Chapter 3

METHOD

This chapter describes the research methodology adopted to address the research objectives underlined for the study. The aim of the present research is to test and examine the determinants of stock market participation and the causality relationship among the determinants in the Indian context. In every study, it is essential to apply an appropriate sampling technique and adopt proper methods, so as to achieve the objectives laid down for the investigation. It is more so, especially when an investigation deals with human beings. The selection of method depends upon the problem selected and the kind of data necessary for its solution.

The structure of this chapter is as follows. Section 3.1 is the description of the research design and statistical analysis used in this research. This is followed in Section 3.2 with an explanation of the participants studied. The structure, contents and justification of the instruments used in this study are explained in Section 3.3. Section 3.4 explains the procedure used in this study.

3.1 Research Design

The present study employed a descriptive research design to obtain data by conducting a survey using a questionnaire and suitably designed tasks as described below. The study involved the following variables:

Dependent variables: Stock Market Participation

Independent variables: Cognitive Abilities, Emotional Intelligence, Self-Esteem, Age and Gender

Mediating variables: Loss Aversion, Regret and Risk Preferences

3.1.1 Statistical Analysis

This section discusses the use of statistical techniques used to analyze the data. The statistics tools used in the present study are Structural Equation Modeling and ANOVA.
3.1.1.1. Structural Equation Modeling (SEM)

In order to identify the channels/path through which the independent variable such as Cognitive abilities, Emotional intelligence and Self-esteem influence stock market participation, we conducted a structural equation modeling (SEM). SEM tests the conceptual and theoretical model. In SEM, Independent variables are known as Exogenous variables and Dependent variables are called Endogenous variables. The variables that are directly observed and measured are called a **manifest or measured variables**. The variables that are indirectly measured are called **latent** variables. For example, Cognitive ability is measured by using **General Ability Measure for Adults (GAMA)** in the present study. It has four subscales (Matching, Analogies, Sequence and Construction) and by adding the values of each subscale we get the GAMA score. This total GAMA score is the latent variable while its individual subscale values are the manifest or measured variables. The same applies to all the other independent and dependent variables.

Kline, (2012) have given the following assumptions of SEM:

a) “The presumed cause (e.g., X) must occur before the presumed effect (e.g., Y); that is, there is a temporal precedence. b) There is an association, or an observed covariation, between X and Y. c) There is isolation, which means that there are no other plausible explanations (e.g., extraneous or confounding variables) of the covariation between X and Y; that is, their statistical association holds controlling for other variables that may also effect Y. d) The form of the distribution of the data is known; that is, the observed distributions match those assumed by the method used to estimate associations. e) The direction of the causal relation is correctly specified; that is, X indeed causes Y instead of the reverse, or X and Y cause each other in a reciprocal manner” (p 113).

Confirmatory factor analysis (CFA) is a special case of the structural equation model (SEM). SEM includes two processes, one validating the measurement model which is done by confirmatory factor analysis and second, fitting the structural model carried out by path analysis.
The measurement model of SEM indicates how each latent variable is associated with its measured variable. The value of Cronbach's alpha indicates how close the manifest indicators are related as a group to their respective latent variables. Standardized factor loadings are considered as the construct validity (Ghadi et. al., 2012; Keller et.al. 1998). These are used to assess the extent to which a latent variable is measured by its indicators. Standardized factor loadings are contingent not fixed. The literature indicates that 0.30 is the acceptable limit for the standardized factor loadings. (Li & Ford 2007; Kaplan & Succuzzo, 2007). The composite reliability estimates the extent to which a set of latent construct indicators share in their measurement of a construct, whilst the average variance extracted is the amount of common variance among latent construct indicators (Hair et al., 1998).

Path analysis was first introduced by geneticist Sewell Wright (1921) to investigate the influence of hypothesized models in phylogenetic studies. It is a second subset of structural equation modelling which shows causal relationships between endogenous and exogenous variables. It explores the direct and indirect association among the variables. For non-experimental research it is the pertinent and right method (Heise, 1975; Madu & Akobi, 2014).

LISREL, AMOS, and EQS are the three main software for performing SEM. Amos 21.0 was used for structural equation modeling (SEM) in the present study. It applies standard multivariate analysis methods, regression, factor analysis, correlation, and analysis of variance in the research. In Amos, researchers can feed their model as a path diagram to show hypothesized relationships among the different variables. The software includes various methods of conducting structural equation modeling such as Maximum likelihood estimates, Unweighted least squares, Generalized least squares, Scale-free least squares, and Bayesian estimation. It provides standard errors (SE) and critical ratios (CR) to evaluate the significance of each path estimate coefficients. The estimate is significant if CR is > ±1.96 at p = .05 and ±2.58 at p = .01. Further, if the relationship between the variables is positive then CR will be positive and vice versa.
It provides various absolute model fit indices (Chi square, GFI, NFI and many others) to evaluate how well the model fits the data. Garson suggested that there are various limitations of the chi square test. Therefore, the researchers who conduct analysis using SEM and whose sample size is more than 200 should also consider other fit tests (ex., NNFI, CFI, RMSEA to test the model. (c.f. Shadfar & Malekmohammadi, 2013)

The present study used the following important indices (Table 1) to test the goodness of fit for both measurement and structural model.

Table 1

Fit Indices

<table>
<thead>
<tr>
<th>Indices</th>
<th>Model Fit Criteria</th>
<th>Researcher</th>
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<tbody>
<tr>
<td>Chi Square (CMIN/DF)</td>
<td>Between 2-5</td>
<td>Paswan, 2009</td>
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<tr>
<td>The Goodness-of-Fit (GFI)</td>
<td>A value of GFI = 1.00 indicates perfect fit, .95 a good fit, and .90 acceptable fit.</td>
<td>Joreskob and Sorbom, 1993</td>
</tr>
<tr>
<td>Normed Fit Index (NFI)</td>
<td>Values of .9 or higher indicate good fit</td>
<td>Hu and Bentler, 1999</td>
</tr>
<tr>
<td>Comparative Fit Index (CFI)</td>
<td>Values of .95 (or .9 or higher) indicates good fit</td>
<td>Bentler, 1990</td>
</tr>
<tr>
<td>Tucker Lewis Index (TLI)</td>
<td>Values of .95 (or .9 or higher) indicates good fit and and .90 acceptable fit</td>
<td>Hu and Bentler, 1999</td>
</tr>
<tr>
<td>The Root Mean Square Error of Approximation (RMSEA)</td>
<td>RMSEA of .05 or less indicates good fit .06 to .08 acceptable fit &gt;.08 poor fit</td>
<td>Brown and Cudeck 1993</td>
</tr>
</tbody>
</table>
3.1.1.2 ANOVA

The ANOVA was conducted to confirm the relationship between all the variables and to identify the interaction effect between variables if any.

Individuals having very high and very low scores on cognitive abilities, emotional intelligence, and self-esteem were identified by using the Mean-SD based split technique. The extent of loss aversion, regret, stock market participation, and risk preferences of all participants were measured. These extreme categories were then compared on loss aversion, regret, stock market participation and risk preferences.

A 2x2x2 factorial design was used to analyze the data. A 2 (Gender: male, female) x 2 (Age: 25-40 years, 41-55 years) x 2 (Cognitive abilities: high, low); 2 (Gender: male, female) x 2 (Age: 25-40 years, 41-55 years) x 2 (Emotional Intelligence: high, low); 2 (Gender: male, female) x 2 (Age: 25-40 years, 41-55 years) x 2 (Self-Esteem: high, low) were used.

3.2 Participants

The target group for the present study included professionals from various organizations, businessmen, and teachers. Data was collected from 740 investors of the northern part of India. Generally people shy away from revealing information about their investments. In addition, willingness to participate in the experiment was another concern. Therefore the researcher had to adopt a technique for collecting the data based on the availability of the investors. Participants were selected through non-probability convenience and snowball sampling. Demographic characteristics of the participants are as described below—Gender (Males: 534, Females: 206); Age Groups (Group 1: 25-40 y, Group 2: 41-55 y); Income: (Indian Rupees: 3,00,000 - 9,60,000 annual income); Education (Graduation and above). These two age groups were selected based on the fact that an individual in Indian context starts earning their livelihood at approximately 25 years of age, settles down in his life at the age of 40 and retires at the age of 60. Based on this assumption, two groups were chosen. One age group: 25-40 years, from starting of the job till settlement. The second age group: 41-55 years, after settlement till retirement.
3.3 Instruments

The tools of the present study were adapted or adopted from various sources as described here under. The instruments given below were administered in the printed format (in the form of a booklet). Instruction for each test/questionnaire was provided in the beginning of the test and the sample items were provided by the researcher before conducting the test to make sure that participants understood the instructions thoroughly.

a) **General Ability Measure for Adults (GAMA) (Naglieri and Bardos, 1997):**
Cognitive abilities were measured by using standardized test of General ability measure for adults developed by Naglieri and Bardos (1997). GAMA is a brief, self-administered, nonverbal measure of intelligence. It consists of 66 items which are divided into four types of test items and subscales. These are matching, analogies, sequence, and construction. The scores on the subscales were then added to form a GAMA score.

b) **Trait emotional Intelligence Questionnaire (TeiQUE) (Petrides and Furnham):** Emotional Intelligence was measured through (TeiQUE) developed by Petrides and Furnham (2006). This is a 30-item questionnaire divided into four subscales: well-being, self-control, emotionality, and sociability. Individuals responded to TeiQUE on a 7-point Likert scale. The raw score of each subscale was then added to form the emotional intelligence (EI) score.

c) **Self-Esteem (Rosenberg, 1965):** Self-esteem was measured by using standardized test of Rosenberg self-esteem scale developed by Rosenberg (1965). It consists of statements dealing with general feelings about one-self. The scale is a ten-item Likert scale and the items were answered on a four point scale ranging from “strongly agree” to “strongly disagree.” The raw score on each item is added to form a self-esteem score.

d) **Loss aversion:** To measure loss aversion, we used the modified version of the lottery choice task developed by Gachter, Johnson and Hermann (2010) which was originally developed by Fehr and Goette (2007). Individuals had to decide whether they wanted to accept a sure outcome or the lottery (Appendix A). Loss aversion was measured by investors’ switching point from sure outcome.
to choose the lottery. Higher the switching point, higher is the subject’s loss aversion.

Loss aversion is measured using risky choice task based on cumulative prospect theory (Tversky & Kahnerman 1992). The participant will show the indifference between accepting and rejecting the lottery, if \( w^+(0.5)v(G) = w^-(0.5)\lambda_{\text{risky}}v(L) \).

where \( L \) denotes the loss in a given lottery and \( G \) the gain; \( v(x) \) is the utility of the outcome \( x \in \{G, L\} \), \( \lambda_{\text{risky}} \) denotes the coefficient of loss aversion in the risky choice task; and \( w^+(0.5) \) and \( w^-(0.5) \) denote the probability weights for the 0.5-chance of gaining \( G \) or losing \( L \), respectively.

I assume that \( w^+(0.5) = w^-(0.5) \) as given by probability weighting function proposed by Prelec (1998).

Therefore, \( v(G)/v(L) = \lambda_{\text{risky}} \).

The above ratio defines an individual’s implied loss aversion in the lottery choice task. Moreover, a frequent assumption on \( v(x) \) for small amounts is linearity that means \( (v(x) = x) \) is also applied. Finally, we get a very simple measure of loss aversion:

\[ \lambda_{\text{risky}} = \frac{G}{L}. \]

According to Gachter et al., (2010) the lottery choice task experiment used in the present study measures the loss aversion and not the risk aversion. Risk aversion cannot explain choice behaviour in small-stakes risky prospects. According to expected utility theory, people in such gambles should be risk neutral, that is, people should accept lotteries 1 to 5 which have a positive expected value in this risky choice task. However, it was observed that low-stake gambles with a positive expected value were rejected. Therefore, this lottery task indicated the loss aversion and not the risk aversion.
In the previous studies single item was used to measure the presence or absence of loss aversion (Kahneman, 1993). However, in the present study investigator was interested in measuring the extent of loss aversion which could be measured only by lottery choice experiment devised by Gachter et al. (2010)

e) **Regret:** Regret inducing situation given in Ratner and Herbst (2005) study was adapted and modified for the present study. Investors were asked to read the situation in which they had to invest Rs. 50000 with one of the two brokers (Broker A and Broker B) for a period of one year. After taking the decision, investors were asked to judge whether their decision was right or wrong if the broker chosen by them failed after one year. Following participants’ response to the regret inducing situation, the decision regret scale (O’ Connor, 1996) was administered to gauge the extent of regret experienced by the investors (Appendix B).

The author wanted to measure the extent of regret of the investors in their investment decisions. Therefore, in order to make investors regret, the researcher adapted and modified Ratner and Herbst (2005) regret inducing situation and then the extent of regret experienced by the investors was gauged using decision regret scale (O’ Connor, 1996). This scale is widely used in other studies (Sheehan et al., 2013; Brehaut et. al., 2003).

f) **Stock market participation (SMP):** It was measured by a self-designed questionnaire which consisted of 4 items that elicited how much the investors had invested in stocks, how much their investments were in equities and shares (Appendix C). Participants had to choose one of the four or five options which suited them the best for each item. Each item in the questionnaire was coded from 1 to 5 according to the number of options in each question, and then they were totalled up to get scores of stock market participation with higher scores indicating higher stock market participation.

We have not come across any well defined questionnaire for measuring the extent of stock market participation. In view of this a questionnaire was designed for the present study.

The investigator constructed a questionnaire for measuring the extent of stock market participation. First, in most of the studies related to stock market
participation, secondary data was used. However, in India secondary data is not readily available. Second, only one item scale related to absence and presence of stocks was available in the literature. The researcher did not find any standardized questionnaire in the literature which could specifically measure the extent of stock market participation. Therefore, the researcher constructed stock market questionnaire which could elicit level of stock market participation. The factor loading for these four items are in acceptable range. The psychometric properties are already given in table 2.

g) **Risk Preference**: A questionnaire was used to measure the extent of risk preference of the investors. Investors had to choose the best from the *five* options given for each of the seven questions (Appendix D). Each question was coded from 1 to 5 according to number of options in each question and then they are totaled up to get the scores of risk preferences, with higher scores indicating higher risk preference. The questions asked to elicit the information about the preferences were derived from questions generally asked by financial planners and advisors from the sites such as humfauji.com and duswealth.com (sought permission) to measure the risk tolerance of their clients or customers.

The researcher could not find any standardized questionnaire in the literature that could measure the extent of risk preferences. The items which were actually measuring the extent of risk preferences were chosen from questions used by the financial planners and advisors to measure the risk tolerance of their clients or customers.
3.4 Procedure

The present study used self-administered survey. The researcher approached different financial and non-financial organizations in Punjab and requested the related authorities permission for data collection. The purpose of the study was duly explained to the authorities in advance. After obtaining permission from the authorities, the researcher approached individual investors and asked for appointment for their voluntarily participation. Participants signed the consent form stating their willingness to participate in the present study and they were also informed that all the information provided by them will be kept strictly confidential.

All the subjects were tested individually. Refreshments were given to all the participants after completing the testing session. The scoring of the collected data was done as per the manuals of the respective tests.

Thus, the data was analyzed using SPSS (versions 21.0) and AMOS (versions 21.0) in the present study. The results were interpreted in the light of different conceptual frameworks.