk attitude. Given the presence of family responsibilities associated with raising children, married individuals with children are more risk-averse than the individuals without children (Weber, 2013). Education and access to training considered in this study reflect the human capital aspects of handloom micro-entrepreneurship which are assumed to have a negative impact on the risk aversion attitude of the micro-entrepreneurs. Education and training may enable entrepreneurs to recognize business opportunities, process information, deal with business challenges and undertake calculated risks (Bhagavatula et al., 2010; Brauw & Eozenou, 2014; Fairlie & Holleran, 2012).

In North East India, the handloom micro-entrepreneurs often operate as home-based family firms and are mostly labor intensive, where family members are engaged in the production activities (Bortamuly & Goswami, 2015). Hence, this study also takes into account family size and family business background as determinants influencing the risk attitude of handloom micro-entrepreneurs. Given that the handloom micro-entrepreneurs operate in a rural informal set-up, this study considers maintenance of bookkeeping for different handloom activities undertaken among the micro-entrepreneurs to reflect their financial literacy. Inaccessibility to finance is one of the primary constraints faced by the handloom micro-entrepreneurs in the rural areas of the region (Hazarika & Goswami, 2014). Financial inclusion and income of handloom micro-entrepreneurs are taken into account to analyze its impact on their financial risk attitude.

The econometric model so defined for the present study is as given below.

$$\begin{aligned} \text{Or, } Z_{im}^* = & \beta_0 + \beta_1 \text{Female} + \beta_2 \text{Caste} + \beta_3 \text{Age} \\ & + \beta_4 \text{Education} + \beta_5 \text{Past business} \\ & + \beta_6 \text{Access to training} + \beta_7 \text{Financial inclusion} \\ & + \beta_8 \text{In Annual income} + \beta_9 \text{Family size} \\ & + \beta_{10} \text{Marital status} + \beta_{11} \text{Bookkeeping} + u_i \end{aligned}$$

Table 1 presents the description of the determinants of attitude towards financial risk in the context of handloom micro-entrepreneurship in North East India.

##### 4.2. Sampling framework and data

The present study is based on primary data collected from 332 handloom micro-entrepreneurs from three North East Indian states. The study used a multi-stage sampling technique. Although the North East India comprises of eight<sup>1</sup> states, the study is

<sup>1</sup> North East India comprises eight states namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim.

**Table 1**  
Description of the determinants of attitude towards financial risk.

Determinant	Description of the determinant	Measurement unit	Expected sign
Female	Gender of the respondent	Binary: Male = 1, Female = 2	+
Caste	Social group of the respondent	Categorical: SC = 1, ST = 2, OBC = 3, General = 4	?
Age	Age of the respondent	In year	–
Age <sup>2</sup>	Square term of age after centering at mean	In number	?
Education	Years spent in school	In year	–
Education <sup>2</sup>	Square term of education after centering at mean	In number	?
Past business	Family background of handloom business	Binary: Yes = 1, No = 0	–
Access to training	Access to institutional training	Binary: Yes = 1, No = 0	–
Financial inclusion	Having a bank account	Binary: Yes = 1, No = 0	–
ln(Annual income)	Natural logarithm of annual income of the respondent	In number	+
Family size	Total number of household members	In number	+
Married	Marital status of the respondent	Binary: Married = 1, Others = 0	–
Bookkeeping	Maintenance of bookkeeping accounts	Binary: Yes = 1, No = 0	–
State	Native state of the respondent	Categorical: Arunachal Pradesh = 1, Assam = 2, and Meghalaya = 3	?

restricted to Assam, Arunachal Pradesh, and Meghalaya only. The selection also represents the states with highly concentrated commercial handloom activities (Assam) against the states with poorly concentrated handloom activities (Arunachal Pradesh and Meghalaya). Assam alone accounts for 1.24 million (44.6%) handloom households, whereas, Arunachal Pradesh and Meghalaya has 0.03 million (1.1%) and 0.01 million (0.4%) of such households respectively (NCAER, 2010). Assam is selected as the state that is little different from the other North Eastern states regarding altitude and topography. In contrast, Arunachal Pradesh and Meghalaya are chosen as a representative of the other North Eastern states, as it is similar in topography to these states. The targeted population of the present study is the micro-entrepreneurs in the handloom industry. For the operational purpose, a handloom micro-entrepreneur is defined as an individual who owns a handloom enterprise with not more than 10 paid employees or working looms in the survey year. Those new enterprises which were yet to complete even one year of operation have not been considered for inclusion in the sample.<sup>2</sup>

The study follows a mixed sampling framework. The selection of the state, districts, blocks, and villages are made based on the commercial concentration of the handloom activities. In order to retain the representativeness of the region, the respondents of the sample survey were selected from a total of 25 villages out of which 10 villages are in two districts namely *Kamrup* (Rural) and *Baksa* of Assam, 7 villages in 2 districts namely *East Siang* and *Papum Pare* of Arunachal Pradesh, and 8 villages in *Ri-Bhoi* district of Meghalaya. The number of respondents from Arunachal Pradesh, Assam and Meghalaya are 84, 153 and 95 respectively. The handloom micro-entrepreneurs selected as respondents for the study are home-based micro-entrepreneurs who operate in a rural informal set-up. Before the primary data collection, at each selected village, a list of existing micro-entrepreneurs so defined was prepared. From the sample framework so defined, a minimum of 10 percent of the total handloom micro-entrepreneurs from each selected village were chosen using the Random Number Table<sup>3</sup> as the ultimate sample units. Data were collected from the micro-entrepreneurs through a face-to-face interview that used a semi-structured interview schedule and lasted for 30–40 min for each respondent. Apart from the interviews, a few focus group discussions

(FGDs) were also conducted for an in-depth analysis of different issues related to handloom micro-entrepreneurial activities. A sample size of at least 300 micro-entrepreneurs was considered as a Rule of Thumb following a few earlier studies from the handloom industry (Bortamuly et al., 2013, 2014; Hazarika et al., 2016; Hazarika & Goswami, 2014, 2016). Finally, a total of 332 micro-entrepreneurs is interviewed of which the shares of the females and the males are 58.73 percent and 41.27 percent respectively.

## 5. Results and discussions

### 5.1. Descriptive statistics

Table 2 presents the descriptive statistics of the determinants of individuals' risk attitude among the handloom micro-entrepreneurs in the North East India. The Table reveals that most of the respondents in the sample have come from Assam (46.1%) as Assam occupies almost 77 percent of the total workforce in the handloom industry in the region. The proportion of the female micro-entrepreneurs in the region is found to be 58.7 percent. The proportion of the same for Arunachal Pradesh, Assam, and Meghalaya are found to be 67.9 percent, 43.1 percent, and 73.8

**Table 2**  
Descriptive statistics of the determinants of attitude towards financial risk.

Determinant	All		Male		Female	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Female	0.587	0.493				
Caste						
SC	0.114	0.319	0.190	0.394	0.062	0.241
ST	0.572	0.495	0.376	0.486	0.680	0.468
OBC	0.078	0.269	0.088	0.284	0.072	0.259
General	0.235	0.425	0.336	0.474	0.164	0.371
Age	39.187	9.573	39.876	9.620	38.703	9.536
Age <sup>2</sup>	91.395	105.266	92.553	104.435	90.582	106.106
Education	7.217	3.856	8.964	3.461	5.990	3.648
Education <sup>2</sup>	14.830	16.816	14.736	16.216	14.896	17.265
Past business	0.482	0.500	0.584	0.495	0.410	0.493
Access to training	0.142	0.349	0.153	0.362	0.133	0.341
Financial inclusion	0.720	0.450	0.708	0.456	0.728	0.446
ln(Annual income)	9.921	0.993	10.525	1.008	9.498	0.730
Family size	5.229	1.698	4.985	1.515	5.400	1.800
Married	0.913	0.283	0.898	0.304	0.923	0.267
Bookkeeping	0.268	0.444	0.416	0.495	0.164	0.371
State						
Arunachal Pradesh	0.253	0.435	0.197	0.399	0.293	0.456
Assam	0.461	0.499	0.645	0.480	0.338	0.482
Meghalaya	0.286	0.453	0.168	0.375	0.369	0.484
Total sample size	332		137		195	

<sup>2</sup> Few earlier studies also have followed similar definition.

<sup>3</sup> The random numbers for choosing the sample unit were generated in Microsoft Excel. For example, in order to get the random numbers from 1 to 500, one can enter the formula '=INT(500\*RAND()) + 1'. The INT eliminates the digits after the decimal, the 500\* creates the range to be covered, and the +1 sets the lowest number in the range.

percent respectively. Females dominate the handloom workforce in North East India. It is found that the share of women in the total handloom workforce in North East India is 98.54 percent, whereas, at the national level, it is 77.94 percent (NCAER, 2010). From the ethnic group perspective, the micro-entrepreneurs from the ST group (85.7%) dominate the sample as apart from the *Bodo* and *Mishing* Community from Assam, both Arunachal Pradesh and Meghalaya are Schedule Tribes dominated. The average age of the handloom micro-entrepreneurs in the sample is found to be 39.19 years. The male micro-entrepreneurs appear to be relatively older compared to their female counterpart across the states.

The level of education is much lower among the micro-entrepreneurs in the North Eastern states. On an average, the micro-entrepreneurs from Arunachal Pradesh, Assam, and Meghalaya spent only 6.57 years, 8.35 years, and 5.96 years in school respectively. It is also found that the females have a lower level of educational attainments (5.99 years) compared to their male counterpart (8.96 years). More than half of the respondents in Assam (63.4%) have a family business background, and the figures are much lower for Arunachal Pradesh (22.6%) and Meghalaya (46.3%). In Assam, particularly in *Kamrup* district, the handloom micro-entrepreneurial activities have been practiced commercially for many generations. However, in other parts of Assam and the rural areas of Arunachal Pradesh and Meghalaya, agriculture being the primary means of livelihood, the handloom micro-entrepreneurial activities by the females, in particular, is carried mostly out of necessity, with no prior history of handloom micro-entrepreneurial practices spanning across generations (Hazarika & Goswami, 2014). Access to institutional training is found to be much lower across the gender and the sample states. Moreover, it was found in FGDs that there is a gap in institutional training that focuses on skill development in terms of weaving of fine intricate designs, using mechanized techniques of production in the remote rural areas. The average family size is found to be 5.23 persons per family. The figure in Assam is lower compared to the other two states. Financial literacy, measured in terms of financial inclusion and bookkeeping maintenance, shows mixed results. While the rate of financial inclusion is impressive across the sample states, maintenance of bookkeeping is found at a much lower level.

## 5.2. Determinants of risk attitude of the micro-entrepreneurs

Estimated model reveals that the gender, caste, education, financial inclusion, and income significantly influence an individual's attitude towards risk (Table 3). In line with the previous studies (Hazarika et al., 2016), the female handloom micro-entrepreneurs appear to be more risk-averse compared to their male counterpart. Females perceive themselves to be less confident and less competent in financial decision-making compared to their male counterpart which can be a result of a general trait leading to a stereotypical attitude that a female possesses less ability to run a micro-enterprise.

Compared to the Scheduled Tribe (ST) category, the micro-entrepreneurs belong to the Scheduled Caste (SC), Other Backward Caste (OBC), and General categories are found to be more risk-averse while undertaking any financial decision regarding the handloom activities. Results indicate that the young male micro-entrepreneurs are more likely to take the risk compared to the old micro-entrepreneurs. It is evident that the young people are more aware of the market situation and importance of adoption of technology and modern practices in their micro-entrepreneurs. In contrast, the older micro-entrepreneurs are reluctant to go after the modern practices and continue with the traditional technologies (Hazarika et al., 2016). However, the study does not find any evidence for a significant influence of age/experience on risk attitude

**Table 3**

Descriptive statistics and the ordinal probit estimates of the determinants of attitude towards financial risk.

Determinant	Ordinal probit results		
	All	Male	Female
Female	0.529***	–	–
Caste: base category - ST			
SC	0.965**	7.240	7.240
OBC	1.260**	7.480	7.480
General	1.191***	7.805	7.805
State: base category -Assam			
Arunachal Pradesh	0.827*	8.459	–0.174
Meghalaya	1.712	9.137	0.854*
Age	–0.005***	0.031*	–0.013
Age <sup>2</sup>	0.001	–0.001	0.001
Education	–0.077***	–0.039	–0.095***
Education <sup>2</sup>	–0.009**	–0.017**	–0.007
Past business	–0.183	0.002	–0.357*
Access to training	–1.209***	–0.880***	–1.434***
Financial inclusion	–0.344**	0.163	–0.561***
Annual income	–0.282**	0.343	–0.687***
Family size	0.032	–0.053	0.056
Married	–0.166	–0.442	–0.431
Bookkeeping	–0.141	–0.576**	0.069
Sample	332	137	195
LR Chi <sup>2</sup>	245.190	105.820	150.780
p-value	0.001	0.001	0.001
Pseudo R <sup>2</sup>	0.169	0.203	0.176
Log likelihood	–604.152	–208.097	–353.402

Note: \*\*\*, \*\*, and \* represent significant at 1 percent, 5 percent, and 10 percent respectively.

of the female micro-entrepreneurs.

Results suggest that the education tends to reduce the inherent risks in handloom entrepreneurial activities by reducing the uncertainty because of an enhanced ability to receive, decode, and understand the related information (Knight et al., 2003). It not only changes the individuals' attitudes towards risk and uncertainty by facilitating new ideas and adoption of new practices, but also improves the productivity, income, and access to credit which provides a safeguard against any unwanted failure of entrepreneurial activity. While its influence is negligible for the male, it significantly and negatively impacts the risk aversion attitude of the female micro-entrepreneurs. It can be seen from the distribution of educational attainments across gender that, while the educational attainments for the males are somewhat similar across the risk groups, the distribution is heterogeneous for the females. Given the stereotypical attitudes of the social system and remoteness, the females are not much encouraged to attend school. Hence, those who attended a higher level of schooling enhanced their ability to receive, decode, and understand information which further tends to decrease their risk aversion attitude.

Similar to education, the influence of having a business background, financially included, and income is found significant and negative in decreasing the risk aversion attitude of the female micro-entrepreneurs. However, the influences of these determinants are not significant for the male micro-entrepreneurs. The estimate shows that the females with a business background are 35.7 percent less risk-averse than those without such background. In the rural areas where females mostly devote themselves to household activities and do not have better access to market information and depend more on the male members of the family for the purchase of the inputs like yarn and *zari* and the marketing of the products in the markets. Hence, female micro-entrepreneurs with a family business background in handloom micro-entrepreneurial activities feel more confident in undertaking the associated financial risk in carrying out their business.

Financial inclusion appears important in shaping one's attitude towards risk. Provision of credit facilities enhances one's capability in mobilizing and allocating the non-financial productive resources. It is found that the females with higher credit access are investing in technology and high-valued production practices. Therefore, the provision and implementation of various financial inclusion programs for easy access to credit with proper follow-up programs should be made to ensure the efficient utilization of credit, with a primary focus on the female micro-entrepreneurs.

The influence of individuals' income is found to be negative and significant on risk aversion attitude of the handloom micro-entrepreneurs. The higher is the income the lower is the risk aversion attitude. From, gendered perspective, it can be seen that financially sound female micro-entrepreneurs are less risk averse compared to others and even to their male counterpart. A higher level of income not only helps a micro-entrepreneur in using skill labor and efficient utilization and management of resources but also provides a safeguard for unwanted business failure. It is also found that the male micro-entrepreneurs are more organized and often keep the business records. As expected, such bookkeeping practices are found to have a negative and significant influence on the risk aversion among the males.

The influence of access to training appears to be negative and significant on risk aversion. Provision of training imparts knowledge and skills and enhances the adoption of technology and modern practices in the entrepreneurial activities. There exist a variation in the degree of use of production techniques and modern managerial practices due to the variation in individuals' risk attitude. Such variability in risk attitude not only related to their willingness to take a risk but also associated with constraints such as labor, raw materials, technology, and credit (Binswanger, 1980). Results also reveal that the influence of training in reducing the risk aversion attitude of the handloom micro-entrepreneurs is more for the females compared to their male counterpart. The estimates indicate that with training facilities, the male and the female micro-entrepreneurs are 88.0 percent and 143.4 percent less risk-averse than that of those without such training facilities. Therefore, the provisions for vocational education and training programs should be enhanced that focus on the entrepreneurship education of the female micro-entrepreneurs in the rural areas.

Turning to locational effects, the micro-entrepreneurs in Arunachal Pradesh (in overall) and Meghalaya (among females) are more risk-averse than the micro-entrepreneurs in Assam. The difference in locational effects can be attributed to the differences in the macro level determinants such as that in financial inclusion, lack of financial knowledge, marketing infrastructure, and economic condition. Reports show that as on March 2012, the number of villages covered by financial inclusion plans is highest in Assam among all the North Eastern states which stood at 683. Whereas, the number of villages covered by financial inclusion plans in Arunachal Pradesh and Meghalaya was 3 and 13 respectively (Reserve Bank of India, 2014). As on March 2010, the number of bank branches in rural Assam was 791, while it was 51 and 126 in rural Arunachal Pradesh and Meghalaya (Ministry of Development of North Eastern Region, 2012). Road connectivity plays an important role in the marketing of products from remote rural areas to the places of commerce. Assam has the longest road network of 35,129 km in North East India, while the figure stood at 14,950 km and 5624 km for Arunachal Pradesh and Meghalaya respectively (Planning Commission, 2012). During the FGDs it was found that the handloom micro-entrepreneurs in the remote rural areas of Arunachal Pradesh and Meghalaya were discouraged to invest in production activities and sell their handloom products due to the inaccessibility to markets. It is found during the FGDs that the handloom micro-entrepreneurs in both Arunachal Pradesh and

Meghalaya possess lower levels of educational attainments, access to credit, and bookkeeping activities as compared to those in Assam.

## 6. Conclusion

From the findings of the study, it can be concluded that with no exception to the established literature, the female micro-entrepreneurs in the handloom industry are more risk-averse compared to their male counterpart. It is also found that the growth of the female-owned micro-enterprises is constrained by insufficient resources and low-valued production. Education not only has a direct influence on reducing the risk aversion attitude through the changes in subjective perception about associated risk and uncertainty but also have indirect effects on improved productivity, income, and access to credit that provides a safeguard against any unwanted failure of micro-entrepreneurial activity. In the presence of the constraints related to the labor, raw materials, technology, credit, and market environment, the access to training can change the individuals' attitude towards risk. The present study also establishes locational effects on risk aversion that the micro-entrepreneurs in Assam are less risk-averse than those in Arunachal Pradesh and Meghalaya. Such differences can be attributed to the differences in aspects such as financial inclusion, marketing infrastructure, lack of financial knowledge, and economic condition. Nevertheless, the study suggests for the provisions for vocational education and training programs that focus on entrepreneurship education towards pro-risk attitude especially for the rural female micro-entrepreneurs. Besides, the provision and implementation of various financial inclusion programs for easy access to credit with proper follow-up programs are also important from the policy perspective to ensure the efficient utilization of credit, with a primary focus on the female micro-entrepreneurs. These findings have contributed to our knowledge on risk behavior of the rural micro-entrepreneurs especially towards financial risk as a demand-side phenomenon. The future research can enrich our understanding of how such behavior can lead to differentiated entrepreneurial performance, especially in a rural and informal context.

The study is not free from limitations. It lacks in incorporating an in-depth analysis on the aspect of social capital and how it influences the financial risk-taking behavior of the handloom micro-entrepreneurs. A case study could have been useful to support the findings of the present study and also to get an insight into the major problems of the micro-entrepreneurs in the handloom industry which is another limitation of the present study. Further, it is confined only to three North Eastern states. Other regions are not considered in the study. There are a few cultural aspects such as social networks, cultural norms and identity, and peer effects across the different regions that may influence the entrepreneur's risk-taking behavior and entrepreneurial performance. The present study has not incorporated these issues which can be a future avenue of research that may bring into light the other dimensions of risk taking behavior of the micro-entrepreneurs.

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