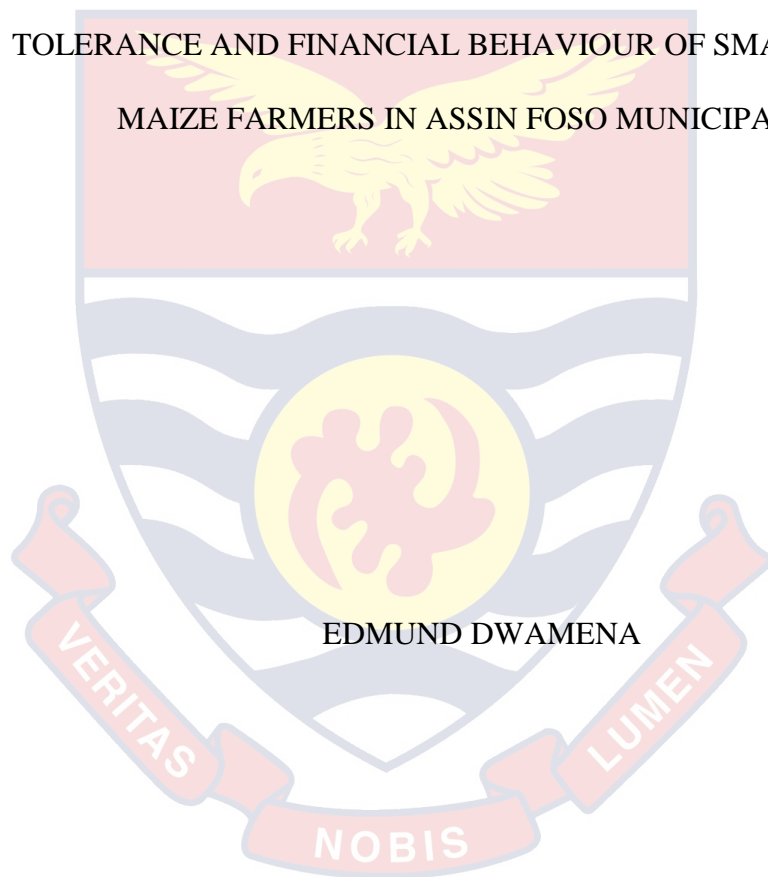UNIVERSITY OF CAPE COAST

INFLUENCE OF PERSONALITY TRAITS ON FINANCIAL RISK

TOLERANCE AND FINANCIAL BEHAVIOUR OF SMALLHOLDER

MAIZE FARMERS IN ASSIN FOSO MUNICIPALITY

EDMUND DWAMENA

2021

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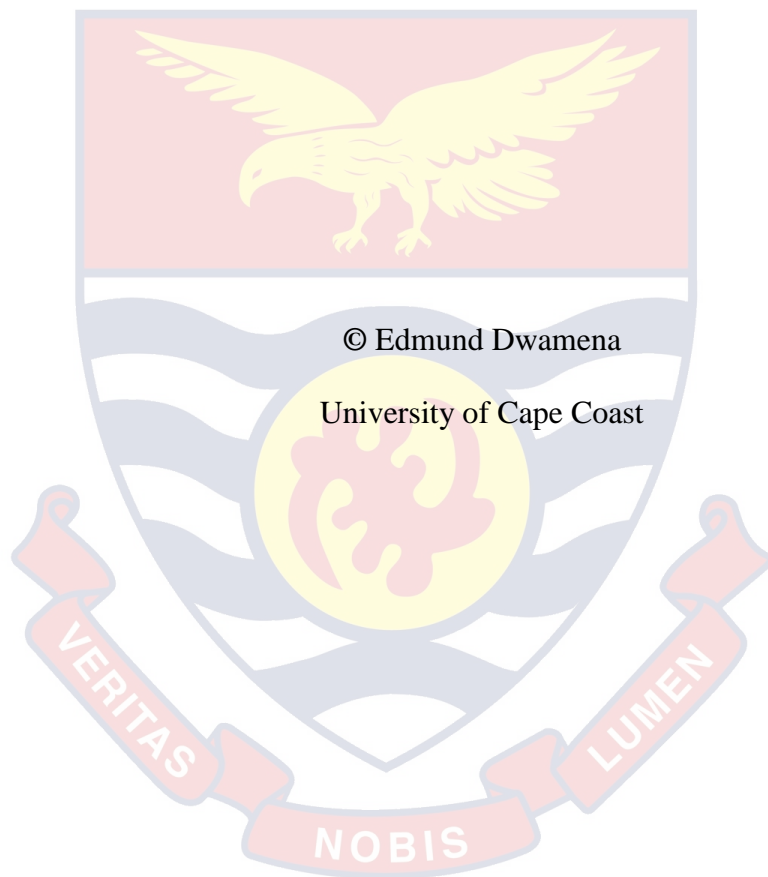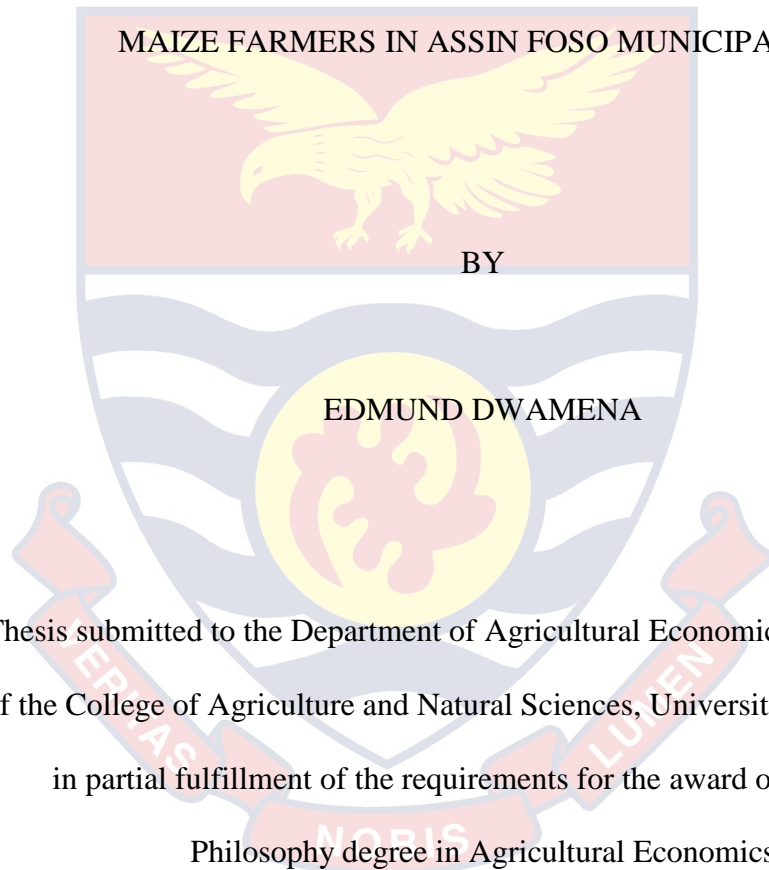University of Cape Coast

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TOLERANCE AND FINANCIAL BEHAVIOUR OF SMALLHOLDER

MAIZE FARMERS IN ASSIN FOSO MUNICIPALITY

BY

EDMUND DWAMENA

Thesis submitted to the Department of Agricultural Economics and Extension

of the College of Agriculture and Natural Sciences, University of Cape Coast,

in partial fulfillment of the requirements for the award of Master of

Philosophy degree in Agricultural Economics

SEPTEMBER 2021

**DECLARATION**

**Candidate's Declaration**

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.


Candidate's Signature:..................................................... Date:...........................
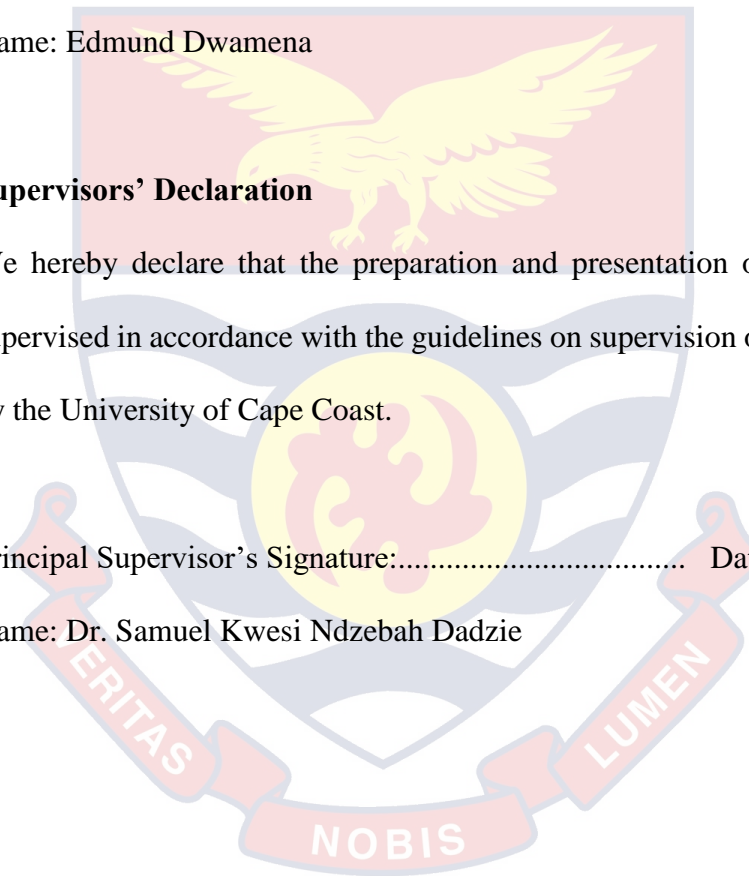
Name: Edmund Dwamena


**Supervisors' Declaration**

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.


Principal Supervisor's Signature:.................................. Date:........................

Name: Dr. Samuel Kwesi Ndzebah Dadzie

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## ABSTRACT

Assessing the influence of personality traits on smallholder maize farmers' financial risk tolerance and financial behaviour is vital because agriculture is capital driven. This research aimed to examine the link between personality traits and financial risk tolerance of the farmers; examined the relationship between financial risk tolerance and financial behaviour; assessed the influence of personality traits on financial behaviour and lastly, examined the link that exist between the personality traits, financial risk tolerance and financial behaviour. The study was conducted using the cross-sectional research design. Primary data was gathered from 320 farmers who were selected using the Multi-stage sampling technique. The data was collected using a structured interview schedule. The data was analyzed using descriptive statistics (mean, standard deviation, frequencies and percentages) and inferential statistics (Endogenous Switching Regression, Tobit model and the Structural Equation Modeling). It was revealed in the study that personality traits affect the financial risk tolerance of farmers. Again, Financial Risk Tolerant Farmers have on average a higher saving ratio than Financial Risk Intolerant Famers. Also, openness and emotional stability trait significantly affected farmers' savings ratio. Lastly, financial risk tolerance exerts a significant mediation effect on personality traits and financial behaviour of farmers. Based on findings, it can be concluded that personality traits and financial risk tolerance affect the financial behaviour of farmers. The study recommends that, agricultural investment advisors of financial institutions should take into consideration the financial risk tolerance levels and personality of farmers when rendering investment advice.

**KEYWORDS**

Agriculture

Financial behaviour

Financial risk tolerance

Maize

Personality traits

Smallholder farmer

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## DEDICATION

I dedicate this thesis to my Dad, Mum, Agnes and William.

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## LIST OF ABBREVIATIONS

AGRA        Alliance for a Green Revolution in Africa

EMH         Efficient Market Hypothesis

ESRM        Endogenous Switching Regression Model

EUT         Expected Utility Theory

FAO         Food and Agriculture Organization of the United Nations

FB          Financial Behaviour

FRT         Financial Risk Tolerance

GDP         Gross Domestic Product

GSS         Ghana Statistical Service

MoFA        Ministry of Food and Agriculture

PLS-SEM     Partial Least Squares Structural Equation Modelling

PT          Personality Traits

SEM         Structural Equation Modeling

SRID        Statistics, Research and Information Directorate

PHC         Population and Housing Census

AVE         Average Variance Extracted

VIF         Variance Inflation Factor

HTMT        Heterotrait-monotrait Ratio of Correlations

CR          Composite Reliability

## CHAPTER ONE

## INTRODUCTION

Agriculture plays a crucial role in the economy of Ghana. This makes the critical decisions taken on the farm relevant to agricultural sector growth. However, these farm level decisions are influenced by a number of factors and so this study uses the Big Five Personality Factors and examines it influence on the smallholder maize farmer's financial risk tolerance and financial behaviour. Specifically, the study examines the relationship between personality traits and financial risk tolerance of the farmers; evaluate the relationship between financial risk tolerance and financial behaviour of the farmers; estimate the relationship between personality traits and financial behaviour of the farmers; lastly, assess the link that exist between personality traits, financial risk tolerance and financial behaviour of the farmer. Cross-sectional data taken from the maize farmers were used to answer the research questions set for the study. The conclusions drawn from the study would direct government, policymakers, agro-finance institutions and researchers in financial and investment management.

### Background to the Study

The contribution of agriculture to the global economy is enormous. The Food and Agricultural Organization (FAO) specifies that over 60% of the current world population of about 7 billion rely on agriculture for sustenance. Correspondingly, Word Bank (2012) indicates that, the agricultural sector account for about 2.8% of the overall global income and as a result, the sector remains essential in the lives of about 1.3 billion people who are engaged in farming. The figures given at the global level is reflective of the relevance of

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agriculture to Sub-Saharan African. What is interesting about Sub-Saharan Africa is the fact that, smallholder farmers depend on 80% of most agricultural lands and this can be translated into the fact that 2.5 billion people depend directly on agriculture and a fraction of this same population which is about 1.5 billion people are smallholder farmers (FAO, 2012).

Smallholder farmers typically manage majority of the farms in Ghana. It is worth noting that, out of about 28 million population of Ghana, about 46% reside in the countryside and the greater share of the populace forming 85% are smallholder farmers (AGRA, 2017). The Statistical Research and Information Directorate (SRID) within the Ministry of Food and Agriculture (MOFA) explains that, about 60% of most farm dimensions are smaller than 1.2 hectares whereas 25% of the farm sizes range from 1.2 to 2.0 hectares and the few farm sizes which are more than 2.0 hectares constitute about 15% (SRID, 2001). This explains that, Ghana's agriculture is largely smallholder in nature.

Overall, agriculture industry contribution to Gross Domestic Product (GDP) in Ghana has declined from 21.1% in 2017 to 19.7% in 2018 as compared to the service and industry sector which contributed to 46.3% and 34% respectively (Ghana Statistical Service [GSS], 2019). The declining trend of agriculture's contribution to GDP can be associated to key sector challenges and the growing extractive and services sector which is causing a phenomenon known as the "Dutch Disease effect". The challenges the agricultural sector faces in Ghana includes, but is not limited to, low yield as a result of fertilizer underutilization, limited access to agro input, markets and high cost of credit which constrain access to credit by smallholder farmers (AGRA, 2017).

The crop subsector contribute about 75% of the total output of the agricultural sector to Ghana's GDP and the 25% left, account for fishing, forestry and livestock (World Bank Group, 2018). Among the crops cultivated within the sub region, maize is generally regarded as one of the staple crops cultivated in all parts of the country. Among the regions in Ghana, central region ranks fourth based on a three-year (2014 - 2016) average maize production (Ministry of Food and Agriculture (MOFA), 2017). Studies show that, over 50% of rural farm households in Ghana grow maize under traditional rain-fed conditions as well as use rudimentary technology in the cultivation, whereas, 16% of urban households are into maize production (Quiñones & Diao, 2011; Scheiterle & Birner, 2018). For that reason, maize contribute significantly to the diet of consumers and therefore serve us a food security crop in the country.

Generally, managing small and medium scale agribusiness is capital driven and it involves investment and risks, resource mobilization and infrastructural setups (Barry & Robison, 2001). As a result, the absence of finance in the agribusiness sector has the potential to impede the growth of the agricultural sector. Smallholder farmers need regular financing to be able to acquire fixed capital such as agricultural tools and implements, machinery as well as working capital such as labour, seedlings, fertilizer and other agro input. In so doing, smallholder farmers will be able to expand the total cultivated acreage to boost the total output of the agricultural sector. However, farmers' behavioural nature when it comes to money mangement plays a vital part in this pursuit. Therefore, the research aims to investigate the influence of personality traits on the financial behaviour and financial risk tolerance of smallholder maize farmers.

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Farmers, just like any other individual involved in a business venture have non-congnitive skill that has the ability to influence economic decisions taken on the farm. Largely, economist view personality traits, which is how people are, as a kind of non-congnitive skill. Personality characters describes behaviour patterns, emotions and thoughts that appear to be fairly consistent over time and in specific circumstances (McCrae & Costa, 2003). This suggest that, personality traits plays a vital role when it comes to understanding a person. A significant amount of research have employed various ways to measure personality traits, however, the prominent among them is the Five-Factor Model (FFM) or the Big Five Model (Allik, 2005; Lee & Ashton, 2004; McCrae & Costa, 1997; Weller & Thulin, 2012). The Big Five categorises personality traits into five major groups which are; extraversion (communicatbility), agreeableness (harmony seeking), neuroticism (emotional stability), conscienctiousness (dutifulness) and openness to experience. OCEAN is the mnemonic used for the five traits. A feature of the Big Five model which makes it very appealing for empirical research is the remarkable stability that it shows in an individual overtime (Heineck & Anger, 2010; Mueller & Plug, 2006). To add to, personality traits of working-age persons are steady over a four-year period (Cobb-Clark & Schurer, 2012). This unique characteristic help prevent the reverse causality that plagues other concept since it does not vary under different life events. Personality trait retains strong predictive power and has the ability to influence a number of economic outcomes. Also, research findings suggest that personality traits correlate with a person's risk-taking behaviour and risk tolerance (Zaleskiewcz, 2001). Similarly, Grable (2000) asserts that, when people are taking financial decisions, their personality traits are observed

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to be positively related to risk tolerance. So, this study focuses on how personality traits affect financial risk tolerance and financial behaviour of smallholder maize farmers.

Indeed, several factors affect financial risk tolerance but personality traits are considered the most prevalent of them all (Weller & Tikir, 2010). Hence, this research directs a part of its lens on the link between personality traits and financial risk tolerance. Financial risk tolerance is the highest possible degree of uncertainty that individuals are able to tolerate when taking a financial decision and that phenomenon exists in all aspect of social and economic life (Grable, 2000). Farmers, like any other businessperson, faces the challenge of risk which is peculiar to the agribusiness enterprise. Largely, risk associated with agribusiness includes uncertainty in yields, price volatility which poses market risk (for instance, growing maize for exports has caused price volatility in domestic markets (Choudhary, Christienson, D'Alessandro, & Josserand, 2020), weak state institutions, lack of risk mitigation strategies or tools and climate variability (Swaminathan, 2007). So, the farmers' ability to accept this risk would have an influence on their financial behaviour. Thus, financial risk tolerance forms an aspect and contribute immensely when it comes to farm risk. Generally, financial risk tolerance is categorized as risk seeking and risk averse (Ferreira, 2015). So, an understanding of a farmer's risk tolerance threshold is vital, this is because it has an influence on financial behaviour or the management of funds on the farm.

Financial behaviour deals with the effects of psychology on the decision-making process of individuals and its resulting effects on markets (Sewell, 2007/2010). Behavioural finance put prominence on the effect of

psychological factors in decision making and their specific outcome. This suggest that, behavioural economics seeks to combine the ideas from psychology with the principles of economics (Kahneman, 2003). The core aspect of behavioural economics posits that humans, and in this context farmers' behaviour, are quasi rational (also known as bounded rationality) as opposed to traditional or standard finance theories which asserts that humans are rational and therefore select optimal choices. This implies that, individuals make financial decisions based on emotional impulses, previous experience, values, errors, and sometimes intellect. For this reason, studies conducted within behavioural economics has the potential to give us the needed understanding on what influences the behaviour of smallholder farmers and how the level of risk play a critical role in their choice of investment, capital, resource allocation and financial decisions (Hanna, Gutter, & Fan, 2001). Therefore, given the strong stability and explanatory power of traits, this study specifically settles on the use of personality trait to determine its influence on financial risk tolerance and financial behaviour of smallholder farmers.

**Statement of the Problem**

The agricultural sector in Ghana is capital driven and the sector depend largely on natural conditions. As a result, the smallholder farmer makes series of financial decisions in anticipation of obtaining better returns amidst the numerous risks within the agricultural sector. Therefore, assessing what influences smallholder farmers' financial risk tolerance and financial behaviour is crucial to agricultural sector growth.

In an attempt to explain what influences financial decision making, traditional financial theorist assert that individuals make financial decisions

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devoid of behavioural biases, however, behavioural finance theorist purport that financial decision making is influenced by behavioural biases such as personality traits (Ackert, 2014). Therefore, this study would contribute to the discussions on what factors significantly explain financial risk tolerance and financial behaviour of smallholder farmers in Ghana.

Also, previous research works have linked personality traits with various economic outcomes and behaviour which include investment (Mayfield, Perdue, & Wooten, 2008) , money management (Donnelly, Lyer, & Howell, 2012), earning (Mueller & Plug, 2006) and risky behaviours (Zuckerman & Kuhlum, 2000). In the Ghanaian context, personality traits have been linked with organizational commitment (Korankye, Ahakwa, Anaman, & Darter, 2021), technical efficiency and technology adoption (Ali, Bowen, & K, 2019) and conflict and performance (Ameyaw, Yue, & Asare, 2020). In view of these literature reviewed, it clearly shows that much attention has been devoted to personality trait studies in areas like organizational, consumer behaviour and financial context compared to the agricultural context. Then again, it is hard to find a study that links personality traits to financial risk tolerance and financial behaviour in the agricultural context, hence this study is conducted to fill the research gap.

Moreover, previous studies have also treated financial risk tolerance as an exogenous variable (Pak & Mahmood, 2015; Pinjisakikool, 2017) as against it being endogenous in nature and that leads to misleading results (Lokshin & Sajaia, 2004). Therefore, the use of the endogenous switching regression model to examine the influence of financial risk tolerance and financial behaviour of the maize farmers (second specific research objective for the study) contribute

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towards bridging the research gap.

**Purpose of the Study**

The purpose of this research is to examine the influence of personality traits on financial risk tolerance and financial behaviour. The study uses the Big Five personality traits which are openness, conscientiousness, extraversion, agreeableness, emotional stability as the independent variables and some socioeconomic variables as control. Financial risk tolerance represents the mediating variable between personality traits and financial behaviour. The dependent variable in this research was financial behaviour. Then, examine the link between personality traits and financial risk tolerance as well as analyze the relationship between financial risk tolerance traits and financial behaviour. Also, it examined the relationship between personality traits and financial behaviour. The study would go ahead to examine the link between personality traits, financial risk tolerance and financial behaviour. The unit of analyses for this research were smallholder maize farmers within Assin Foso Municipality of Ghana.

**Research Objectives**

The general objective of the research is to assess the influence of personality trait on financial risk tolerance and financial behaviour of small holder maize farmers in the Assin Foso Municipal.

Specific objectives of the study are;

1. To examine the relationship between personality traits and financial risk tolerance of smallholder maize farmers in the Assin Foso Municipality.

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2.  To evaluate the relationship between financial risk tolerance and financial behaviour of smallholder maize farmers in the Assin Foso Municipality.

3.  To estimate the relationship between personality traits and financial behavior of smallholder maize farmers in the Assin Foso Municipality.

4.  To assess the link between personality traits, financial risk tolerance and financial behaviour of smallholder maize farmers in the Assin Foso Municipal.

**Research Questions**

The research question for the study are as follows;

1.  What is the relationship between the personality traits and financial risk tolerance of smallholder maize farmers in the Assin Foso Municipality?

2.  How does financial risk tolerance influence financial behaviour of smallholder maize farmers in the Assin Foso Municipality?

3.  How do personality traits influence financial behaviour of smallholder maize farmers in the Assin Foso Municipality?

4.  What is the link between personality traits, financial risk tolerance and financial behaviour of smallholder maize farmers in the Assin Foso Municipal?

**Significance of the Study**

The outcome of this research would deliver valuable information and help address the gap that exist in literature when it comes to the influence of personality traits on financial risk tolerance and financial behaviour of smallholder farmers. As per the literature reviewed earlier, it shows that inconsistent results exist in some findings related to the predictions of the

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changes in financial risk tolerance. For that reason, the research is intended to help explain previous findings and hypotheses and also attempt to further advance and add to a generally accepted understanding of the influence of personality traits on financial risk tolerance and financial behaviour of smallholder farmers.

Second, the study would redound to benefit smallholder farmers by offering insight into the relevance of personality traits in financial decisions. This is because, in most situations, farmers are not conscious of their psychological biases and are prone to make costly mistakes when taking financial decisions. So, the findings from this research would enable farmers to become aware of the weaknesses associated with specific personality type and this in turn would help farmers take financial decisions in a more conscious way thereby increasing on the quality of decisions and by this means reap full benefits from those decisions. Zweig (2011), affirms this by specifying that, being aware of yourself as an investor helps you to gain more and build more wealth.

The vital information derived from this thesis will be of immense help to financial services providers, financial consultants, and policy makers. Understanding a farmer's personality disposition and decision making would position financial service providers well when it comes to fashioning out financial products that better suit a farmer's personality type and this would improve the performance and service delivery of financial institutions. The outcome of this research would offer valuable insight for financial consultants to analyze the risk tolerance of farmers and suggest financial products that suit their risk tolerance and personality.  Policymakers would be informed and can

base on this research to assist in the formulation of policy frameworks that would educate and train financial advisors and also develop appropriate measures that would manage financial products that fulfills the risk acceptance of the different personality trait of the smallholder farmer.

This study contributes to literature by reporting new data and document subjective evaluations on the influence of personality traits on financial risk tolerance and financial behaviour of smallholder farmers. Further, this study will provide supplementary comprehension and aid future researchers who will consider the link between personality traits and economic factors such as financial satisfaction and financial risk perception. As an extra significance to this study, although much further-fetched, this research may contribute to agribusiness start-up initiatives that are actively interested in risk seeking behaviour among the unemployed dependents of smallholder farmers. This is supported in the finding of Weber and Blais (2002) who claim that, individuals can be selected on the basis of their perceived risk profiles, particularly when it comes to start-up ventures.

**Delimitations**

This study included only smallholder maize farmers in Assin Foso Municipality within the central region of Ghana. All other crop farmers were excluded from the unit of analysis. The focus of the study was on the influence of personality traits on financial risk tolerance and financial behaviour of smallholder maize farmers. The main attention of this study was on the influence of personality traits on the variables under study, although a recognition was given to the effect of some socioeconomic factors on the study's main variables. The interview schedule included closed-ended and

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open-ended questions. The philosophical framework for this study is positivism and this implies that, the research is limited by the data collected and the interpretation of the data should be done objectively.

**Limitations**

This thesis, however, is subject to five limitations that can be addressed in ongoing and future studies. First, the research was conducted in one country which is Ghana, thus, generalizability of the findings should be carefully weighed. Second, the study data set include only smallholder maize farmers and as such may not fully reflect all smallholder farmers in Ghana. Third, this study paid attention to only personality traits, although individual biases such as past experiences, family upbringing, level of financial literacy and financial condition may have significance effect on financial risk tolerance and financial behaviour. Fourth, the research disregarded the influence of social and cultural factors even though it may have influence on decision making in Ghanaian setting. Notwithstanding, the study contribute valuable insights towards the comprehension of the link between personality traits, financial risk tolerance and financial behaviour in a country with a mixed economic system where capitalist and socialist elements are incorporated in the system. Fifth, due to time and financial constraints, the cross-sectional research design was used for this research.

**Definition of Terms**

Personality traits: These are features of an individual which expresses people's typical thought patterns, feelings and actions.

Financial risk tolerance: Financial risk tolerance is the highest level of risk an individual is prepared to consider when undertaking a financial decision that

includes the likelihood of a loss.

Financial behaviour: This is a human behavior or action that is applicable to the management of funds.

Smallholder farmer: This is a farmer who has a farm holding equal to or less than 2 hectares, relies largely on family labour, produces part of the farm's output for family consumption and the rest for sale.

**Organization of the Study**

This research was ordered into five chapters. The first chapter comprised of the background of the study, statement of the problem, research goals, significance of the study, limitation, delimitation and definition of key terms in the study. Chapter two covered review of literature which includes theoretical framework, conceptual framework and empirical underpinning of the study. Chapter three provided details about the research methods. It includes the research design, sampling, data collection procedures and analyses. Chapter four comprised of results and discussion of the study's findings. Finally, chapter five spelt out the summary of the research, conclusions and recommendations.

**Chapter Summary**

This chapter presented an overview of the thesis. It outlined the background to the study which includes brief information that would help to clarify the research goals that the research is intended to accomplish. It also included statement of the problem, purpose of the study, research objectives, importance of the study, delimitation and limitation of the study. Finally, the chapter also provided a contextual interpretation to the different terms used in this study as well as organization of the study.

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## CHAPTER TWO

## LITERATURE REVIEW

**Introduction**

This research investigates the influence of personality traits on financial risk tolerance and financial behaviour of smallholder maize farmers. As a result, this part of the study presents a review of the literature which underpins the research. The literature reviewed includes topics in relations to the theoretical, conceptual and empirical framework of the study.

**Smallholder Farmers and Maize Production**

Smallholder farmers form the majority of farmers in Sub-Saharan Africa (Gollin, 2014). As such, their contribution to food supply within the sub-region cannot be underestimated yet many smallholder farmers live in abject poverty and in rural areas where access to resources and amenities are limited (Maybeck & Redfem, 2014; Rapsomanikis, 2015).  According to FAO (2012), about 80% of farmlands within Sub-Saharan Africa are managed by smallholder farmers. Ghana for instance has majority of its farm holdings being managed by smallholder farmers and the typical land size of these farm holdings are less than 2 hectares although quite a few of the farm units or plantations exceed the 2-hectare threshold (MOFA, 2017). This makes their contribution to Ghana's economy significant.

In Ghana, the major staple crop cultivated and consumed is maize. This is predominently cultivated under rainfed agriculture by smallholder farmers in all the agro-ecological zones of the country. Maize account for 50% of the production volumes of cereals in the country and the chunk of the maize produced goes into food consumption (Akramov & Malek, 2012). Maize also

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serve as poultry feed and an important raw material for the brewing industry. Largely, average yield of maize has being ustable over the years. For instance, the analysis conducted by the Ministry of Food and Agriculture (MOFA) in collaboration with the International Food Policy Research Institute stipulate that, the estimated yield of maize fluctuated from 1.47 to 1.87 million tonnes from 2008 to 2010 and this concurred with the introduction of the Fertilizer Subsidy Programme (FSP) implemented by the government, however, the suspension of FSP in 2014 and reintroduction in 2015 and then subsequent incorporation in the government flagship programme, Planting for Food and Jobs (PFJ) in 2017 gave rise to an increase in maize yield by 67%, translating into an increase in maize output from 1.8 metric tonnes per hectare to 3.0 metric tonnes per hectare (MOFA-IFPRI, 2020; Tanko, 2020). Thus, the 3.06 million tonnes of maize output achieved in 2019 (MOFA, 2020), can be attributed to the supply of inputs such as fertilizer and improved seeds provided under PFJ (MOFA-IFPRI, 2020).

Given the above, it is clearly seen that the contribution of smallholder maize farmers to the Ghanaian economy is significant and as such research conducted to study how their specific traits influence their financial risk and decision making is significant since the outcome of the study can impact policy and move the country towards achieving its development goals.

**Theoretical Framework**

The theoretical framework for this research was informed by a review of previous research works that is considered to be germane when studying the influence of personality traits on financial risk tolerance and financial behaviour

of respondents.  The study elucidated on personality traits theories, traditional and behavioural finance theories.

**Personality Trait Theories**

Personality traits characterizes a persons' everyday pattern of behaviour, thought and emotion that is exhibited in a broad range of circumstances (Novikova, 2013). The concept of personality traits can be traced back to Aristotle (384-322 BC) whose work on "Ethics" shed light on human dispositions that can be described as moral and immoral behaviour and Theophrastus (371-287 BC) whose work on thirty characters or personality types also contributed to the theory of personality traits (Matthews, Deary, & Whiteman, 2003).

Given the contributions of early authors to trait theory, (Allport & Odbert, 1936) went a step further by gathering from an entire English Dictionary an estimated amount of 18000 words which described the personality of an individual. Allport and Odbert categorized these dispositions into cardinal disposition, central disposition and secondary disposition. Cardinal disposition described traits that are evident or dominant in a person's life; Central disposition on the other hand, described traits that are not obvious as cardinal traits but are found to some extent in every individual; Secondary dispositions are exhibited in specific circumstances and are often not stable in an individual.

Due to the overwhelming number of personality-relevant words identified by Allport and Odbert, using it for research purposes would be tedious and so, Cattell (1943) used Allport's work as a baseline to generate a subset of about 4500 personality relevant terms which was later reduced to 35 variables. Further, Raymond B. Cattel conducted a number of oblique factor analyses to

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arrive at what is known as the Sixteen Personality Factor Model (16PF). The 16PF included (1) Warmth (A); (2) Intelligence (B); (3) Emotional Stability (C); (4) Dominance (E); (5) Liveliness (F); (6) Rule-Consciousness (G); (7) Social Boldness (H); (8) Sensitivity (I); (9) Vigilance (L); (10) Abstractedness (M); (11) Privateness (N); (12) Apprehension (O); (13) Openness to Change (Q1); (14) Self-Reliance (Q2); (15) Perfectionism (Q3); and (16) Tension (Q4) (Novikova, 2013). The need for a shorter list of personality descriptors stimulated other researchers to continue with Cattell's work. This led to the identification of the the Five-Factor structure (Tupes & Christal, 1992). The five-factors, also called Cattell's five Global Factors were replicated in other studies and was found to be relatively recurrent and dominant (Digman & Takemoto-Chock, 1981; Norman, 1963). These factors, according to Norman, (1963), were labelled as follows; Extraversion (talkative, energetic); Agreeableness (cooperative, good-natured); Conscientiousness (dependable, orderly); Emotional Stability (calm); and Culture (intellectual). These personality factors in due course became recognized as the "Big Five" (Goldberg, 1981). The name "Big Five" represented broad range of personality factors and emerged from Cattell's Five Global Factors. However, Cattell's work was criticized for having some clerical errors and the excellent correspondence Cattell claimed the factors had across methods, like self-reporting and rating, were questioned by other authors (Digman & Takemoto-Chock, 1981).

Hans Eysenck contribution to personality theory led to the development of the hierarchical model of personality which involves three main factors. That is, Extraversion – Introversion; Neuroticism – Emotional Stability and

Psychoticism - Socialization (Novikova, 2013). Extraversion describes individuals who mainly receive pleasure outside of themselves whereas Introversion is a personality trait which describes individuals who generally resort to internal emotions rather than external stimulus. Emotional Stability or Neuroticism describes individuals who have the long-term propensity to be in a pessimistic or anxious state. Psychoticism characterizes individuals with an impulsive behaviour, antisocial or interpersonal hostility. Eysenck used factor analysis with orthogonal rotation to arrive at the three personality traits and the traits were measured using the Eysenck Personality Questionnaire (EPQ), that is, self-report questionnaire. Research have revealed that the magnitude of neuroticism and extraversion scores come near to to a normal curve, while psychoticism are significantly skewed to low scores (Matthews, Deary, & Whiteman, 2003).

Friedman and Rosenman (1959) are also two important personality theorist who worked with three categories of men to come out with the Type A, Type B and Type C personality traits. Basically, Friedman and Rosenman selected the men based on their behavioural patterns towards their work and compared it with their medical samples. The results showed that, men with Type A personality traits are seven times more susceptible to heart diseases than Type B and Type C. This was because, Type A individuals are generally observed to be workaholics, driven and impatient. Type B on the other hand were flexible, content and mostly calm whereas Type C were neither Type A nor Type B.

A more contemporary and broad-based personality theory used by this study is the Big Five personality traits which was identified by Goldberg (1981) and its validity confirmed by Goldberg (1990); Costa and McCrae (1992) and

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others. The Big Five personality traits have been broadly used in personality studies and are considered to be largely stable and has the ability to predict many economic outcomes (Cobb-Clark & Schurer, 2012). The Big Five personality traits comprise of Openness to experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism. The Big Five is popularly referred to as OCEAN or CANOE.

Openness is a Big Five Personality dimension which is often linked with individuals with intellectual curiosity and imaginative disposition (Soto, 2018). These individuals are generally observed to be able to take ideas and embrace situations which are completely new and unusual to them. They are also observed to be relatively liberal and their decision-making style is flexible (Robie, Brown, & Bly, 2005). Nekljudova (2019) summarized the openness into six main aspects which includes, open to action (that is, active participation and gratification from novelty), openness to ideas, values, beauty, creativity and emotions.

Conscientiousness describes individuals who are discipline, hardworking, dependable, exercise self-restraint, law abiding and responsible (Roberts, Jackson, Fayard, Edmonds, & Meints, 2009). Conscientiousness is therefore an important trait which predicts most life outcomes. However, individuals who are rated low on conscientiousness are largely seen to disorganized, have inclination towards laziness, undisciplined, and are generally not aware of responsibilities (Bacanli, İlhan, & Aslan, 2009).

Extraversion is a personality trait which describes individuals who have a general inclination towards gregariousness, find it easy to socialize and very much enjoy the company of others (Soto, 2018). Extroverts are often seen to be

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filled with energy, form relationships with others effortlessness, talkers and generally exude an amount of liveliness regularly. These traits also make extroverts sympathetic and optimistic. Introverts on the contrary are reserved and do not have the habit of socializing easily.

Agreeableness is associated with individuals who have prosocial tendencies. Agreeableness reflects an attitude of forgiveness, soft heartedness, good natured and the ability to keep up with positive relations with others (Martins, 2002). Additionally, Agreeable individuals conform to societal norms, uphold religious principles, engage in voluntary work and are more likely to have a stable and a satisfying relationship.

Neuroticism, also called Emotional Stability, describes the tendency for individuals to experience negative emotions such as rage, anxiety, self-consciousness, impulsive behaviour and depressive symptoms (Widiger, 2009).

**Table 1: Summary of the Big-Five Personality Traits**

| Personality Traits | Positive Valence | Negative Valence |
|---|---|---|
| Openness | Creative, curious, intellectual and flexible | Closed-minded and simple |
| Conscientiousness | Responsible, reliable, organized, achievement-oriented | Careless, lazy, disorganized, irresponsible |
| Extraversion | Optimistic, sociable, outgoing, assertive and energetic | Introverted, shy and reserved |
| Agreeableness | Friendly, sympathetic, warm, nice, trusting and forgiving | Selfish, hostile and rude |
| Emotional Stability | Calm, well-adjusted, stable and resilient | Neurotic, anxious, depressed and unstable |

Source: (Parks-Leduc, Feldman, & Bardi, 2014)

Neurotics have pessimistic outlook and tend to experience lower satisfaction in various life domains including job and marriage (Soto, 2018). These challenges associated with neuroticism is attributed to the absence of effective cognitive ability, deficiency in analytical and critical reasoning as well as the inability to fully conceptualize and understand life situations (Pak & Mahmood, 2015). So, their inability to have an effective logical reasoning renders them anxious and scared. Conversely, individuals who are rated low on neuroticism appear to be much more emotionally stable, less susceptible to stress and are less likely to feel anxious and depressed. Although they are low in negative emotional, it is also true that they are not inherently high in position emotion.

Indeed, the relevance of each independent trait in the Big-Five would be useful in ascertaining their influence on financial behaviour and the degree of risk an individual is ready to accept or not.

**Traditional and Behavioural Finance theory**

Researchers have used concept on normative, descriptive and prescriptive approaches to understand what motivates individual decision making so as to understand the thought process of an investor (Raiffa, 1997). Normative analysis stipulates the rational solution to a given problem; descriptive analysis specifies how individual investors actually behave when confronted with an investment decision whereas prescriptive analysis deals with the resources that will aid the investor to be able to achieve results that approximate the ideal outcome propagated by normative analysis. The explanation provided by normative approach coincides with the assumptions provided by traditional (standard) finance theorist - who describes individuals

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as rational, whereas descriptive approach is to behavioural finance theory since they describe individuals as normal. It is worth noting that, the efforts used to apply behavioral finance theory is considered as prescriptive.

Traditional finance theory began in the mid-18th century, (Pompian, 2011), with a primary normative model as the Expected Utility Theory (EUT). The concept of EUT was proposed by Von Neumann & Morgenstern (1944), it was based on the foundation that, when making decisions under risk, consumers or investors ought to select choices which affords them with the greatest expected outcome. In the expected utility context, risk preferences are measured using the shape of consumer's utility function which helps in the categorization of their risk attitudes as reflected in the choices they have made in a given situation. For example, when a consumer is faced with two choices with equal and expected value of, say, a sure income and a lottery and the consumer opt for a sure income, we can say that the consumer is risk averse (Weber & Milliman, 1997). So, a consumer's utility function is assumed to mimic a constant relative risk aversion utility function, such that, the graphical view shows that, as wealth rises, marginal utility increases at a decreasing rate (Grable, 2016). Thus, EUT assumes that individuals are rational and their risk preferences are constant hence this study measures financial risk tolerance in the context of EUT by formulating hypothetical gambles for consumers to choose options that gives them the most utility.

Given the success of EUT, various extension of this framework has been propounded by several researchers, this includes Savage's (1964) Subjective Expected Utility Theory; the Markowitz's (1952) Modern Portfolio Theory which, according to Kapoora and Prosad (2017), describes the diversification of

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some risky securities and a risk-free asset to obtain an optimal portfolio, thereby, making investors develop risk and return trade-offs. The Markowitz Portfolio Theory provided grounds for an important asset pricing models known as the Capital Asset Pricing Model (CAPM). This model set out the correlation that exist between the risk of the asset and the benchmarked anticipated return (Bodie, Kane, Marcus, & Mohanty, 2009). However, this model was abandoned because it gave results which were inconsistent with market efficiency, and so, the three-factor model was then embraced. A number of asset pricing models were formulated on the assumption of market efficiency introduced by Fama (1970) and explained as a market system where the investors value securities rationally, decisions are made out of self-interest and prices of securities fully incorporate and reflect all available information. The Efficient Market Hypothesis (EMH) was successful after it conception but traditional finance theorist could not still explain the disruptions within the market system and that gave rise to behavioural finance theories which relaxes the rational nature of individual decision makers and the efficient market theory proposed by traditional finance theories.

Behavioural finance theory was embraced subsequently because it provided an explanation as to why the anomalies in the market system persisted. Behavioural finance theory posited that, individuals' cognitive and emotional bias play a part in the financial decision-making process. This theory was introduced by Kahneman and Tversky, (1979) and the framework used to analyze financial decision under risk was the Prospect Theory. Though there are a number of frameworks based on behavioural finance theory which includes, Regret Theory, Ellsberg's Paradox, Satisficing Theory, the main theory which

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has become the backbone of behavioural finance and an alternative to EUT is the Prospect Theory (Grable, 2016). In Prospect Theory, value, instead of utility is used to describe gains or losses. So, the value function in the Prospect Theory is replaced with the utility function in EUT. The value function specifies that the intensity associated with certain gains or losses are stronger than others. This suggest that, sometimes, the feeling experienced when an investor runs at a loss is greater than the pleasure derived from gaining an equivalent amount and this is termed as loss aversion. The Prospect theory proposes that individuals do not have a uniform risk attitude and this makes the value function S shaped, where the curve below the horizontal axis which forms a convex shape represent losses but the curve above the horizontal axis which is shape like a concave signify gains. However, the value function for loses which is convex is steep whereas that of concave is not relatively steep. This simply implies that losses loom larger than gains (Kapoora & Prosad, 2017). Therefore, a person's risk tolerance would largely be contingent on how the situation is framed since decision makers exhibit risk aversion when requested to make an option in which the aftermath is framed as gain but when the same choice is framed as loss, decision makers become risk seeking.

Overall, it is worth noting that, the practical application of both traditional finance and behavioral finance may lead to a much better conclusion rather than use each theory in isolation. This study for instance takes into consideration the influence of individual personality traits on financial risk tolerance and then goes ahead to measure financial risk tolerance in the context of the EUT. This method may bring to light the issue of how investors should behave and how they actually behave to cause anomalies in the market system.

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As a result of their behavioral biases which in effect would improve the investment approach of individuals and help them in their management of risk.

**Financial Risk Tolerance**

Risk in the agricultural sector is inevitable, that is why studies conducted to measure the risk tolerance of farmers remain essential to agricultural sector growth. According to Grable (2000), Financial Risk Tolerance (FRT) can be explained within the financial decision domain as the highest amount of risk that a person is likely to accept when making a financial decision and this concept permeates through all aspects of social and economic life. Per this definition, it can be deduced that FRT represent both Risk Aversion and Risk Seeking decision makers. Risk averse individuals prefer stakes that come with high probability of wins and losses with low probabilities compared to risk seeking individuals who have preference for stakes with low probabilities of winning and losses with high probabilities (Keister, 2004) To add to, Gärling, Kirchler, Lewis, and van Raaij (2009) asserts that risk taking in one domain hardly ever relates to risk tolerance in a different domain. This implies that, risk taking in the agricultural sector is rarely related to risk taking in the social or financial domain and that is why this study would be of immense benefit to the agricultural sector.

Another important aspect of risk is the issue of subjective and objective nature of the construct. Subjective risk deals with risk that the decision maker is willing to accept whereas objective risk involves risk that the decision maker is able to take (Van de Venter, Michayluk, & Davey, 2012). According to Larkin, Lucey, & Mulholland (2013) FRT tend to be more of a subjective

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whereas goals, time horizon and financial stability are considered as objective risk.

Several research on the stability of FRT has been conducted over the years. While some researchers indicate that FRT is relatively stable, others present diverging views on the construct. For instance, the research by Yao (2003) suggested that FRT changes substantially over time. Yao worked to identify patterns of FRT in a data collected from 1983 to 2001 using the Consumer Finance Questionnaire and it was established that households in 1989 and 1998 were found to be twice as likely above average risk takers. Likewise, Hoffmann, Post and Pennings (2013) in their research work also reported that, risk tolerance decreased substantially during the Global Financial Crisis (GFC) from 2007 to 2009. However, the changes in the risk tolerance levels were reported to have been temporal.

Regarding the stableness of FRT, it was observed in the study by Roszkowski and Davey (2010) on changes of FRT and risk perception after GFC and it was reported that, there was minimal changes in FRT over time. Several researchers including Gerrans, Faff and Hartnett (2013) had findings which support the finding that FRT is fairly stable over time. This and among others has motivated this study to assume that FRT of its respondents were fairly stable.

Previous studies have demonstrated that demographic, socioeconomic, psychographic and other factors have low to high level of influence on financial risk tolerance. Grable (2016) for instance conducted a comprehensive review of literature consisting of 144 articles published between 1960 to 2014 to ascertain the level of support prior studies have for the link between various individual

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factors and financial risk tolerance. Grable's study discovered that factors such as Gender, being a single male, net worth, financial satisfaction, financial knowledge, income source, income variability, self-esteem, Type A personality trait, sensation seeking and mood have received high support from previous literature with regards to their high influence on financial risk tolerance. Further, factors such as religiosity, household size, occupation, employment status, education income, ethnicity, marital status and age have received moderate support from prior studies concerning its influence on financial risk tolerance. However, homeownership and locus of control have received low amount of influence on financial risk tolerance according to Grable's research. Particularly, aside personality traits being the main independent variable for the study, individual characteristics such as age, gender, years of education, years of farming, access to agricultural extension services and whether the farmer is engaged in any other income generating activities were examined to ascertain it influence on financial risk tolerance and financial behaviour.

Regarding the measurement of financial risk tolerance (Faff, Mulino, & Chai, 2008) identified three main methods of assessing the construct and these includes observing actual investment behaviour, observing choices in experiments and creating scores from questionnaires. Upon reviewing the different forms of financial risk tolerance measures, this study settled on the use of creating scores from questionnaires. The two questionnaires reviewed by this study were the Grable and Lytton's (1999) 13-item scale and the Survey of Consumer Finances (SCF) risk tolerance scale. The two scales were found to be positively correlated (r=54) and the relative reliability of both scales were estimated.  Grable and Lytton reported that the Cronbach $\alpha$ for the 13-item scale

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was 0.75. This finding showed acceptable level of validity and reliability compared to the Survey of Consumer Finances (SCF) risk tolerance item which has an estimated Cronbach α (validity test) within the range of 0.52 to 0.59 (Grable & Schumm, 2010). The 13-item scale has items which measures factors in relation to investment risk, risk as a level of comfort and speculative risk but SCF scale is a single item questionnaire which may not be a good proxy for individual's true risk aversion (Chen & Finke, 1996). As a result, Grable and Schumm concluded that, researchers interested in obtaining a more robust measure of an individual's financial risk tolerance should consider the 13-item scale, hence, this study uses the Grable and Lytton's 13-item scale to measure the financial risk tolerance of smallholder farmers.

**Financial Behaviour**

The attitude and behaviour of an individual towards money management in a financial field is termed as financial behaviour (Joo & Grable, 2004). In Ghana, smallholder farmers, just like other individuals participate in all kinds of financial behaviour in their everyday agribusiness activities and this influence their household financial wellbeing. This further implies that, financial behaviour gives an indication as to how good a farmer or an individual is in managing financial resources such as saving, borrowing, spending, insurance and investment (Sudindra & Naidu, 2018; Hasibuan, Lubis, & Altsani, 2018).

Individual habits relating to money management can be influenced by several factors which includes, but not limited to economic status, marital status, gender, income levels, outlook towards future and knowledge about finance (Sudindra & Naidu, 2018). Similarly, Hira (2012), posit that the financial

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behaviour of individuals are affected by a number of environmental and personal factors. These factors can be categorized under external (macro) and internal (micro) factors. External factors which influence financial behaviour includes inflation, interest rates, unemployment rates and quality of financial products and services whereas internal factors take into account knowledge and skills, attitudes, cultural values and beliefs, and also personal financial resources. Hira goes ahead to state that, personal factors such as a person's psychology, cognitive factors and family history also influence the money management of individuals even though most people have some level of control over these factors. Almlund, Duckworth, Heckman and Kautz (2011) also stipulates that, socioeconomic and demographic characteristics has been studied to ascertain their influence on the financial behaviour over the period, therefore, the attention now has been drawn to the use of non-cognitive factors and personality traits in determining their influence on financial behaviour. It is against this background that the study hypothesizes the relationship between personality traits and financial behaviour.

This study made use of the Dew and Xiao's (2011) Financial Management Behaviour Scale (FMBS) to measure the financial behaviour of smallholder farmers in the country. The study also went ahead to measure the saving ratio of respondents and compared it with the results from the FMBA result. FMBS measures a number of financial behaviour domain which is significant to the study. These domains included cash management (indicating item 17 – 20 on questionnaire), credit management (item 21-23), savings and investment (24-27) and insurance behaviour (item 28-30). Each domain had at least three behavioural measures within the scale. FMBS has been validated

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using a nationally representative sample and has shown a reliability of alpha =
0.81 (Dew & Xiao, 2011). It is relevant to note that a few modifications were
done in the FMBS to suit the research context in order to elicit the maximum
information as possible.

**Empirical Review**

This study reviewed empirical findings from various research. The
empirical review was conducted in four main areas, these include, the
socioeconomic variable effect on financial risk tolerance and financial
behaviour, the relationship between personality traits and financial risk
tolerance, financial risk tolerance and financial behaviour as well as personality
traits and financial behaviour. On the basis of the empirical review, it was
observed that financial risk tolerance may have an influence on personality traits
and financial behaviour, therefore, it was theorised that financial risk tolerance
have a mediating effect on personality traits and financial behaviour. The
empirical review of the study can be found below.

**Socio-Economic Variables Effect on Financial Risk Tolerance and
Financial Behaviour**

The literature reviewed so far point out that, there are a number of
factors, other than personality traits which influence financial risk tolerance and
financial behaviour. Factors such as age, sex, marital status, education and
income have been extensively studied and research findings show that, these
factors influence financial risk tolerance. For instance, studies on sex suggest
that women are observed to be relatively conservative than men and this implies
that women have a higher tendency to make an investment that comes with low
risk (Bernasek & Shwiff, 2001; Cooper, Kingyens, & Paradi, 2014; Grable,

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2000; Hallahan, Faff, & Mckenzie, 2004; Roszkowski & Grable, 2005). The risk averse nature of women can be attributed to the fact that women give birth and take care of children and so they prefer to have security most of the time (Hallahan, Faff, & Mckenzie, 2004). However, other findings suggest that, there is insignificant relationship between gender and financial risk tolerance (Grable & Joo, 2004).

For age, Grable (2016) indicate that, younger individuals tend to be more risk tolerant than older individuals. Other studies show that older indviduals are more risk tolerance than younger individuals (Grable, 2000). However, some studies suggest a negative link between age and financial risk tolerance (Gibson, Michayluk, & Van de Venter, 2013; Grable & Roszkowski, 2008; Yao, Sharp, & Wang, 2011). In contrast to these findings, some studies also showed no link between age and financial risk tolerance and that suggest that age has no influence on financial risk tolerance (Faff, Mulino, & Chai, 2008; Hallahan, Faff, & Mckenzie, 2004). Although, studying demographic variables is not the main focus of the study, a number of them would be used as control varibles to study their influence on the study variables.

Regarding marital status, the literature provide moderate backing for the fact that individuals who are not married, unlike married couples, are more risk tolerant (Grable, 2016). Likewise, other studies also suggest that single individuals have an inclination towards risky ventures (Ardehali, Paradi, & Asmild, 2005; Hallahan, Faff, & Mckenzie, 2004). This can be explained to mean that married individuals tend to incorporate the possibility of future family event such as parenthood and also, individuals with children less risk tolerant than single ones (Chaulk, Johnson, & Bulcroft, 2003; Yao, Sharp, & Wang,

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2011). On the contrary, the findings from others studies indicates that those married are more likely to take on financial risk (Grable, 2000). Notwithstanding, studies from other authors shows an insignificant relationship between marital status and risk tolerance (Grable & Joo, 2004; Haliassos & Bertaut, 1995).

Based on the aforementioned, the literature reviewed indicates that, there are several inconsistencies in the use of socio-economic variables as predictors of financial risk tolerance and financial behaviour, therefore, the study hypothesise that, the omitted variable which would have a significant influence on financial risk and financial behaviour are behavioural biases such as personality traits.

**Personality Traits and Financial Risk Tolerance**

Research findings show a strong predictive power of cognitive factors on various economic outcomes, but significant bias may occur if only cognitive factors are used in explaining various life outcomes (Heckman, 1999). Therefore, this study examined the influence of a non-cognitive factor such as personality traits on financial risk tolerance as one of its specific objectives. Research findings indicate that investor's traits such as openness to experience, extraversion, agreeableness and conscientiousness had a positive relationship with financial risk tolerance, although openness trait had a significant positive relationship with financial risk tolerance (Ferreira, 2015). Personality trait categorization other than the Big Five have been studied and it shows that retail investor's Type A and Type B personality traits have a significant and a positive relationship with financial risk tolerance (Kannadhasan, Aramvalarthan, & Mitra, 2016). Furthermore, a survey on 127 students enrolled in an Investment

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Management Course and faculty members at the KIMEP University, Kazakhstan revealed that, students and faculty members with the agreeableness and conscientiousness trait had a negative relationship with risk tolerance, whereas extraversion, neuroticism and openness to experience had a positive relationship with financial risk tolerance (Pak & Mahmood, 2015). From this finding, only agreeableness and openness had a significant relationship with risk tolerance.

Additionally, a study conducted on 4,026 Dutch population revealed that, extraversion and intellect (openness) had a positive relationship with financial risk tolerance but personality traits such as agreeableness, conscientiousness and emotional stability has a negative significant relationship with financial risk tolerance (Pinjisakikool, 2017). Previous research have established that there is a link between personality traits and financial risk tolerance, for instance, extroverts tend to accept more risks compared to introverts and that maybe due to their outgoing and social nature (Sadi, Asl, Rostami, Gholipour, & Gholipour, 2011). Highly agreeable individuals are observed to be cooperative, warm and considerate and that makes them accept more risks compared to those who score low on agreeableness (Chitra & Sreedevi, 2011). Conscientious individuals are careful and organized and are often observed to take calculated risks, hence conscientious individuals have a negative relationship between financial risk tolerance (Kübilay, 2016; Pak & Mahmood, 2015). These empirical findings therefore suggest that, they maybe a relationship between smallholder maize farmer's personality traits and financial risk tolerance, hence this study aims to answer this research question.

**Personality Traits and Financial Behaviour**

Previous research have demonstrated that there is a link between personality traits and financial behaviour. Pinjisakikool (2017) found out that personality traits indirectly predict financial behaviour. Specifically, Pinjisakikool established that personality traits have a positive but insignificant relationship with savings ratio. Further, Pinjisakikool findings also showed that extraversion had a negative but significant relationship with bond and mutual fund whereas emotional stability was the only trait which had a negative but significant relationship with equity ratio. More so, research finding indicate that personality trait has a link with investment decisions (Crysel, Crosier, & Webster, 2012). This is because agreeable individuals are cooperative, warm and friendly towards others and this nature makes them prone to accepting the views of others and that also implies that, they may rely on experts in their investment decisions. Also, the high optimism expressed by extroverts may lead them to overestimating a potential gain or underestimating a possible loss from an investment decision. Conscientious individuals are careful about investment decisions; they normally conduct extensive analysis about an investment option before they commit to it. Neurotic individuals have anxiety issues and may tend to exaggerate the risks in the event of financial market crisis and also underestimate the returns from financial markets during favourable conditions. Moreover, those with the openness traits have preference for new market information and that allows them to easily diversify their financial portfolios with changes in financial market trends. Similarly, research on the influence of personality traits on financial behaviour of household heads in their late adulthood revealed that, traits such as conscientiousness, risk aversion and

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neuroticism has a significant and positive relationship with stock market participation (Bertoni, Bonfatti, Celidoni, Crema, & Bianco, 2016). The main findings of an investigation of how personality traits and locus of control influence retirement savings revealed that extraversion had a positive relationship with the probability of having savings whereas agreeableness had a negative effect (Schäfer, 2016). From these findings, it indicates that they maybe a relationship between personality traits and financial behaviour of smallholder maize farmers.

**Financial Risk Tolerance and Financial Behaviour**

Previous empirical evidence suggests that financial risk tolerance influence financial behaviour. These two concepts provide an understanding of how individual's risk tolerance level affect their financial investment decisions and general market behaviour. So, an individual's readiness to accept more risk or not would reflect in one's investment decisions. Research on the determining factors of financial risk tolerance and investment behaviour among French and Swedish Business school students suggest a possible link between financial risk tolerance and investment behaviour of the respondents (Massol & Molines, 2015). Likewise, Grable and Lytton (2003) assert that the more cash and bonds one has in a portfolio the more likely one is financial risk intolerant whereas an investment in equity indicate an inclination for high risk since equity comes with much gains and higher risks (Keller & Siegrist, 2006; Wood & Zaichkowsky, 2004). These findings informed this research to hypothesise the relationship between financial risk tolerance and financial behaviour of smallholder farmers. It is relevant to note that, financial behaviour in this study would be measured in two ways, that is savings ratio and four other variables

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which includes; cash management, credit management, insurance and savings and investment. Anecdotal evidence suggests that, a large proportion of farmers in Ghana do not engage in bonds, mutual funds and equities and so data on these financial decisions would be challenging to ascertain.

**Mediation Effect of Financial Risk Tolerance on Personality Traits and Financial Behaviour.**

Given the empirical basis of the link between personality traits and financial behaviour as well as the link between personality traits and financial risk tolerance, this study goes ahead to hypothesise that financial risk tolerance exerts some amount of mediation when introduced between personality traits and financial behaviour. Furthermore, a study by Pinjisakikool (2017) purports that the influence of personality traits on financial behaviour is indirect through financial risk tolerance. Further research confirms that there is a mediation effect of financial risk tolerance on the relationship between personality traits and financial behaviour among individual investors (Sadiq & Amna, 2019). Hence the last the objective of the study examines the mediation effect financial risk tolerance on the relationship between personality traits and financial behaviour.

**Conceptual Framework**

The theoretical and empirical review for this research work informed the conceptual framework of the study. Previous research suggests that individual decision making is influenced by behavioural biases and these biases have the ability to influence the amount risk one can accept and the financial behaviour of a person. The conceptual framework is shown in Figure 1. The conceptual framework as shown below helps to show the link between the main study

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variables and for that matter the specific objectives set for the study. The relationship between personality traits and financial risk tolerance forms the first object of the study. The second objective is seen from the link between financial risk tolerance to financial behaviour and the third objective is from personality traits to financial behaviour. The last objective of the study examined the mediation between personality traits and financial behaviour as a result of the introduction of financial risk tolerance. Below is the conceptual framework of the study.
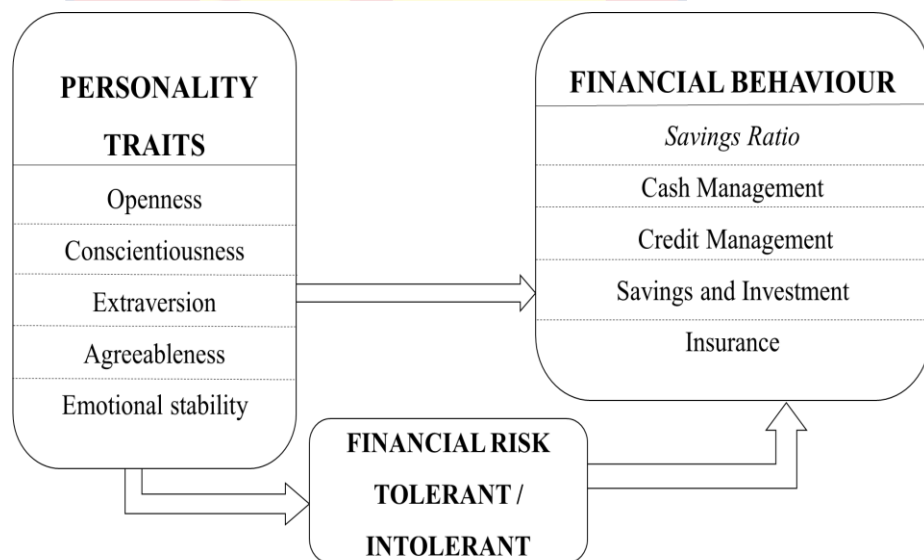


*Figure 1:* Conceptual Framework of the Study
Source: Author's Construct (2020)

**Chapter Summary**

This chapter presented the review of relevant literature on the study. The topics reviewed under this section included smallholder farmers' maize production in Ghana, financial theories, personality trait theories, literature on financial risk tolerance and financial behaviour as well as empirical review. The last section presented the conceptual framework of the study.

**CHAPTER THREE**

**RESEARCH METHODS**

**Introduction**

This chapter provides detailed information regarding the systematic way of solving the research problem. Specifically, this chapter elucidated on the research paradigm and design, study area, population, sampling procedure and sample size, data collection instrument, pre-testing of research instrument, data collection procedure, data processing, data analysis and the analytical tools used to operationalize the study variables as well as ethical consideration.

**Research Philosophy**

Every research is guided by the lens with which the investigator views the world. This undergirds the significance of research paradigm. As from educational research perspective, research paradigm describes a researcher's view of the world (Mackenzie & Knipe, 2006). This implies that, research is informed by the researchers' beliefs, experiences, prior understanding, attitudes and these consequently informs the choice of research methods for the research.

The pioneers in the field of research paradigm, Lincoln & Guba (1985), specifies that there are four main forms of research paradigm which includes ontology, epistemology, methodology and axiology. These paradigms are important to research since it advocates the philosophical stand of the researcher as well as goes ahead to assert the assumptions, beliefs, and values that guides the research. Beforehand, the philosophy of ontology is more about the assumptions individuals make about reality (Scotland, 2012). Kivunja and Kuvyini (2017) purports that, the ontological stance raises questions about the nature of reality, that is, whether reality exist in the social environment or it's

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just a construction based on individuals' intuition. This leads to the two main branch of ontology which are, objectivism (or positivism) and subjectivism (or interpretivism) (Saunders, Lewis, & Thornhill, 2012). Objectivism purport that the researcher or social actors exist in a reality external to the social phenomenon being investigated whereas subjectivism asserts that social actors exist in a reality which is constructed by their perceptions and actions.

Another research paradigm which has received attention in literature is epistemology. Epistemology basically deals with what is considered as acceptable knowledge or how we learn about the truth or reality (Saunders *et al.*, 2012). Therefore, your ontological view will feed into your epistemological standpoint. This means that, if the researcher reasons out that reality is independent of the social actor, then the researchers' epistemological stance will be based on facts or empirical study. However, if the researcher acquired knowledge based on his or her interaction with participants and also through the researcher's thinking then the assumption of subjectivist epistemology underpins the researcher's epistemological position (Punch, 2005).

Next, methodology as a paradigm involves discourse that stipulates how the research should be carried out in other to gain some knowledge about the world (Grix, 2004). For this reason, it can be inferred that, the choice of research methods and techniques needed to gather data to answer the research problem is informed by the study's methodology, in other words, it is the methodology that will determine how the world should be investigated.

The last paradigm to be considered in this study is axiology. This paradigm is concerned with the ethical issues related to the research being conducted. It put emphasis on the values upheld by the researcher and the

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respect the researcher has for the participants as well as the audience who will receive the results after publication (Kivunja & Kuvyini, 2017).

Although this study elucidated on four paradigms, early researchers have indicated that, there are many paradigms but all these paradigms can be categorized under three main taxonomies which includes positivism, interpretivisim and critical theory (Candy, 1989). The importance of these paradigms is that, the philosophical assumptions surrounding these paradigms aid in the understanding of reality about the world and how it can be studied to gain some knowledge and be able to answer pressing research questions about various phenomenon. Since this study would largely depend on objective interpretation of data collected from respondents, and explore relationships within variables to determine changes in the explained variable because of changes in the predictor variable, the philosophical stance of this research is positivism. As a result, the ontological, epistemological, methodological and axiological position of this study are naïve realism, objectivist, cross-sectional research design and beneficence respectively.

Thus, the ontological standpoint of this study which is naive realism propose that, the study assumes there exist a world which should be seen objectively instead of interpreting the world in a subjective manner. The epistemological posture of the study which is objectivist, maintains that human understanding of reality is borne out of reason or measurable data (Fadhel, 2002).  Also, the methodological stand of this study is cross-sectional. This indicates that, the research will gather data from a population at a specific point in time to explore relationships using the variables under study. Lastly, the axiology of this study is beneficence and this is due to the fact that, the

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researcher would reduce any risk or wrong behaviour to the barest minimum while maximizing the good outcome the study aims to provide to its audience (Mertens, 2015).

The positivist nature of the work paved way for quantitative data to be collected and analyzed using descriptive and inferential statistics. Ideally, there are two main research choices which comprises of qualitative and quantitative method (Bryman & Bell, 2011). These research choices are associated with deductive or inductive approach to research. Generally, qualitative motivated research follows the inductive approach where inferences are drawn from collected data and afterwards, a theory is developed from the data (Saunders *et al*., 2012). Conversely, quantitative inclined study is associated with the deductive approach and this is where a theory is first generated from the literature reviewed and then tested using statistical tools. An advantage of deductive research is the room it gives the researcher to generalize the research findings over the target population, however, it is required of the researcher to collect sufficient sample for the study (Saunders *et al*., 2012). This study used quantitative data and as such the approach to research was deductive.

**Research Design**

The overall structure of data inquiry and analysis used for the study was the cross-sectional research design. This research design fit under quantitative technique of data collection. The cross-sectional research design has been referred to as snapshots of the population about which data was drawn at one point in time (Hall, 2011). The benchmark for the selection of respondents is centered on exclusion and inclusion principle determined for the research. Data collected under cross-sectional design can be done by interviewing respondents

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face to face, cell phone interviews, emailed or mailed questionnaires or a combination of these data collection techniques (Hall). This study, however, used the face-to-face interview for its data collection. Studies conducted using cross-sectional designs are relatively faster and budget friendly but the major disadvantage is the fact that data are collected at one point in time and so it presents the challenge of deriving causal relationships.

The cross-sectional research design paves way for data to be observed and this paves way for models to be generated for relationships existing among variables understudy. As a result, the suitable research strategy for this research is descriptive and explanatory research.

**Study Area**

The area for this study was Assin Foso Municipal. Assin Foso Municipal is found in northern part of the Central Region of Ghana. It forms part of the 260 Metropolitan, Municipal and District Assemblies (MMDAs) in the country and on the regional level, Assin Fosu Municipal is part of the 22 MMDAs in the Central Region of Ghana (Ghana Districts, 2017). Assin Foso Municipal was carved out from the then Assin North Municipal in 2017 using an Act of Parliament which is referred to as the LI 2300 of 2017 Legislative Instrument (Assin Foso Municipal Assembly, 2019). The Assin Foso Municipal is positioned not further than Longitudes $1^0$ 05' East and $1^0$ 25' West and Latitudes $6^0$ 05' North and $6^0$ 04' South (Ghana Districts). Assin Foso Municipal shares a border with Assin North District on the North, Upper Denkyira East on the North West, Assin South District on the South, Twifo Atti Morkwa on the West and Asikuma Odoben-Brakwa and Birim South on the Eastern part of the study area (Ghana Districts). The average area covered by the study area is estimated

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to be approximately 1,500 square kilometers and this area is composed of about 1000 settlements. The Municipal capital of the study area is Assin Foso (Population and Housing Census [PHC], 2010). Also, the environmental conditions in the research area relatively favours high maize yields compared to other Districts or Municipalities in the Central Region of Ghana. (Ghana Districts). Assin Foso Municipal is found in the tropical semi-deciduous rain forest which has the most fertile soils for maize production in the country. The annual average rainfall of the area ranges from 1500mm to 2000mm with a relative humidity range of 60% to 70% (PHC, 2010). Maize generally thrives in the major rainy season (April to July) which is also the main planting season and then in the minor planting season (September to November).

**Population**

The population consist of all maize farmers located in the Assin Fosu Municipal of the Central Region of Ghana. Beforehand, the population of the then Assin North Municipal according to the 2010 PHC was estimated to be 161, 341 with about 53% representing the total population of Assin Foso Municipal. This implies that the population of Assin Foso Municipal is approximately 85,670 with about 49.7% representing males and 50.3% constituting females. It was estimated that the growth rate per annum of Assin Foso Municipal stood at 3.2% therefore, the population of the Municipality is approximately 110,664 as at 2018 (Assin Foso Municipal Assembly, 2019). It is also estimated that more than half of the population reside in rural parts of the Municipality and the population is largely youthful (PHC, 2010). The Municipality has on the average 4.3 persons within a household – with children forming the highest proportion of about 44.5% (PHC, 2010).

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Regarding education, the 2010 PHC asserts that majority of people aged from 11 years and above can read and write and this constituted 80% whereas the 20% left could not read and write. Also, the percentage of males forming 53.2% are literate and this exceeded the percentage (46.82%) of women who are not literate. Overall, a total of 64,528 (47.1%) constituting people who are 3 years and above are attending school while 38.2% and 17.8% constitution people who have attended school in the past and those who have never attended school respectively.

The main economic activity in the Municipality is agriculture. Other business activities engaged in by part of the populace include commerce, agro-processing and service. The agricultural sector engages close to about 63.2% of the labour force whereas commerce, service and manufacturing employs 24.8%, 9.6% and 2.4% respectively (Assin Foso Municipal Assembly, 2019). Based on the aforementioned, the population selected for the research reflects the characteristics of the target population.

**Sample Size and Sampling Procedure**

It would be impractical and pricey for the researcher to gather data from all respondents within the target population and so a sample was drawn from the research population. The sample included all registered smallholder maize farmers in the Assin Fosu Municipal. The total population of smallholder maize farmers according to Department of Agriculture in Assin Foso was 1,913 and since the study sought to derive a representative sample from the target population the Krejcie and Morgan's (1970) formula was used to determine the sample size for the study. The formula is specified as follows;

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$$s = \frac{x^2 NP(1 - P)}{d^2(N - 1) + x^2 P(1 - P)} \qquad (1)$$

where:

$s$          required sample size

$x^2$          the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)

$N$          the population size

$P$          the population proportion (assumed to be 0.5)

$d^2$          the degree of accuracy expressed as a proportion (0.05)

It is worth knowing that, they are two types of sampling and these are probability non-probability sampling. Probability sampling uses techniques which gives all the elements in the population equal chance of being included in the sample whereas non-probability sampling selects elements from the target population based on a specific rational and the samples selected are not representative of the target population nor probability of being selected is equal or random (Taherdoost, 2016).

This study used the multistage probability sampling technique to draw 320 sample from the study population. The multistage sampling was used because it gives the researcher the opportunity to combine different sampling techniques to enable the researcher arrive at a representative sample. First, the Department of Agriculture assisted in the identification of communities where maize production is predominant in the Assin Foso Municipality. The Municipal has 23 communities and so the simple random sampling technique was used to select 20 communities from Assin Foso Municipal. Afterwards, the stratified sampling was used to organize all smallholder maize farmers into one stratum

in each community. Thereafter, the simple random sampling was used to select 16 smallholder maize farmers from each stratum in each of the communities and this summed up to 320 smallholder maize farmers.

**Data Collection Instrument**

The research instrument used for the collection of primary data was a structured interview guide.  The research instrument covered all the variables generated for this research from the literature reviewed thus far. The variables of this research included socio-demographic variables, personality traits, financial risk tolerance and financial behaviour. The interview guide was prepared such that each section was dedicated to one of the research variables in the study. Therefore, the sections of the interview guide summed up to 4 sections, that is section A to D.  Section A contained the personal profile or the socio -demographic factors of the respondents. Section B (Part I) comprised of Dew and Xiao's (2011) Financial Management Behaviour Scale (FMBS) and Section B (Part II) was used to compute their savings ratio. So, Part I of the FMBS scale encompassed questions on cash management, credit management, insurance and savings and investment. Section C adapted a psychometrically designed Grable and Lytton's (1999) 13-item scale to measure financial risk tolerance. Section D also used Goldberg's (1992) 25-item psychometrically designed scale to measure personality traits and responses from the personality traits scale was elicited on a 5-point Likert scale which spanned from 1 - strongly agree to 5 - strongly disagree. Most of the questionnaire items were closed ended questions with few open-ended spaces for respondents to complete. The scales used had been validated by the authors who developed it and other researchers who have used it, however, some of the items of the scales

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used in this research were modified slightly to suit the research, and the content was further assessed and approved by the research supervisor and experts in other institutions.

**Pre-testing of Instrument**

Pre-testing of the research instrument can be described as a "feasibility study" which seeks to guide the scheduling of a large-scale research (Thabane, *et al*., 2010). Pre-testing is important to research studies since it provides the researcher with an opportunity to refine survey items and improve upon the research instrument ability to generate the needed data so that the research questions can be answered. Saunders *et al*. (2012) agrees to this and further assert that pre-testing of survey instrument helps to avert problems that may arise during the administration of the research instrument.

For the purpose of this research, a pre-test was conducted in the Birim North District within the Eastern Region of Ghana on October 30, 2020. Overall, 50 interview guide were administered and the feedback led to modification of certain question types and this also directed the researcher to consult expert on the best interpretation to use to elicit the desired response.

**Data Collection Procedures**

The researcher recruited and trained 10 research assistants to assist in the collection. The selection criteria of the research assistants were based on academic qualification, ability to speak the local dialect (Twi or Fante) and previous experience in data collection. The data was collected using a structured interview guide. This is because majority of the farmers were not literates, therefore a face-to-face interview was needed so that the researcher could interpret the questions for their answers to be recorded. The data collection

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exercise began in November 1, 2020 to December 10, 2020. Majority of the farmers were engaged in the later part of the day, Sundays and on their Taboo days. The challenge was that most farmers were not present in the morning and afternoon.

Regarding secondary data, the researcher collected data from peer reviewed journal articles; books; published electronic sources; Ghana Statistical Service; Municipal Assembly Reports; Statistics, Research and Information Directorate (SRID) of the Ministry of Food and Agriculture (MoFA) reports and Food and Agricultural Organization of the United Nations (FAO) reports. These materials helped in the confirmation of the robustness, consistency and reliability of the research output.

**Data Processing**

The data collected using interviewer-administered questionnaire was in a raw form and it was prepared and converted in a form that is appropriate for the required analysis. The processing of the data involved the perusal of the completed structured interview guide to see if it was fully completed or not and where possible omissions and errors corrected.  The data was examined to see if the respondents exhibited appreciable understanding of the questions asked and in situation where inadequate knowledge was demonstrated the questionnaire was discarded. The data was further coded by assigning specific symbols to item response and that helped to organize responses into limited categories. The data was tabulated by organizing it into columns for further analysis and the data was further examined for consistency and missing values.

**Data Analysis**

The primary data collected was analyzed using descriptive and inferential statistics. Descriptive statistics described the properties of a sample. The statistical measures used to summarize the sample in other to gain insight about the data collected in this study included the mean, standard deviation, frequencies and percentages. It is worth noting that, descriptive statistics do not allow for conclusions to be made regarding the study's hypotheses even though descriptive statistics describe the selected sample with certainty. Therefore, this study used the descriptive statistics to make inferences about the study population and this process is referred to as inferential statistics (Sutanapong & Louangrath, 2015). Inferential statistics comes with the general challenge of uncertainty with regards to the inferences made about the study population based on the descriptive statistics of the sample (Evans & Rosenthal, 2009). In this study, a number of inferential statistics were used, this includes; Endogenous Switching Regression Model, Tobit Model and the Partial Least Squares Structural Equation Modeling (SEM). The data was analyzed using R version 4.0.4, SmartPLS version 3.3.2, Excel and SPSS version 26 Software.

**Measurement of Variables**

**Personality Trait Assessment**

Personality traits was measured using 25 items from Goldberg's (1992) psychometrically designed scale. Goldberg's (1992) personality traits measured the BIG FIVE personality traits which consist of openness to experience (OPN), conscientiousness (CONC), extraversion (EXTRA), agreeableness (AGREE) and emotional stability (EMO). The traits were scored from 1 to 5, where 1 means strongly disagree, 2 was disagree, 3 was neutral, 4 was agree and 5

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implied strongly agree. The scores obtained by each respondent under each trait was summated and later used for further analysis in this study.

**Financial Risk Tolerance (FRT) Measurement**

FRT was analyzed using summated scores obtained from Grable & Lytton's, (1999) psychometrically validated 13–item scale. The FRT scale was modified slightly to suit the research context. For instance, the currency in the original scale was changed to Ghana Cedi and the value of the money used in the adapted version reflected the relative income level of the respondents used in the original version of FRT scale. Likewise, the inherent risk observed in the original scale was contextualized to depict agricultural risks. Items 2,9, and 10 measured speculative risk and item 4,5,8,11, and 12 assessed investment risk whereas 1,3,6,7, and 13 evaluated financial risk. Each item on the scale had a multiple choice which corresponded to a score ranging from 1 to 4; where 1 suggested highest financial risk intolerance and 4 implied highest financial risk tolerance. The highest score and least score one can get on the scale was 47 and 13 respectively whereas the mean score and standard deviation was computed as 27.53 and 5.48 respectively (Kuzniak, Rabbani, Heo, Ruiz-Menjivar, & Grable, 2015). Therefore, above average scores indicated that the respondent is financial risk tolerant and below average score indicated that the respondent was financial risk intolerant. In this study, FRT was treated as a dummy variable, where 1 implies Financial Risk Tolerant Farmer and 0 implies Financial Risk Intolerant Farmer.

**Financial Behaviour Measurement**

Financial behaviour was measurement in this study in two ways. First, financial behaviour in this study was measured using Dew and Xiao's (2011)

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Financial Management Behaviour Scale (FMBS) which was composed of questions on cash management, credit management, insurance and savings and investment. Further, financial behaviour was measured using the farmer's saving ratio. This was computed from the ratio of the farmer's personal savings to his or her financial asset. So, a saving ratio close to 0 or less than zero suggested that the farmer's propensity to save is low, whereas, saving ratio close to 1 or greater than one indicated higher savings ratio or the farmer's propensity to save is higher. The implication of the savings ratio estimation is that, savings ratio is directly proportional to savings and inversely proportional to financial asset. This means a higher savings ratio would mean a higher amount of savings at the disposal of the farmer and also a less amount of financial asset and vice versa. Since savings allows the farmer to meet long-term goals, it is relevant to note that it is less risky compared to engaging in financial investments options. Further in the analysis, the saving ratio of the farmers were censored at 0 on the left and at 1 on the right to derive a saving ratio from 0 to 1 and this was used in the Tobit estimation later in this research work.

**Econometric Specification of Endogenous Switching Regression**

This section of the research addresses the research question for specific objective 1 and specific objective 2. Specific objective 1 aimed to examine the influence of personality traits on financial risk tolerance whereas specific objective 2 examined the relationship between financial risk tolerance and financial behaviour of smallholder maize farmers. At this stage, the Endogenous Switching Regression Model (ESRM) was employed to empirically verify and answer to the research questions.

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ESRM first models selection into financial risk tolerant or not with a binary probit model. So, a maize farmer intuitively decides to be financial risk tolerant if the gains from the risk decision is higher than the utility derived from gains as a result of being financial risk intolerant. At the second stage, the equations for the outcome of interest are modeled for the financial behaviour of financial risk tolerant group and financial risk intolerant group. Therefore, it is assumed that a latent variable $S^*$ exist that captures the utility for deciding to be financial risk tolerant or not. The latent variable is specified as

$$S_i^* = Z_i \alpha + \eta_i \; with = \; S_i = \begin{cases} S_i = 1 \; if \, S^* > 0 \\ S_i = 0 \; if \, S^* < 0 \end{cases} \qquad (2)$$

Where the vector Z represent the independent variables, that is personality traits and six socioeconomic factors such as age, sex, years of farming, other income generating activities and access to Agricultural Extension services that contribute towards explaining the variation in the financial risk tolerance status of the farmer, that is financial risk tolerant ($S_i = 1$) or not ($S_i = 0$).

In the second stage, the financial behaviour of financial risk tolerant farmers and financial risk intolerant farmers were modeled against personality traits and five socioeconomic factors, namely age, sex, years of education, years of farming and access to extension services. Nonetheless, estimating the two stages separately yield residuals which are heteroskedastic (Lokshin & Sajaia, 2004). Further, one may consider a simple way of estimating financial behaviour and financial risk tolerance by adding to the financial behaviour equation a dummy variable equal to 1 if the farmer is financial risk tolerant, and then go ahead to estimate the equation using Ordinary Least Squares (OLS). In effect, this procedure might yield inconsistent or biased estimate since it

assumed that financial risk tolerance is exogenously determined while it is potentially endogenous (Bidzakin, Fialor, Awunyo-Vitor, & Yahaya, 2019; Di Falco, Veronesi, & Yesuf, 2011). Financial risk tolerant (FRT) is endogenous in the sense that, it can be explained by personality traits when both are treated as exogenous variable in a regression equation where financial behaviour is the dependent variable. Thereby resulting in a situation where the exogenous variable FRT is related to financial behaviour and also related to personality traits. More so, farmers who are financial risk tolerant may have characteristics which are different from financial risk intolerant farmers. Based on this, the study account for endogeneity of the financial risk tolerance decision by simultaneously estimating equations involving financial risk tolerance and financial behaviour by following the full information maximum likelihood (FIML) estimation approach ( see for example: Bidzakin, Fialor, Awunyo-Vitor, & Yahaya, 2019; Di Falco, Veronesi, & Yesuf, 2011). With this in mind, the selection biases were accounted for by using the endogenous switching regression model of financial behaviour, where the farmer faces two regimes, that is regime 1: to be financial risk tolerant and regime 2: to be financial risk intolerant. This is specified as follows.

$$\text{Regime 1: } y_{1i} = x'_{1i}\beta_1 + \epsilon_{1i} \qquad \text{if } S_i^* > 0 \ (S_i = 1) \qquad (3)$$

$$\text{Regime 2: } y_{2i} = x'_{2i}\beta_2 + \epsilon_{2i} \qquad \text{if } S_i^* < 0 \ (S_i = 0) \qquad (4)$$

Where $y_i$ is the financial behaviour associated with financial risk tolerance of the farmer in the two regimes and $x'_i$ are row vectors of independent variables such as the Big Five personality traits and six socio-economic variables such as age, sex, years of education, years of farming and access to

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agricultural extension services that may impact the financial behaviour in the two regimes.

Consequently, the disturbance terms in equation (2), (3), (4) are assumed to have trivariate normal distribution with zero mean and covariance matrix: $\Sigma$, that is, $(\eta, \in_1, \in_2)' \sim N(0, \Sigma)$

$$\Sigma = \begin{bmatrix} 1 & \sigma_{u\,1} & \sigma_{u\,2} \\ \sigma_{1\,u} & \sigma_1^2 & . \\ \sigma_{u\,1} & . & \sigma_2^2 \end{bmatrix} \tag{5}$$

Where $\sigma_\eta^2$ denotes the variance of the disturbance term in the selection equation (2), assumed to be 1 since $\gamma$ is estimable up to a scale factor, whereas the covariance terms $\sigma_{12}$ and $\sigma_{21}$ (between $\in_1$ and $\in_2$) are not estimable with the reason being that $y_1 \mid S_1 = 1$ and $y_1 \mid S_1 = 0$ do not occur simultaneously.

Therefore, the 3 equations which forms the endogenous switching regression model, that is, (2), (3), (4) are estimated simultaneously by means of full information maximum likelihood (FIML) estimation. The log-likelihood function for the model was:

$$1\mathrm{n}\,L = \sum_{i=1}^{N} S_i \left[ 1\mathrm{n}\,\emptyset \left( \frac{\in_{1i}}{\sigma_1} \right) - 1\mathrm{n}\,\sigma_1 + 1\mathrm{n}\,\Phi(\zeta_{1i}) \right]$$
$$+ (1 - S_i) \left[ 1\mathrm{n}\,\emptyset \left( \frac{\in_{2i}}{\sigma_2} \right) - 1\mathrm{n}\,\sigma_2 + 1\mathrm{n}\,\Phi(-\zeta_{2i}) \right] \tag{6}$$

Where $\Phi$ (.) and $\emptyset$ (.) are cumulative density and probability density functions of the standard normal distribution, respectively: $\zeta_{1i} = (z_i'\gamma + \rho_1 \in_{1i}/\sigma_1)/(1 - \rho_1^2)^{0.5}$ and $\zeta_{2i} = (z_i'\gamma + \rho_2 \in_{2i}/\sigma_1)/(1 - \rho_2^2)^{0.5}$ with $\rho_1$ and $\rho_2$ being the coefficient of correlation between $u_i$ and $\in_{1i}$ and $u_i$ and $\in_{2i}$, respectively.

**Estimation of Treatment Effect of Financial Risk Tolerance on Financial Behaviour**

In line with the estimation presented on the endogenous switching regression model, further analysis can be conducted to ascertain the expected saving ratio (used in measuring financial behaviour) of farmers who are financial risk tolerant (Cell A, Table 2) and farmers who are financial risk intolerant (Cell B, Table 2) and the counterfactual scenario where financial risk tolerant farmers were intolerant (Cell C, Table 2) and financial risk intolerant farmers were tolerant (Cell D, Table 2). The estimation for the expected savings ratio in the four scenarios are done following the equations below:

$$E(y_{1i}|S_i = 1) = x'_{1i}\beta_1 + \sigma_{1\eta}\lambda_{1i} \qquad (7)$$

$$E(y_{2i}|S_i = 0) = x'_{2i}\beta_2 + \sigma_{2\eta}\lambda_{2i} \qquad (8)$$

$$E(y_{2i}|S_i = 1) = x'_{1i}\beta_2 + \sigma_{2\eta}\lambda_{1i} \qquad (9)$$

$$E(y_{1i}|S_i = 0) = x'_{2i}\beta_1 + \sigma_{1\eta}\lambda_{2i} \qquad (10)$$

Therefore, it follows that equation (7) and (8) represent the actual saving ratios for financial risk tolerant farmers and financial risk intolerant farmers respectively. On the other hand, equation (9) and (10) represent the counterfactual saving ratios for financial risk tolerant farmers and financial risk intolerant farmers respectively. So, the conditional expectation, treatment effects as well as the Heterogeneity effects are presented in Table 2 below.

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**Table 2: Conditional Expectation, Treatment and Heterogeneity**

| | Decision Stage | | |
| | Financial Risk Tolerant | Financial Risk Intolerant | Treatment Effects |
| Sub-samples | (1) | (2) | (3)= (1)-(2) |
|---|---|---|---|
| Financial Risk Tolerant | (A) $E(y_{1i}|S_i = 1)$ | (C) $E(y_{2i}|S_i = 1)$ | TT |
| Financial Risk Intolerant | (D) $E(y_{1i}|S_i = 0)$ | (B) $E(y_{2i}|S_i = 0)$ | TU |
| Heterogeneity Effects | $BH_1$ | $BH_2$ | TH |

The treatment effects as well as the heterogeneity effects are the differences between the actual and the counterfactual scenarios as provided in Table 2 above. Specifically, the notations for the treatment and heterogeneity effects in Table 2 are explained below;

TT = Effect of the treatment on the treated (financial risk tolerant farmers)

TU = Effect of the treatment on the untreated (financial risk intolerant farmers)

TH = Transitional Heterogeneity (TT - TU)

$BH_i$ = Base heterogeneity effect for financial risk tolerant farmers (i=1) and financial risk intolerant farmers (i=0)

**Tobit Model Specification: Effect of Personality Traits on Financial behaviour**

This section uses the Tobit model to estimate the influence of personality traits on financial behaviour of the farmers. The Tobit was used because the dependent variable, saving ratio, was censored from below and above and hence


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had scores ranging from 0 to 1. To put it another way, the Tobit model would estimate the relationship between a dependent variable which is a non-negative variable and a set of independent variables representing personality traits and some control variables (socioeconomic characters). Specifically, the model is expressed as follows;

$$y_i^* = x_i\beta + \cup_i \tag{11}$$

$$y_i^* = \begin{cases} y_i^* = x_i\beta + \varepsilon_i \ if \ y_i^* > 0 \\ 0 \qquad\qquad if \ y_i^* \leq 0 \end{cases} \tag{12}$$

$$\cup_i \sim IIND(0, \sigma^2) \tag{13}$$

From equation (11) the subscript i is equal to 1 to the nth term; $y_i^*$ is the unobserved endogenous latent variable (saving ratio); $x_i$ is the set of explanatory variable which includes personality traits (openness, conscientiousness, extraversion, agreeableness, emotional stability) and socioeconomic variables (age, sex, years of education, years of farming and access to agricultural extension services); $\beta$ is the unknown parameter estimate and $\cup_i$ is the error term of the Tobit model.

**The SEM**

The link between Personality Traits, Financial Risk Tolerance (FRT) and Financial Behaviour (FB) was examined using the Structural Equation Modeling (SEM). SEM was used at this stage of the research because it allows researchers to analyze several hypotheses hinged on theory while controlling for errors at the same time (Newman, Vance, & Moneyham, 2010). The mechanism underpinning SEM is complex but that gives it a comparative advantage over traditional data analytic methods, like regression analysis, which test interrelationships among variables one at a time (Von der Embse,

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2016; Morrison, Morrison, & McCutcheon, 2017).  SEM uses a confirmatory approach to test for hypotheses rather than exploratory method (Byrne, 2016). This implies that, the interrelationships among variables are in tune with what pertains in theory. Therefore, the theoretical models are tested to ascertain whether it fit the data collected.

The variables analyzed by SEM are latent (unobserved) and manifest (observed) variables (Byrne, 2016). The preliminary step associated with SEM involves the diagrammatic presentation of hypothesized relationships which has its foundation in theory. In SEM diagrams, rectangles represent observed variables whereas circles or ovals represent latent constructs (McDonald & Ho, 2002). In addition, one directional arrow represents causal paths which implies that the variable affects another directly while the double-headed directional arrows represent relationship between the variables understudy (Stein, Morris, & Nock, 2012). The direction of the arrows connecting the latent construct and indicator is dictated by the nature of the latent construct in theory and that subsequently indicate whether it's a reflective or a formative measure (Khan, Dewan, & Chowdhury, 2016). This research used reflective measure in its Structural Equation Modeling.

SEM is composed of two main sub-models which are measurement model and structural model (Stein, Morris, & Nock, 2012). The measurement model test relationships among the latent variable and the manifest variables (indicators) whereas the structural model test relationship among the latent constructs. In this study, the measurement model was composed of only reflective constructs. As stated by Bollen (1989) the measurement model can be specified as follows;

$$x_i = \lambda_i \eta_i + \delta_i$$

where:

| | |
|---|---|
| $x_i$ | observed indicators for latent variables |
| $\eta_i$ | latent variables |
| $\lambda_i$ | factor loadings |
| $\delta_i$ | disturbance terms |

The structural model can be simply specified in a matrix form according to Bollen (1989) as follows;

$$\eta = \alpha + \beta\eta + \Gamma\xi + \zeta$$

where:

$\eta$    m x 1 vector of latent endogenous variables

$\xi$    n x 1 vector of latent exogenous variables

$\alpha$    m x 1 vector of intercept terms

$\beta$    m x m matrix of coefficients that give the influence of $\eta$ on each other

$\Gamma$    m x n matrix of the coefficients of the effect of $\xi$ on $\eta$

$\zeta$    m x 1 vector of disturbances that contain the explained parts of $\eta's$

Given the structural model equation above, it may seem contrary to intuition to regress $\eta$ on itself; however, each variable in $\eta_i$ is influenced by other variables in $\eta_i$ so this denotes latent variable relationships.

The mediation analysis followed the measurement and structural model assessment. This was done by observing the direct effects and the specific indirect effects generated by the structural model assessment and based on the result a determination is made whether the type of mediation is full or partial, if

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partial, further analysis is done to determine if it is complementary partial mediation or competitive partial mediation. This mediation analysis was done using the diagram proposed by Zhao, Lynch and Chen (2012) and this diagram is shown at Appendix B of the Appendices section of this research.

The measurement and the structural assessment criteria as used in partial least squares structural equation modeling is summarized in the Figure below. **Measurement and structural assessment criteria used in study.**
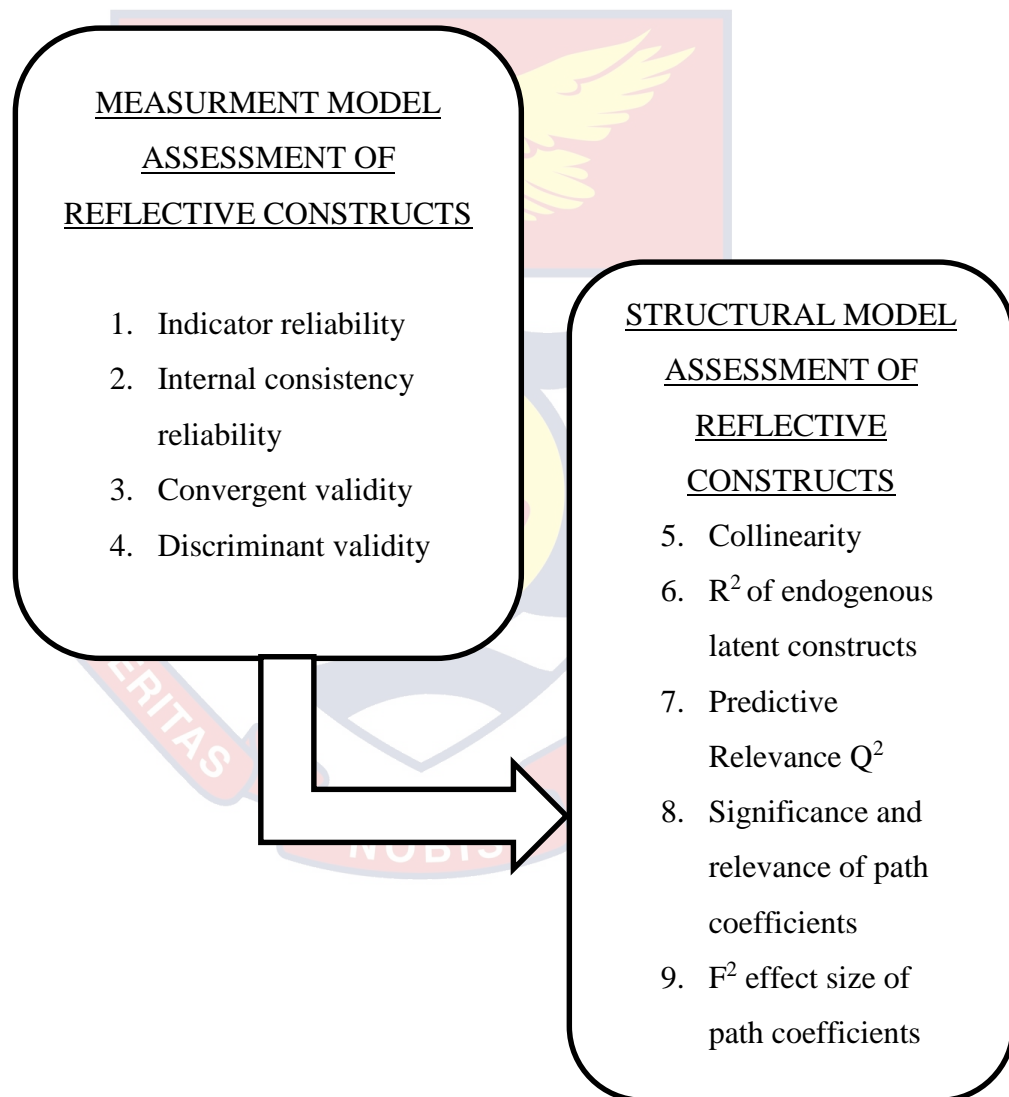


*Figure 2:* Measurement and Structural Model Assessment in PLS-SEM
Source: (Sarstedt, Ringle, Smith, Reams, & Hair, 2014)

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**Ethical Considerations**

The consent of the University was sought by applying for ethical clearance which paved way for data to be collected from the respondents. Furthermore, the research proposal of this study was also presented to the Department and it was approved. Thus, the research participants were not exploited nor subjected to any harm while data was being collected. Research respondents were assured that their responses to survey questions would remain completely anonymous. Since the axiology of this research was beneficence, that is, the research was aimed at maximizing the good outcome while ensuring that the dignity and respect for participants are not compromised. The outcome of this research was objectively communicated and no misrepresentation whatsoever was condoned and all sources were duly acknowledged as well.

**Chapter Summary**

This chapter described the procedures and strategies guiding the research. The chapter elucidated on the steps undertaken to gather data for the study and the areas expounded on in the chapter were research paradigm and design, study area, target population, sampling procedure, sample size, research instrument, pilot testing of research instrument, data collection procedure, data processing, data analysis and ethical consideration of the research.

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## CHAPTER FOUR

## RESULTS AND DISCUSSIONS

**Introduction**

This chapter presented the results from the analysis conducted on the data collected to answer the research questions for the research. The first section of this chapter present results on the socio-demographic characteristics of smallholder maize farmers. The second and third section presented results on the determinants of financial risk tolerance (objective one) and how financial risk tolerance impact financial behaviour of smallholder maize farmers (objective two). The fourth section examines the influence of personality traits on financial behaviour of respondents (objective three). The fifth section examines the mediating effect of financial risk tolerance on personality traits and financial behaviour (objective four). The last section summarizes the results and discussion of this study.

**Socio-Demographic Characteristics of Smallholder Farmers**

**Sex Distribution of farmers**

Among the 320 smallholder farmers sampled for the study, Table 3 shows that 129, representing 40.3% were females and 191, representing 59.7% were males. This implies that male maize farmers dominate agricultural related work within the area of study. This finding supports the fact that most males within the Ghanaian traditional setting are considered as heads of family, clans and tribes and that comes with the privilege of inheriting most of the agricultural fields (Ackuaku, 2014). However, other findings point out that women involvement in agricultural related activities have been massive even after the shift from the hoe cultivation to a more mechanized agriculture especially in

non-cash crop farming such as maize (Gopal & Srivastava, 2008). Yet, this study's finding conclude that male farmers dominate agriculture within the study area.

**Table 3: Sex Distribution of Farmers**

| Sex | Frequency | Percentage |
| --- | --- | --- |
| Female | 129 | 40.3 |
| Male | 191 | 59.7 |
| Total | 320 | 100 |

Source: Field Survey (2020)

**Age Categories of Farmers**

The age categories of the farmers as specified in Table 4, indicate that majority of the farmers (104) find themselves within the 41 – 50 age bracket. This is followed by farmers who find themselves within the 31- 40 age bracket and 51 - 60 age bracket - representing (28.2%) and (22.7%) respectively. This result from Table 4 clearly indicates that most of the farmers are still within the economic active group, that is from 15 – 65 years (Nelson, 2000) since few farmers are above 65 years. This, in effect, is a positive indicator of the study area's contribution to agricultural sector growth using her active man power.

**Table 4: Distribution of Age Categories of Farmers**

| Age Categories (Years) | Frequency | Percent Valid |
| --- | --- | --- |
| 21-30 | 30 | 9.7 |
| 31-40 | 87 | 28.2 |
| 41-50 | 104 | 33.7 |
| 51-60 | 70 | 22.7 |
| 61-70 | 15 | 4.9 |
| 71-80 | 3 | 1.0 |
| Total | 309 | 100.0 |

Source: Field Survey (2020)

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**Marital Status of Farmers**

The results from Table 5 suggest that most of the farmers (75%) are married whereas the few fall within other marital status categories. This result shows that married maize farmers dominate agriculture in the study area. This result is consistent with the research finding from Danso-Abbean (2010) who indicated that farming in Ghana is dominated by married people.

**Table 5: Marital Status of Farmers**

| Marital Status | Frequency | Percentage |
|---|---|---|
| Divorced | 27 | 8.4 |
| Single | 34 | 10.6 |
| Widowed | 19 | 5.9 |
| Married | 240 | 75.0 |
| Total | 320 | 100.0 |

Source: Field Survey (2020)

The reason for this outcome may be due to the fact that farm labour maybe nonexistent and also hired labour on the other hand do shirk their responsibility on the farm which leads to low yield. Further, hired labour also comes with costs, hence farmers prefer to make use of their own family labour (Cramer, Sender, & Oqubay, 2020).

**Educational Level of Farmers**

This study revealed that the bulk of the population (37.5%) of farmers have received formal education up to the Junior High School (J.H.S) level whereas a similar proportion (36.6%) have not received any form of formal education as shown in Table 6. This finding demonstrates that, the introduction of the Free Compulsory Universal Education in Ghana has helped improve the

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number of school going individuals and that has positive effect on adoption of good agricultural practices (Spillan & King, 2017).

**Table 6: Educational Level of Farmers**

| Educational Level | Frequency | Percentage |
|---|---|---|
| No Formal Education | 117 | 36.6 |
| Nursery/KG | 3 | 0.9 |
| Primary | 10 | 3.1 |
| JHS | 120 | 37.5 |
| SHS | 64 | 20.0 |
| Certificate/Vocational Training | 4 | 1.3 |
| Diploma | 2 | 0.6 |
| Total | 320 | 100.0 |

Source: Field Survey (2020)

However, what is concerning is that an equivalent amount of the people have not received any form of education and that may have an implication on the dissemination of agricultural technology to these farmers. It is also clearly seen that the numbers reduce sharply after completing Junior High School – most pupils do not progress to the Senior High School Level and then to Tertiary institutions.

**Years of Farming**

In terms of the number of years of farming, most farmers (30.6%) fall within less than 5-year category according to Table 7. It is also observed that 31.3% have farmed for a period of 10 – 20 years and few farmers have been engaged in farming for over 20 years. The number of years of farming has

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positive implication on farmers' practical knowledge and experience gained while working on the field for years (Tracey & Morrow, 2017).

**Table 7: Years of Farming of Farmers**

| Years of Farming | Frequency | Percentage |
|---|---|---|
| Less than 5 years | 98 | 30.6 |
| 5 - 10 years | 78 | 24.4 |
| 10 - 20 years | 100 | 31.3 |
| Over 20 years | 44 | 13.8 |
| Total | 320 | 100.0 |

Source: Field Survey (2020)

Then again, having more farmers engaged in farming for less than 5 years could be associated with the low income and yield derived from maize agribusiness, therefore, farmers get discouraged and invest in cash crops or move to other sectors of the economy.

**Other Income Generating Activities of Respondents**

Per the results from Table 8, it is observed that a huge proportion of the farmers were engaged in other income generating activities aside their maize agribusiness. This finding confirms the traditional fact that, farmers use these other income generating activities to supplement their incomes during off peak seasons. Few of the common other income generating activities included artisanship, cocoa, rice, okra and oil palm farming.

**Table 8: Other Income Generating Activity of Farmers**

| Other Income Generating Activity | Frequency | Percentage |
|---|---|---|
| No | 108 | 33.8 |
| Yes | 212 | 66.3 |
| Total | 320 | 100.0 |

Source: Field Survey (2020)

**Access to Agricultural Extension Services**

The results from Table 9 assert that, a large number of the respondents (84.4%) have access to Agricultural Extension Services compared to those who do not have access. This has a huge implication on agricultural development since previous studies show the lack thereof Agricultural Extension Services (Cramer, Sender, & Oqubay, 2020). Agricultural Extension Agents offer tremendous help to farmers in terms field demonstrations, home visits, education on good agricultural practices and financial management (Norton, 2004). These activities by these agents improves the productive capacity of farmers

**Table 9: Access to Agricultural Extension Services**

| Access to Agricultural Extension Services | Frequency | Percentage |
|---|---|---|
| No | 50 | 15.6 |
| Yes | 270 | 84.4 |
| Total | 320 | 100.0 |

Source: Field Survey (2020)

**Association Status of Farmers**

Given the results from Table 10, it clearly demonstrates that most of the farmers were part of a farm-based association. This finding supports the fact that farm-based associations are formed to serve the interest of farmers and it is through this farmers gain numerous benefits, such as, pooling resources from members to purchase agro-input, secure a loan, build norms of reciprocity which allows farmers to offer communal assistance to other members (Rheingold, 2012)

**Table 10: Association Status of Farmers**

| Association Status | Frequency | Percentage |
|---|---|---|
| No | 63 | 19.7 |
| Yes | 257 | 80.3 |
| Total | 320 | 100.0 |

Source: Field Survey (2020)

**Income of Farmers**

This study discovered that majority of the farmers (42.2%) generate incomes up to GH₵1000 as observed from Table 11 and 26.6% have their income range from GH₵2001 to GH₵3000. However, only 1.9% generate incomes above GH₵4001 within the maize planting season.

**Table 11: Income Range of Farmers**

| Farm Income | Frequency | Percentage |
|---|---|---|
| ≤ GH₵1000 | 135 | 42.2 |
| GH₵1001-GH₵2000 | 67 | 20.9 |
| GH₵2001-GH₵3000 | 85 | 26.6 |
| GH₵3001-GH₵4000 | 27 | 8.4 |
| Above GH₵4001 | 6 | 1.9 |
| Total | 320 | 100.0 |

Source: Field Survey (2020)

Following the results from Table 11, it shows that farmers generate relatively low amount of money in the growing season and this may be due to high cost of agricultural input, such as, pesticides, fertilizers, farm implements and cost associated with the hiring of farm labour (International Cocoa Initiative Foundation, 2017)

**Determinants of Financial Risk Tolerance and Financial Behaviour**

Table 12 present results from the maximum likelihood estimation of Endogenous Switching Regression model and estimation of Treatment Effect using the "endoSwitch" command (Chen, Yun, & Gramig, 2020) in R version 4.0.4. This model simultaneously presented results from two equations – selection equation and outcome equation. The selection equation presented results for specific objective 1 of the research which was to examine the relationship between financial risk tolerance and personality traits. The dummy variable was financial risk tolerance which was coded as 1 for Financial Risk Tolerant Farmers and 0 for Financial Risk Intolerant Farmers. From Table 12, there are four columns in all, the first column contains the predictors, the second column present results on the selection equation (Financial Risk Tolerance: 1 or 0) and the third and fourth column present results for the relationship between the predictors (column 1) and financial behaviour of the two regimes (Financial Risk Tolerant Farmers (column 3); Financial Risk Intolerant Farmers (column 4)). In so doing, specific objective 2 of the study was answered and the results were shown in Table 12.

In this research much attention was devoted to how personality traits influence financial risk tolerance and financial behaviour of farmers, however some socio-economic factors were used as control variables since the literature explored so far indicate that they do have an influence on financial risk tolerance and financial behaviour. That said, results from Table 12, column 2, shows that, extraversion, conscientious and emotional stability increases the odds of a farmer becoming financial risk tolerant and the results for extraversion and emotional stability were significant but that of conscientiousness was

insignificant. This result for extraversion is consistent with previous studies because the literature explored thus far shows that extroverts tend to have general disposition towards gregariousness, they like to explore to derive the joy in the moment and enjoy the company of others (Soto, 2018). Therefore, extroverts would have a higher tendency of being tolerant to financial risk with the probable reason being that, their constant exploration and social nature would always be a priority as opposed to the risk involved in such prospects. Linking this finding to agricultural setting, it would be observed that farmers who are extroverts, for instance, may have access to potential high yielding cultivars recommended to them by colleague farmers, Extension Agents and relatives which they are likely to plant to gain the benefit. Likewise, the positive and significant relationship between emotional stability and financial risk tolerance is not surprising since emotional stable farmers are less likely to feel anxious and they have the ability to keep emotional balance in the face of stressful financial risk conditions. The next predictor which increased a farmer's odds of being financial risk tolerant because of its positive relationship with financial risk tolerance was conscientiousness. This result is unexpected because, conscientious individuals tend to be responsible, discipline, diligent and oftentimes exercise self–restraint (Roberts, Jackson, Fayard, Edmonds, & Meints, 2009). So it is not surprising conscientious farmers have the tendency to exercise restraint when it comes to financial risk. However, from the results achieved in this study, it can be explained that the farmers might have scored low on conscientiousness.

**Table 12: Endogenous Switching Regression Results for the Determinants**

**of Financial Risk tolerance and Financial behaviour**

| Predictor | Selection Equation | Outcome Equation | |
|---|---|---|---|
| | Financial Risk Tolerance Status (1/0) | Financial Behaviour | |
| | | Financial Risk Tolerant | Financial Risk Intolerant |
| | Coefficient (Std Error) | Coefficient (Std Error) | Coefficient (Std Error) |
| Openness | -0.0760*** ( 0.0289) | -0.0184*** ( 0.0068) | -0.0038 ( 0.0095) |
| Conscientiousness | 0.0178 ( 0.0358) | -0.0049 ( 0.0076) | 0.0055 ( 0.0104) |
| Extraversion | 0.0616** ( 0.0255) | 0.0054 ( 0.0058) | -0.0091 (0.0084) |
| Agreeableness | -0.0170 ( 0.0268) | -0.0024 ( 0.0059) | -0.0209** ( 0.0088) |
| Emotional Stability | 0.1064*** ( 0.0256) | 0.0176*** ( 0.0065) | 0.0035 ( 0.0099) |
| Age | 0.0236*** ( 0.0076) | -0.0011 ( 0.0019) | -0.0021 ( 0.0025) |
| Sex | 0.1017 ( 0.1538) | 0.0726 ( 0.0410) | -0.0230 ( 0.0452) |
| Educational Years | 0.0514*** ( 0.0152) | -0.0002 ( 0.0039) | -0.0138*** ( 0.0041) |
| Years of Farming | 0.0073 ( 0.0728) | -0.0081 ( 0.0174) | 0.0019 ( 0.0226) |
| Access to Extension Agents | 0.3040 ( 0.1974) | -0.0235 ( 0.0485) | 0.0060 ( 0.0613) |

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Table 12: continued

| Predictor | Selection Equation | Outcome Equation | |
|---|---|---|---|
| | Financial Risk Tolerance Status (1/0) | Financial Behaviour | |
| | | Financial Risk Tolerant (1) | Financial Risk Intolerant (0) |
| | Coefficient (Std Error) | Coefficient (Std Error) | Coefficient (Std Error) |
| Other Income Generating Activity | 0.1940** (0.0831) | - | - |
| Constant | -3.0213*** ( 0.7061) | 0.3275*** ( 0.2228) | 0.7361*** ( 0.2532) |
| Sigma | | 0.2426*** ( 0.0327) | 0.3178*** ( 0.0278) |
| Rho | | 0.8936*** ( 0.1218) | -0.9905*** ( 0.0152) |

Source: Field Survey (2020)

*** 1% level of significance; **5% level of significance

This means that farmers with low levels of conscientiousness are observed to be careless, lack self-control, have no respect for authority and social order and are generally impulsive (Clarke & Robertson, 2005). These attributes may lead an individual with low levels of conscientiousness to be reckless with financial risk as opposed to individuals who are fully conscientiousness as deem it in this study. However, it is relevant to state that the results for conscientious was insignificant.

From Table 12, it is clearly observed that, openness and agreeableness have a negative relation with financial risk tolerance. Among these variables,

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only openness has a significant negative relation with financial risk tolerance and this result is unexpected. Openness in general is associated with intellectual and experiential curiosity (DeYoung, 2014). So, individuals with the openness traits are more likely to be financial risk tolerant (McGhee, Ehrler, Buckhalt, & Phillips, 2012). However, the finding from this study shows that farmers who have the openness traits are more likely to be financial risk intolerant and this may be attributed to the fact that, these farmers may have the openness trait but the increasing financial risks associated with agricultural sector may have had a way of dampening the openness trait. An example is the current influx and infestation of Maize Army Worms in the country and the dependence of rain fed agriculture in Ghana which normally comes with numerous financial risks such that in the long run majority of the farmers may become financial risk intolerant. To add to, it is relevant to note that, personality traits barely change (Cobb-Clark & Schurer, 2012) but in an extremely catastrophic event individuals may act differently from their assigned personality traits.

Moreover, the study found out that individuals with agreeable trait have the tendency to be financial risk intolerant. This is consistent with previous studies since agreeable individuals have the tendency to keep up with positive relations with others, so the advices they receive from their social circle end up confusing them (Ahmed, Khattak, & Anwar, 2020) and render them unable to pursue specific activities, hence the results of this study is valid.

This study also considered the effect of other socio-economic variables on financial risk tolerance and it came out that age, sex, years of education, access to extension services, whether farmers engaged in other income generating activity, had a positive relationship with financial risk tolerance. The

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positive relationship with financial risk tolerance shows that such farmers are more likely to be financial risk tolerant. Among the aforementioned predictors, only age, years of education and whether the farmer engaged in other income generating activities had a positive and significant relationship with financial risk tolerance. So, it implies that older farmers, educated farmers and farmers who engage in other income generating activities were likely to be financial risk tolerant.

Then again, the results from the financial behaviour function (outcome equation) showed that openness to experience, conscientiousness and agreeableness had negative relationship with the savings ratio of Financial Risk Tolerant Farmers. Among these traits, openness to experience was significant. On the contrary, farmers with personality traits such as extraversion and emotional stability had a positive relationship with savings ratio for farmers who are financial risk tolerant. Also, none of the socio-economic variables had a significant relationship with the saving ratio of financial risk tolerant farmers.

Regarding the relationship between the saving ratio of financial risk intolerant farmers and its predictors, it is clearly observed that, it is only agreeableness and years of education which had a negative but significant relationship with savings ratio for financial risk intolerant farmers. The rest of the results were insignificant. This finding further affirms the fact that sample selectivity bias existed in the data and the use of the endogenous switching regression model is justified.

Additionally, the "endoSwitch" function in R adds to its output the original distribution parameters, that is Rho and Sigma from the estimates of the transformed distribution parameters by means of the delta method (Chen, Yun,

& Gramig, 2020). So, Sigma for Financial Risk Tolerant Farmers and that of Financial Risk Intolerant Farmers are the square roots of the variances of the residuals of the regression part of the model or simply, the standard deviation. Rho, as specified in the last row of Table 12, connotes the correlation coefficient between the error term of the selection equation and the error term of the outcome equation for Financial Risk Tolerant and Financial Risk Intolerant farmers respectively. The coefficient, Rho, for the correlation of the error term between the selection equation and the outcome equation for Financial Risk Tolerant Farmers is statistically significant and positive whereas Rho for the correlation of the error term between selection equation and the outcome equation for Financial Risk Intolerant Farmers is negative and significant. The significant difference between Financial Risk Tolerant Farmers and Financial Risk Intolerant Farmers indicate that self-selection might have occurred and so the use of the Endogenous Switching Regression Model is warranted since the effect of Financial Risk Tolerant Famers maybe be different if the farmers chose to be Financial Risk Intolerant.

**Financial Risk Tolerance and Financial behaviour**

From Table 13, the expected saving ratio of Financial Risk Tolerant Farmers was 0.3355 at cell A whereas the expected saving ratio of Financial Risk Intolerant Farmers was computed as 0.3307 at cell B. From this result, it could be inferred that Financial Risk Tolerant Farmers have about 1.5% higher saving ratio than Financial Risk Intolerant Famers. However, this sort of simple comparison could lead to misleading conclusions as a result of this naive estimation. Therefore, the counterfactual scenario of financial risk tolerance of each of the two categories must be examined. Based on this, the counterfactual

case for the saving ratio of Financial Risk Tolerant would be reduced by a margin of 0.1260 whereas the counterfactual case for Financial Risk Intolerant Farmers would be reduced by 0.0164 cell D. This means that being Financial Risk Tolerant Farmer gives you the opportunity to gain more saving ratio and that translate into having enough savings for long term investment than the counterfactual situation where your saving ratio would be substantially reduced by 0.1260 (Cell C). Further, Financial Risk Intolerant Farmers also face the challenge of a reduction in their saving ratio in the counterfactual scenario although the margin is small compared to the reduction Financial Risk Tolerant Farmers face. Hence, Financial Risk Tolerant Farmers stand a chance of having higher saving ratio compared to Financial Risk Intolerant Farmers.

The last row of Table 13 also shows the potential heterogeneity effect that influences savings ratio of farmers aside financial risk tolerance. According to Table 13, a farmer who is Financial Risk Tolerant would have received a 0.3519 increase in saving ratio for reasons other than financial risk tolerance. The heterogeneity effect also shows that a farmer who is Financial Risk Intolerant would have a reduction in saving ratio by 0.4567 for reasons other than financial risk tolerance. However, when the sample potential heterogeneity effects are adjusted, the treatment effect on the treated shows that being Financial Risk Tolerant yield a higher saving ratio than the saving ratio of the average treatment effect on the untreated (financial risk intolerant farmers). So, farmers who are financial risk tolerant have a higher savings and that translate into they having funds to meet their long-term goals, invest in their agribusiness production and are better off when it comes to pursuing investment opportunities than Financial Risk Intolerant Farmers.

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**Table 13: Impact of Financial Risk Tolerance on Financial behaviour**

| Financial Behaviour Outcome | Financial Risk Tolerance Status of Farmers | Decision Stage | | Treatment Effects |
|---|---|---|---|---|
| | | Financial Risk Tolerant | Financial Risk Intolerant | |
| Financial Behaviour (Savings Ratio) | Financial Risk Tolerant (ATT) | (A) 0.3355 (0.0767) | (C) -0.1260 (0.1234) | 0.4615 (0.0098) |
| | Financial Risk Intolerant (ATU) | (D) -0.0164 (0.0811) | (B) 0.3307 (0.1156) | -0.3471 (0.0082) |
| | Heterogeneity Effects (ATH) | 0.3519 (0.0090) | -0.4567 (0.0136) | 0.8086 (0.0128) |

Source: Field Survey (2020)

**Personality Traits and Financial Behaviour**

This section presents results of objective three which was to examine the relationship between personality traits and financial behaviour of smallholder maize farmers. Financial behaviour was measured using the savings ratio of the farmers. Their saving ratios were censored on the left and on the right. The left censoring was 0 and the right censoring was 1. Therefore, saving ratio of a farmer increases from 0 to 1. This result was obtained using the censReg function (Henningsen, 2020) in R version 4.0.4. The results are shown in Table 14 together with the marginal effects the explanatory variables have on the dependent variable.

From Table 14, it can be observed that farmers with personality traits such as openness to experience, conscientiousness, Extraversion and

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Agreeableness have a negative relationship with savings ratio. This implies that, these personality traits decrease a farmer's likelihood of having a higher saving ratio. However, among these traits, only openness to experience and its marginal effects were statistically significant. This result may be attributed to the fact that, farmers with openness to experience traits devote much resources in prospects that they believe has the potential to increase the expected yield from their agribusiness operation and so end up have a lesser savings.

It can also be observed from Table 14 that emotional stability had a positive and significant relationship with savings ratio and that same relationship is expressed in their corresponding marginal effect which is also significant. This suggest individuals who are emotionally stable tend to have higher saving ratios (Cobb-Clark, Kassenboehmer, & Sinning, 2013).

**Table 14: Tobit Results on Financial behaviour and Personality Traits**

| Variables | Coefficient (Standard Error) | Marginal Effects (Standard Error) |
|---|---|---|
| Constant | 0.7895*** (0.1053) | |
| Openness | -0.0163*** (0.0047) | -0.0153*** (0.0044) |
| Conscientiousness | -0.0043 (0.0052) | -0.0040 (0.0049) |
| Extraversion | -0.0021 (0.0042) | -0.0019 (0.0040) |
| Agreeableness | -0.0052 (0.0045) | -0.0049 (0.0042) |
| Emotional Stability | 0.0124*** (0.0036) | 0.0117*** (0.0034) |

Table 14: Continued

| | | |
|---|---|---|
| Age | -0.0014 | -0.0013 |
| | (0.0012) | (0.0012) |
| Sex | 0.0107 | 0.0100 |
| | (0.0250) | (0.0235) |
| Educational Years | -0.0080*** | -0.0075*** |
| | (0.0022) | (0.0021) |
| Years of Farming | -0.0036 | -0.0034 |
| | (0.0013) | (0.0119) |
| Access to | -0.0021 | -0.0198 |
| Extension Agents | (0.0034) | (0.0321) |
| LogSigma | -1.5570*** | |
| | (0.0041) | |

*** 1% level of significance; **5% level of significance

Source: Field Survey (2020)

This result may imply that farmers with emotional stability traits can easily set aside funds for saving purposes from their high rewarding but risky prospects within their agribusiness operation.

That said, the socio-economic variables also influenced the saving ratios of the smallholder maize farmers. From the result presented in Table 14, it is clear that, age, years of education, years of farming, and access to extension services had a negative relationship with saving ratio whereas sex had a positive relationship with saving ratio. Among these, only years of education had a significant influence on saving ratio.

**Personality Traits, Financial Risk Tolerance and Financial Behaviour**

This section present results for the analysis conducted for specific objective four of the study. This objective examined the link that exist between personality traits, financial risk tolerance and financial behaviour of the smallholder farmers. The partial least squares structural equation modeling

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(PLS-SEM) was used to analyze specific objective four in SmartPLS version 3.3.2. In order to assess the mediating effect of financial risk tolerance on personality traits and financial behaviour, the preliminary evaluation which involves examining the measurement model must be conducted which is followed by the structural model assessment.

**Assessment of Reflective Measurement Models**

In this study, measurement model assessment was conducted to ascertain reflective construct reliability and validity as shown in Table 15 to Table 17. The measurement model assessment included indicator loading, composite reliability, rho_A (lies between the lower and upper bounds of Cronbach's alpha and the composite reliability), Average Variance Extracted (AVE), discriminant validity, and the heterotrait-monotrait (HTMT) ratio.

From Table 15, the indicator loading shows that majority of the indicators were equal or above the acceptable loading specification of 0.708 (Hair, Risher, Sarstedt, & Ringle, 2019) or 0.6 (Chin, Peterson, & Brown, 2008). Few indicators had loadings from 0.5 to 0.6 but they were retained because they contributed towards an AVE equal or greater than the recommended 0.5 specification.

The next measurement assessment tool is composite reliability (CR) which assesses the reliability of internal consistency of the model. According to Hair *et al*. (2019), composite reliability values from 0.70 to 0.90 are considered as satisfactory to good. From Table 15, all the constructs fall within the acceptable composite reliability range. Then again, rho_A represents a good measure of true reliability since it lies between Cronbach's alpha which is

considered as conservative and composite reliability which is also said to be too liberal (Dijkstra & Henseler, 2015).

Further, the reflective measurement model was assessed using convergent validity of each construct. Convergent validity deals with the degree to which the constructs converge to explain the variance of its indicators and the metric used to assess convergent validity is the Average Variance Extracted (AVE). According to Hair *et al.* (2019), the recommended AVE should be above 0.50 and from the Table 16, all the construct had AVEs greater than 0.50.

Also, discriminant validity was tested for the model and this informs the researcher about the fact that, the indicators used to measure the construct are not a reflection of other constructs. The results for the discriminant validity indicate low correlations of the measure of interest and other constructs. Therefore, Table 16 shows that the square root of the AVE (bolded and diagonal) is relatively bigger than its corresponding correlations and that suggest acceptable discriminant validity (Fornell & Larcker, 1981).

**Table 15: Validity and Reliability for Constructs**

| Constructs | Items[*] | Loading | AVE | CR | rho_A |
|---|---|---|---|---|---|
| Openness | 4(5) | 0.650 - 0.785 | 0.523 | 0.823 | 0.71 |
| Conscientiousness | 4(5) | 0.671 - 0.780 | 0.529 | 0.817 | 0.713 |
| Extraversion | 4(5) | 0.596 - 0.859 | 0.513 | 0.805 | 0.842 |
| Agreeableness | 4(5) | 0.571 - 0.986 | 0.506 | 0.794 | 2.713 |
| Emotional Stability | 3(5) | 0.704 - 0.842 | 0.611 | 0.824 | 0.699 |
| Cash Management | 3(4) | 0.720 - 0.785 | 0.568 | 0.794 | 0.622 |
| Credit Management | 3(4) | 0.703 - 0.814 | 0.59 | 0.812 | 0.659 |
| Savings and Investment | 4(4) | 0.550 - 0.828 | 0.543 | 0.823 | 0.756 |

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Table 15: Continued

| | | | | | |
|---|---|---|---|---|---|
| Insurance | 2(3) | 0.916 - 0.924 | 0.846 | 0.917 | 0.82 |
| Financial Risk Tolerance Status | 1(1) | 1.000 | 1.000 | 1.000 | 1.000 |

Source: Field Survey (2020)

*Final items retained (initial items per construct)

However, discriminant validity using the Fornell and Larcker's (1981) criteria has come under intense criticism because it does not truly detect discriminant validity and so a newer tool known as the heterotrait-monotrait (HTMT) ratio was used to assess discriminant validity of the model and the result is displayed in Table 17. HTMT values greater than 0.85 or 0.90 indicates discriminant validity problem (Kline, 2011; Hair, Risher, Sarstedt, & Ringle, 2019).
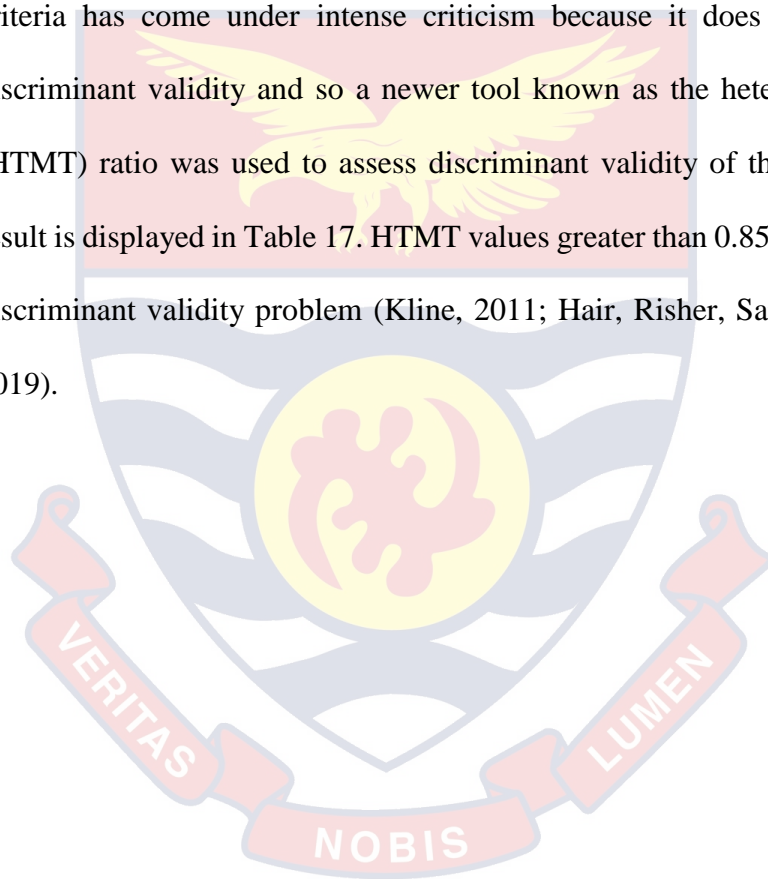
**Table 16: Discriminant Validity (Fornell and Larcker Criterion)**

| Constructs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| AGREE | **0.711** | | | | | | | | | |
| CASH MGT | -0.085 | **0.754** | | | | | | | | |
| CONSC | 0.299 | 0.275 | **0.727** | | | | | | | |
| CREDIT MGT | -0.128 | 0.348 | 0.145 | **0.768** | | | | | | |
| EMO | 0.328 | -0.265 | -0.051 | -0.040 | **0.782** | | | | | |
| EXTRA | 0.260 | 0.361 | 0.530 | 0.274 | 0.021 | **0.716** | | | | |
| FRT | 0.173 | -0.088 | -0.082 | 0.249 | 0.347 | 0.073 | **1.000** | | | |
| INSU RANCE | 0.154 | -0.021 | -0.067 | 0.308 | 0.298 | 0.204 | 0.398 | **0.920** | | |
| OPN | 0.189 | 0.333 | 0.587 | 0.168 | -0.105 | 0.489 | -0.145 | -0.085 | **0.723** | |
| SAVING INVEST | 0.106 | 0.172 | 0.039 | 0.391 | 0.216 | 0.208 | 0.330 | 0.425 | 0.145 | **0.737** |

Source: Field Survey (2020)

Values on the diagonal (bolded) are square root of the AVE while the off-diagonals are correlations between constructs. Where the numbers (1-10) in the first row stands for and correspond to the construct in the first column of the Table 16.

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**Table 17: Heterotrait-monotrait (HTMT)**

| Constructs | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| AGREE | | | | | | | | | | |
| CASH MGT | 0.106 | | | | | | | | | |
| CONSC | 0.586 | 0.407 | | | | | | | | |
| CREDIT MGT | 0.106 | 0.534 | 0.214 | | | | | | | |
| EMO | 0.288 | 0.423 | 0.209 | 0.193 | | | | | | |
| EXTRA | 0.546 | 0.472 | 0.776 | 0.357 | 0.215 | | | | | |
| FRT | 0.095 | 0.115 | 0.112 | 0.317 | 0.415 | 0.102 | | | | |
| INSURANCE | 0.15 | 0.083 | 0.102 | 0.437 | 0.4 | 0.251 | 0.44 | | | |
| OPN | 0.454 | 0.502 | 0.864 | 0.259 | 0.22 | 0.724 | 0.158 | 0.114 | | |
| SAVING_INVEST | 0.112 | 0.271 | 0.149 | 0.555 | 0.29 | 0.258 | 0.37 | 0.537 | 0.232 | |

Source: Field Survey (2020); Where the numbers (1-10) in the first row stands for and correspond to the same construct in the first column of the

Table 17.

**Structural Model Assessment**

Given the satisfactory outcome of the measurement model, the next step in partial least squares path modeling is structural model assessment. Hair *et al.* (2019) proposes that this assessment must include the assessment for collinearity issues, assess the significance and importance of structural model relationships or path coefficients, coefficient of determination ($R^2$), predictive relevance ($Q^2$) and effect sizes ($f^2$).

This study assessed the structural model for collinearity issues and it was observed that all the Variance Inflation Factors VIF) were less than 5. The least VIF was 1.829 and the highest was 2.069 and that implies that the model did not have any collinearity issues.

Further, the structural model assessed path coefficients, $R^2$ values and corresponding T-values through bootstrapping method by using 5000 subsamples. $R^2$ values indicates the amount of variance which is explained in each of the endogenous constructs. In other words, it's the in-sample explanatory power (Rigdon, 2012). At this point, it is relevant to note that, the constructs included in the study were the five personality traits dimension, dummy financial risk tolerance (with 1 = Financial Risk Tolerant Farmers and 0 = Financial Risk Intolerant Farmers) and financial behaviour which was measured by cash management, credit management, insurance and saving and investment. It is observed that, the savings ratio of the respondent was not used to measure financial behaviour because partial least squares path modeling allows for more complex relationships which provides a much better way of assessing a farmer's financial behaviour based on different dimensions at a time.

So the $R^2$ values for the endogenous construct were 0.242 (cash management), 0.206 (credit management), financial risk tolerance (0.161), 0.246 (insurance), 0.181 (saving and investment).

In addition to specifying the $R^2$, Hair *et al*. (2019) suggest that the model's predictive accuracy, $Q^2$, and $f^2$ effect size must be reported as well. The predictive accuracy according to Hair *et al*. should be larger than zero for the endogenous variables within the structural model. Based on this, the predicted accuracy ($Q^2$) was calculated and reported as 0.126 (cash management), 0.107 (credit management), 0.134 (financial risk tolerance), 0.188 (insurance), 0.088 (saving and investment). The $f^2$ effect size helps to evaluate the $R^2$ values for all endogenous variables within the model, $f^2$ effect size measures how the exclusion of a certain predictor construct from the model affect the $R^2$ values of all endogenous constructs. The $f^2$ effect size values range from 0.02 (small effect), 0.15 (medium effect), and 0.35 (large effect) (Cohen, 1988). The $f^2$ effect sizes were reported in Table 18 to 20 for all the path relationships.

**Personality Traits and Financial Risk Tolerance**

The path coefficient for the link between personality traits and financial risk tolerance revealed that openness to experience and conscientiousness had a negative relationship with financial risk tolerance. Nonetheless, the path coefficient for openness was significant. This implies that farmers who have these traits are generally financial risk intolerant. This finding is consistent and further validates the results obtained from the Endogenous Switching Regression Model in Table 12 of the study. Additionally, personality traits such as extraversion, agreeableness and emotional stability had a positive

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relationship with financial risk tolerance. Among these constructs, only extraversion and emotional stability had a significant positive relationship with financial risk tolerance – indicating farmers with these traits are mostly financial risk tolerant. Again, this result is consistent with the results displayed in Table 12 of the study, although this time around agreeableness had a positive relationship with financial risk tolerance but it was not significant. The corresponding $f^2$ effect size of the relationship between personality traits and financial risk tolerance is also shown in Table 18.

**Table 18: Relationship Between Personality Traits and Financial Risk Tolerance**

| Construct Relationships | Path Coefficient | Std Error | T Statistic | P Values | $f^2$ Effect Size |
|---|---|---|---|---|---|
| OPN -> FRT | -0.162** | 0.072 | 2.247 | 0.025 | 0.019 |
| CONSC -> FRT | -0.089 | 0.076 | 1.168 | 0.243 | 0.005 |
| EXTRA -> FRT | 0.17*** | 0.06 | 2.842 | 0.004 | 0.023 |
| AGREE -> FRT | 0.091 | 0.08 | 1.14 | 0.255 | 0.008 |
| EMO -> FRT | 0.293*** | 0.053 | 5.55 | 0.000 | 0.087 |

*** 1% level of significance; **5% level of significance

Field Survey: (2020)

**Financial Risk Tolerance and Financial Behaviour**

From Table 19, it is observed that, the different dimensions of financial behaviour relates with financial risk tolerance. The results from Table 20 shows that financial risk tolerance has a positive relationship with financial behaviour. This further suggest that, farmers who are financial risk tolerant are able manage their cash, credit, subscribe to insurance packages as well as save and invest. Nonetheless, the relationship between financial risk tolerance and credit

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management, financial risk tolerance and insurance and financial risk tolerance and savings and investment were significant.

**Table 19: Relationship Between Financial Risk Tolerance and Financial Behaviour**

| Construct Relationships | Std Beta | Std Error | T Statistic | P Value | $f^2$ Effect Size |
|---|---|---|---|---|---|
| FRT -> CASH MGT | 0.017 | 0.057 | 0.305 | 0.761 | 0.000 |
| FRT -> CREDIT MGT | 0.317*** | 0.057 | 5.576 | 0.000 | 0.106 |
| FRT -> INSURANCE | 0.289*** | 0.054 | 5.378 | 0.000 | 0.093 |
| FRT -> SAVING_INVEST | 0.296*** | 0.054 | 5.441 | 0.000 | 0.090 |

*** 1% level of significance; Std = Standard

Field Survey: (2020)

**Personality Traits and Financial Behaviour**

Table 20 provides a comprehensive understanding of how each of the five personality dimensions behave financially and it included aspect with regards to cash management, credit management, saving and investment and insurance.

First, it is observed that farmers with personality traits such as, openness, conscientiousness, extraversion have positive relationship with cash management. Nevertheless, only openness to experience and extraversion had a positive relationship. The result for extraversion was unexpected but it can be attributed to the fact that, their social nature can pave way for them to be exposed to the benefits associated with managing one's cash. However, farmers with emotional stability and agreeableness trait had a negative and a significant relationship with cash management.

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Moreover, Table 20 revealed that farmers with personality traits such as openness to experience, conscientiousness and extraversion had a positive relationship with credit management. However, the only significant relationship was extraversion and credit management. This may imply that extroverts derive credit management techniques form their social circle and that makes them excellent at it. Nevertheless, emotional stability had a negative relationship with credit management. Likewise, agreeable farmers had a significant negative relationship with credit management and this can be attributed to fact that agreeable farmers are generally altruistic and that makes them go an extent of sharing what they have with others at their expense.

Furthermore, it is observed from Table 20 that openness to experience, extraversion and emotional stability had a positive and significant relationship with savings and investment whereas the other traits such as conscientiousness and agreeableness had a negative relationship with savings and investment.

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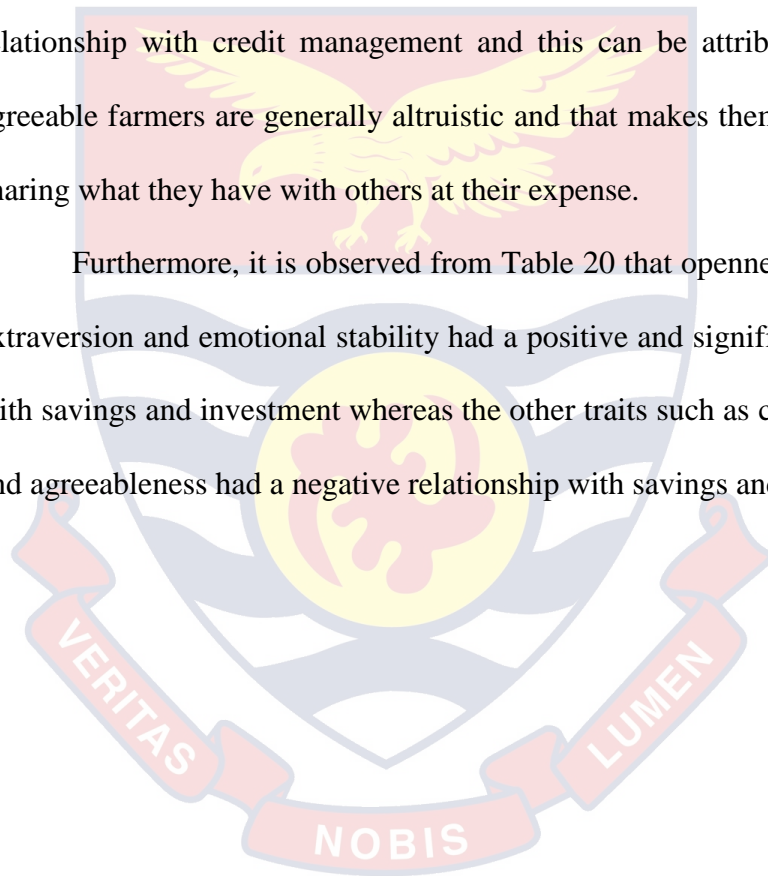
**Table 20: Relationship Between Personality Traits and Financial**

**Behaviour**

| Construct Relationships | Std Beta | Std Error | T Statistic | P Value | f² Effect Size |
|---|---|---|---|---|---|
| OPN -> CASH MGT | 0.165** | 0.074 | 2.23 | 0.026 | 0.021 |
| CONSC -> CASH MGT | 0.058 | 0.076 | 0.767 | 0.443 | 0.002 |
| EXTRA -> CASH MGT | 0.29*** | 0.063 | 4.598 | 0.000 | 0.071 |
| AGREE -> CASH MGT | -0.143** | 0.068 | 2.119 | 0.034 | 0.021 |
| EMO -> CASH MGT | -0.209*** | 0.068 | 3.059 | 0.002 | 0.046 |
| OPN -> CREDIT MGT | 0.108 | 0.07 | 1.548 | 0.122 | 0.009 |
| CONSC -> CREDIT MGT | 0.059 | 0.073 | 0.807 | 0.420 | 0.002 |
| EXTRA -> CREDIT MGT | 0.237*** | 0.07 | 3.374 | 0.001 | 0.045 |
| AGREE -> CREDIT MGT | -0.265*** | 0.1 | 2.642 | 0.008 | 0.069 |
| EMO -> CREDIT MGT | -0.054 | 0.071 | 0.757 | 0.449 | 0.003 |
| OPN -> SAVING_INVEST | 0.203*** | 0.068 | 2.994 | 0.003 | 0.03 |
| CONSC -> SAVING_INVEST | -0.123 | 0.076 | 1.625 | 0.104 | 0.01 |
| EXTRA -> SAVING_INVEST | 0.158** | 0.067 | 2.358 | 0.018 | 0.02 |
| AGREE -> SAVING_INVEST | -0.033 | 0.089 | 0.375 | 0.708 | 0.001 |
| EMO -> SAVING_INVEST | 0.136** | 0.062 | 2.203 | 0.028 | 0.018 |
| OPN -> INSURANCE | -0.089 | 0.068 | 1.302 | 0.193 | 0.006 |
| CONSC -> INSURANCE | -0.148** | 0.07 | 2.125 | 0.034 | 0.016 |
| EXTRA -> INSURANCE | 0.293*** | 0.064 | 4.544 | 0.000 | 0.073 |
| AGREE -> INSURANCE | 0.035 | 0.066 | 0.537 | 0.591 | 0.001 |
| EMO -> INSURANCE | 0.163*** | 0.056 | 2.918 | 0.004 | 0.028 |

*** 1% level of significance; **5% level of significance; Std (Standard)

Field Survey: (2020)

Lastly, the results from Table 20 shows that agreeableness had a positive relationship with insurance but it was not significant. However, extraversion and emotional stability showed a positive and significant relationship with insurance whereas openness was negatively relative to insurance but was not significant.

**Mediating Effect of Financial Risk Tolerance on Personality Traits and Financial behaviour**

This section provides answers to specific objective 4 of the study. It presents results on the mediating effects of financial risk tolerance on personality traits and financial behaviour in Table 21. In other to assess the influence of the mediator (financial risk tolerance) variable on the other constructs in this study, it is important to examine the specific indirect effects and the direct effects between the exogenous variable (personality traits) and endogenous variable (financial behaviour). The results in Table 21 present results of the specific indirect effect which includes the mediator (financial risk tolerance) in the model whereas results of direct effects can be found in Table 18, Table 19 and Table 20. Based on the Tables for the direct effects and specific indirect effects, it will be possible to ascertain whether mediation occurs and also the type of mediation. The type of mediation ranges from full mediation to partial mediation where the partial mediation can either be complementary or competitive mediation (Zhao, Lynch, & Chen, 2010; Hair, Hult, Ringle, & Sarstedt, 2017)

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**Table 21: Mediating Effect of Financial Risk Tolerance on Personality**

**Traits and Financial Behaviour**

| Mediating Relationships | Std Beta | Std Error | T Statistic | P Value |
|---|---|---|---|---|
| OPN -> FRT -> CASH MGT | -0.003 | 0.01 | 0.275 | 0.783 |
| OPN -> FRT -> CREDIT MGT | -0.051** | 0.025 | 2.04 | 0.041 |
| OPN -> FRT -> INSURANCE | -0.047** | 0.023 | 2.019 | 0.044 |
| OPN -> FRT -> SAVING_INV | -0.048** | 0.024 | 2.038 | 0.042 |
| CONSC -> FRT -> CASH MGT | -0.002 | 0.006 | 0.238 | 0.812 |
| CONSC -> FRT -> CREDIT MGT | -0.028 | 0.025 | 1.122 | 0.262 |
| CONSC -> FRT -> INSURANCE | -0.026 | 0.023 | 1.131 | 0.258 |
| CONSC -> FRT -> SAVING_INV | -0.026 | 0.023 | 1.14 | 0.254 |
| EXTRA -> FRT -> CASH MGT | 0.003 | 0.01 | 0.284 | 0.777 |
| EXTRA -> FRT -> CREDIT MGT | 0.054** | 0.021 | 2.509 | 0.012 |
| EXTRA -> FRT -> INSURANCE | 0.049** | 0.02 | 2.411 | 0.016 |
| EXTRA -> FRT -> SAVING_INV | 0.05** | 0.021 | 2.383 | 0.017 |
| AGREE -> FRT -> CASH MGT | 0.002 | 0.006 | 0.253 | 0.800 |
| AGREE -> FRT -> CREDIT MGT | 0.029 | 0.026 | 1.108 | 0.268 |
| AGREE -> FRT -> INSURANCE | 0.026 | 0.024 | 1.099 | 0.272 |
| AGREE -> FRT -> SAVING_INV | 0.027 | 0.024 | 1.135 | 0.256 |
| EMO -> FRT -> CASH MGT | 0.005 | 0.017 | 0.291 | 0.771 |
| EMO -> FRT -> CREDIT MGT | 0.093*** | 0.025 | 3.743 | 0.000 |
| EMO -> FRT -> SAVING_INV | 0.087*** | 0.023 | 3.825 | 0.000 |
| EMO -> FRT -> INSURANCE | 0.085*** | 0.023 | 3.681 | 0.000 |

\*\*\* 1% level of significance; \*\*5% level of significance; Std (Standard)

Field Survey: (2020)

That said, further observation is conducted under the guidance of a mediation diagram by Zhao, Lynch and Chen (2010) located at Appendix A of the Appendices section of this research work to determine the type of mediation that exist in the significant mediation pathways in Table 21. The guide on the

type of mediation involved an observation of the direct relationships in Table 18, 19 and 20 and that of the specific indirect relationships in Table 21 The type of mediation pathways within the constructs is presented in Table 22.

**Table 22: Type of Mediation Between Personality Traits and Financial Behaviour**

| Mediation | Type of Mediation |
|---|---|
| OPN -> FRT -> CREDIT MGT | Competitive Partial Mediation |
| OPN -> FRT -> INSURANCE | Full Mediation |
| OPN -> FRT -> SAVING_INV | Competitive Partial Mediation |
| EXTRA -> FRT -> CREDIT MGT | Complementary Partial Mediation |
| EXTRA -> FRT -> INSURANCE | Complementary Partial Mediation |
| EXTRA -> FRT -> SAVING_INV | Complementary Partial Mediation |
| EMO -> FRT -> CREDIT MGT | Full Mediation |
| EMO -> FRT -> SAVING_INV | Complementary Partial Mediation |
| EMO -> FRT -> INSURANCE | Complementary Partial Mediation |

Source: Field Survey (2020)

The type of mediation as shown in Table 22 shows that, there was competitive partial mediation, complementary partial mediation and full mediation. Competitive partial mediation implies that the direct and specific indirect effects of the relationships are significant and their direction is opposite to each other whereas complementary partial mediation suggest that the direct and specific indirect effects of the relationships are significant and at the same time point to the same direction. In the case of the partial mediation, that is complementary and competitive partial mediation, what happens is that when financial risk tolerance is introduced into the framework, the coefficient of the path from personality traits to financial behaviour is reduced in absolute size but it would still be higher than zero. However, full mediation is where personality

traits does not influence financial behaviour when financial risk tolerance is introduced in the framework.

**Chapter Summary**

Chapter four presented results and discussions of the study. Specifically, results on endogenous switching regression model was presented on the determinants of financial risk tolerance and financial behaviour in addition to the influence of financial risk tolerance on financial behaviour as expressed in their treatment effects. Then again, the Tobit model presented results on the influence of personality traits on financial behaviour and lastly, the partial least squares structural equation modeling presented results on the mediation effect of financial risk tolerance on personality traits and financial behaviour of smallholder maize farmers. The next chapter will provide conclusions to the study and also suggest some recommendations for policy action.
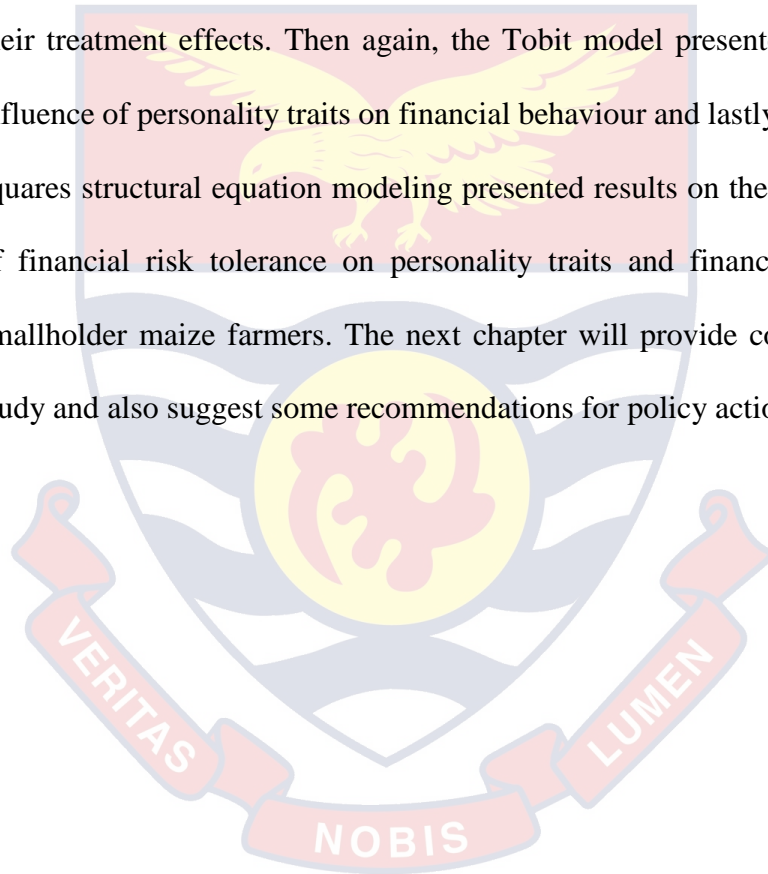
CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

**Introduction**

This chapter presented the summary, conclusions recommendations and suggestions for further research. The summary reflects the entire study and the conclusions reflect the findings of the study. Based on the conclusions, the study made some recommendations to direct government, policymakers and investment advisors in the agro-finance industry.

**Summary**

Agriculture in Ghana is capital driven and involves critical financial decision making, therefore assessing how farmer's behavioural biases such personality traits influence the farmers' financial risk tolerance and financial behaviour is crucial to agricultural sector performance and growth. Specifically, the study sought to examine the relationship between personality traits and financial risk tolerance of the farmers (objective one); study the nexus between financial risk tolerance and financial behaviour (objective two); examine the relationship between personality traits and financial behaviour (objective three); and lastly to investigate the link that exist between personality traits, financial risk tolerance and financial behaviour (objective four).

Primary data was collected on 320 smallholder maize farmers who were sampled using the multi-stage sampling technique. A total of 10 research assistants were used in the data collection exercise. Descriptive and inferential statistics was used to analyze the data collected. To add to, secondary data from published articles and books were used to supplement the data requirements of

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the study. It is relevant to not that objective one and two was estimated simultaneously using the endogenous switching regression model while objective three and four were analyzed using the tobit model and partial least squares structural equation modeling respectively. These estimations were conducted majorly in R version 4.0.4, SmartPLS version 3.3.2, Excel and SPSS. The results are summarized at the summary section in this chapter. The summary of the result is presented based on the research questions set for the study.

**Findings**

**Personality Traits and Financial Risk Tolerance**

The results from the endogenous switching regression indicated that personality traits of farmers have influence on their financial risk tolerance. This was evident with the fact that personality traits such as extraversion, conscientiousness and emotional stability significantly increased a farmers' odds of becoming financial risk tolerant. On the contrary, farmers' personality traits such as openness to experience and agreeableness have a negative relationship with financial risk tolerance and that implied that, it increased the farmers' odds of becoming financial risk intolerant. Among these three personality traits, only openness, extraversion and emotional stability had a significant relationship with financial risk tolerance. This result is also confirmed by the structural equation modeling that was conducted.

**Financial Risk Tolerance and Financial Behaviour**

The findings indicate that being financial risk tolerant farmer increase your saving ratio by a higher magnitude than being a financial risk intolerant

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farmer. From the average expected saving ratios, treatment and heterogeneity effects, the actual expected saving ratio of financial risk tolerant farmers was 0.3355 and its counterfactual case had a decrease in saving ratio by 0.126. The actual expected saving ratio of financial risk intolerant farmers was 0.3307 and its counterfactual case decreased by a margin of 0.0164. The treatment effect on the treated (financial risk tolerant smallholder maize farmers) was 0.4615 and the treatment effect on the untreated (financial risk intolerant smallholder maize farmers) was reduced by 0.3471. However, it is clear that financial risk tolerant farmers had increased saving ratios compared to financial risk intolerant farmers. This implies that, financial risk tolerant farmers would be better positioned to use their accumulated funds for investment opportunities as opposed to financial risk intolerant farmers.

Also, results from SEM indicates that financial risk tolerant farmers are better at saving and investment, managing their credit and enrolling on various insurance packages than financial risk intolerant farmers.

**Personality Traits and Financial Behaviour**

The results show that personality traits such as openness to experience, conscientiousness, extraversion, agreeableness had a negative relationship with a farmer's propensity to save (saving ratio). Nevertheless, the significant relationship was only openness to experience. Then again, emotional stability had a positive and significant relationship with a farmer's propensity to save. Results from SEM also suggest that personality traits influenced other aspects of financial behaviour such as cash and credit management, saving and investment and insurance.

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**Mediating Effect of Financial Risk Tolerance on Personality Traits and Financial Behaviour**

The results from the study shows that, the relationship between personality traits and financial behaviour is mediated by financial risk tolerance. The type of mediation includes competitive partial mediation, complementary partial mediation and full mediation. Among the constructs under study, the type of mediation between openness to experience and credit management was competitive mediation. Similarly, the type mediation between openness to experience and savings and investment was competitive mediation. On the other hand, the type of mediation that existed between extraversion and credit management and that of insurance and savings and investment was complementary partial mediation. To add to, there was a full mediation between emotional stability and credit management. Lastly, complementary partial mediation existed between emotional stability and saving and investment as well as insurance. All these mediation pathways were highly significant.

**Conclusions**

Based on the summary of results aforementioned, the subsequent conclusions can be made for the study.

1. Personality traits such as openness to experience, extraversion and emotional stability significantly affect the financial risk tolerance of a smallholder maize farmer.

2. Financial risk tolerant farmers have a high propensity to save than financial risk intolerant famers

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3. Farmers with personality traits such as openness to experience and emotional stability significantly affected the farmer's propensity to save and personality traits also influenced farmers cash and credit management, savings and investment, and insurance behaviour.

4. Financial risk tolerance exerts a significant mediation effect on financial risk tolerance and financial behaviour of smallholder maize farmers.

**Recommendations**

Based on the conclusions, the following recommendations are made.

1. Agricultural investment advisors of financial institutions should take into consideration the financial risk tolerance levels and personality traits of farmers when rendering investment advice to the farmers.

2. The Ministry of Agriculture should include the concept of behavioural biases such as personality traits and financial risk tolerance in their capacity building training programmes for its employees. This will enable Agricultural Extension Agents to consider the different personality types and risk acceptance levels of farmers when delivering a service to the farmers.

3. Agricultural Development Bank should roll out financial products and services that better suit the financial risk tolerance levels and financial behaviour of farmers. For example, the study found out that Financial Risk Tolerant Farmers have a higher propensity to save and so financial institutions design financial products that would harness the saving potential of this group of farmers and also help

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them to accumulate much savings to achieve long term goals, investment and on retirement.

4. The Ministry of Agriculture through its Extension Agents should regularly organize personality traits test for farmers and also sensitize farmers about their unique traits and how it affects their financial decisions.

5. Financial institutions and professional organizations can partner with the government to develop a standard guideline that will aid financial service providers to properly assess the financial risk tolerance of farmers. The Financial Risk Tolerance Scale used in this study purposely for farmers can also help in the development of the guideline.

6. Financial institutions should focus on personality traits of farmers to establish a relationship between the farmer and their investment products.

**Suggestions for Further Research**

Based on this research work the following areas of research are suggested below.

1. This study looked at the mediation effect of financial risk tolerance on personality traits and financial behaviour of farmers and so further research can look at how other characteristics such as agricultural extension services moderate the mediation effect of financial risk tolerance on the study variables.

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2. Multiple mediation analysis can be conducted instead of the single mediator analysis conducted in this study.

3. This same research can be conducted in all other Municipalities within the country.

4. This study limited it sample size to 320 and the target population was maize farmers. Since this is a limitation, further research should be conducted making use of larger sample sizes and then different crop farmers.

5. Further research can also look at how personality traits affect technology adoption and yield of crop farmers.

6. Likewise, further research can use different statistical models to predict financial risk tolerance and financial behaviour and how their results confirm this study's outcome.

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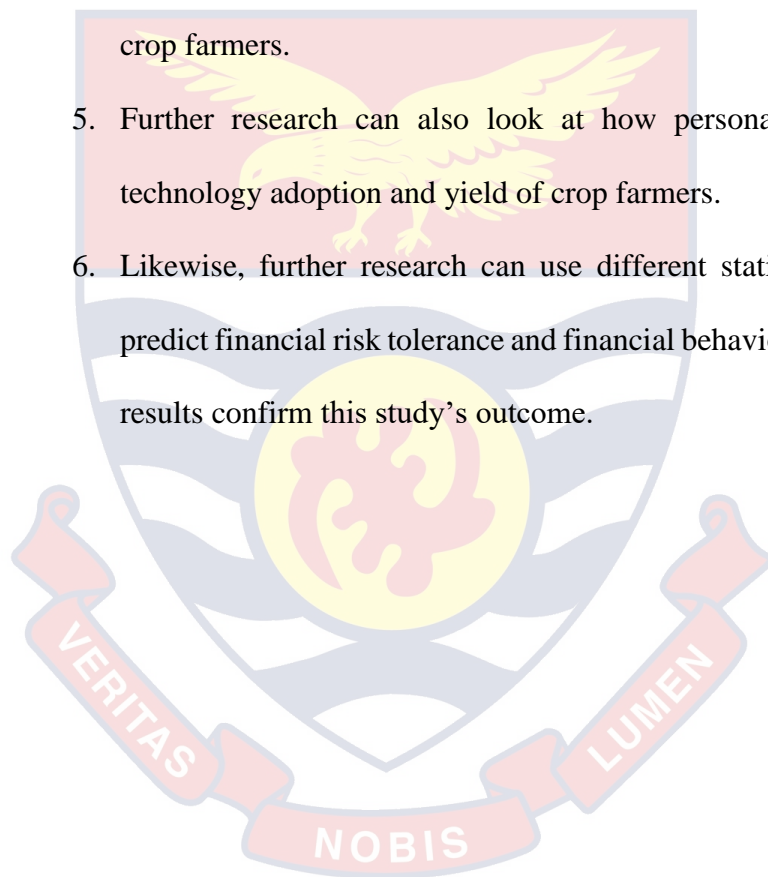
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# APPENDICES

## APPENDIX A: RESEARCH QUESTIONNAIRE

## UNIVERSITY OF CAPE COAST

## SCHOOL OF GRADUATE STUDIES

## COLLEGE OF AGRICULTURE AND NATURAL SCIENCES

## DEPARTMENT OF AGRICULTURAL ECONOMICS AND

## EXTENSION

**Dear Sir/Madam,**

Please fill in this questionnaire, giving as much information as you can. All information will be kept confidential and used solely for academic purposes. For any questions, please feel free to contact me on 0542371079 or edmund.dwamena@stu.ucc.edu.gh or my supervisor at sdadzie@ucc.edu.gh

| SECTION A: PERSONAL PROFILE | | |
|---|---|---|
| **#** | **Item** | **Response(s)** |
| 1 | Location of respondent | …………………………………………………… |
| 2 | Age (in years) | …………………………………………………… |
| 3 | Sex | ☐ Male  ☐ Female |
| | | |

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| 4 | Marital status | ☐ Married ☐ Single ☐ Divorced <br><br> ☐ Widowed |
|---|---|---|
| 5 | Highest level of education achieved | ☐ No formal education ☐ Nursery/KG <br><br> ☐ . S.H.S. ☐ Certificate/ Vocational Training <br><br> ☐ Diploma ☐ Bachelor's Degree ☐ J.H.S. <br><br> Others …………………………………………… |
| 6 | Number of years in education | ……………………………………….…… |
| 7 | Household size | ……………………………………………….. |
| 8 | Number of dependents | ……………………………………………….. |
| 9 | Are you the owner of the maize agribusiness? *If* | ☐ Yes ☐ No |

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| | | |
|---|---|---|
| | *no, move to* <br><br> *Q.10* | |
| 10 | If no, do you have substantial knowledge about the decisions taken on the farm? <br> *NB: If no, look for the owner.* | ☐ Yes  ☐ No |
| 11 | Years of farming | ☐ Less than 5 years   ☐ 5 – 10 years <br><br> ☐ 10 – 20 years   ☐ Over 20years |
| 12 | Farm Size | ☐ Equal or Less than 5 acres   ☐ 6 – 10 acres <br><br> ☐ 11 – 15 acres   ☐ Over 16 acres |
| 13 | Any other income generating activities? <br> If yes, state it | ☐ Yes  ☐ No <br><br> ………………………………………………… |

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| 14 | Have access to Agricultural Extension Services | ☐ Yes  ☐ No |
|----|-----------------------------------------------|-------------|
| 15 | In any form of association or cooperative society | ☐ Yes  ☐ No |
| 16 | Farm Income generated from last year planting season | ☐ 0 - GH₵1000    ☐ GH₵1001 - GH₵2000<br><br>☐ GH₵2001 - GH₵3000<br><br>☐ GH₵3001 - GH₵4000    ☐ Above GH₵4001 |

## SECTION B: FINANCIAL BEHAVIOUR (PART I)

This section measures your financial behaviour. It is made up of two parts, the first part requires you to score the items measuring Financial behaviour from 1 to 5.

Where 1 = Never

  2 = Seldom

  3 = Sometimes

  4 = Often

  5= Always

The next part involves the specification of your savings and financial asset.

| # | INDICATOR | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| *Please indicate how often you have engaged in the following activities in the past year growing season* | | | | | | |
| 17 | Comparison shopped when purchasing an agro-input or a service. | | | | | |
| 18 | Paid all your bills on time. | | | | | |
| 19 | Kept a written or electronic record of your monthly agribusiness expenses. | | | | | |
| 20 | Stayed within your budget or spending plan before, after and during the growing season. | | | | | |
| 21 | Paid off loans in full regularly. | | | | | |
| 22 | **Maxed** out the limit of "Qwikloan" credit you can take from one or more mobile money networks. | | | | | |
| 23 | Made only minimum payments on loans | | | | | |
| 24 | Began or maintained an emergency saving fund | | | | | |
| 25 | Saved money from every earning from my agribusiness venture. | | | | | |

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| 26 | Saved for a long term goal such as a Maize Sheller, Small Tractor Cultivator, etc | | | | | |
|----|-----------------------------------------|---|---|---|---|---|
| 27 | Contributed money to a retirement account | | | | | |

*The following questions is based on your **past year** behavior towards insurance. Please score it just like item 17 to item 27. That is, 1=Never, 2 = Seldom, 3 = Sometimes, 4 = Often, 5= Always*

| 28 | Maintained or purchased adequate health insurance policy | | | | | |
|----|----------------------------------------------------------|---|---|---|---|---|
| 29 | Maintained or purchased adequate property insurance like crop insurance | | | | | |
| 30 | Maintained or purchased adequate life insurance policy | | | | | |

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**SECTION B CON'T: FINANCIAL BEHAVIOUR (PART II: SAVING**

**RATIO)**

*Please glance through the list of financial asset and provide the cost of **ONLY***

*the asset you own.*

| # | Financial behaviour item | Options | |
|---|---|---|---|
| 31 | Specify the savings generated from your last year planting season | GHℭ………………………………………. | |
| 32 | Indicate the range within which your last year savings from maize agribusiness falls. (*Tick where appropriate*) | 1 = ≤ GHℭ500 | |
| | | 2 = GHℭ501 - GHℭ1000 | |
| | | 3 = GHℭ1001 - GHℭ1500 | |
| | | 4 = GHℭ1501 - GHℭ2000 | |
| | | 5 = GHℭ2001 - GHℭ2500 | |
| | | 6 = Above GHℭ2501 | |

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| 33. **Financial Asset** | Cost |
|---|---|
| Non-farm financial asset:<br><br>savings, fixed deposit at the bank, funds generated<br><br>from cooperatives and other non-farm asset | |
| Farmland | |
| Last year Maize yield | |
| Farm implement | |
| Farm machinery | |
| Insurance premium for self and household | |
| House | |
| Other financial asset:<br><br>Money lent out to family or friends, remittances,<br><br>savings or investment not mentioned before | |

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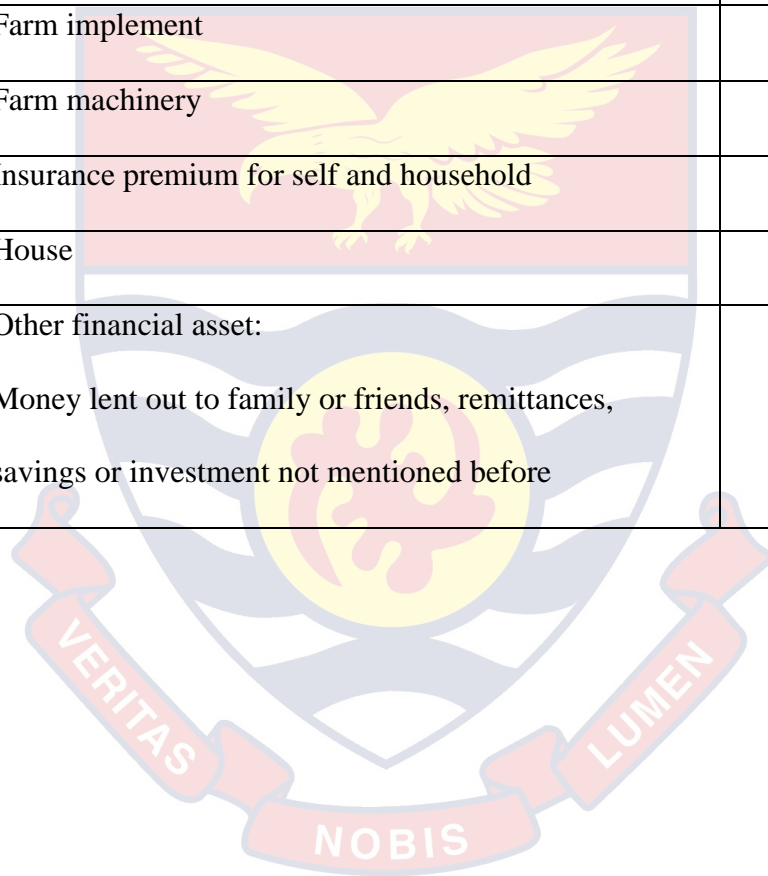
**SECTION C: 13 – ITEM FINANCIAL RISK TOLERANCE SCALE**

This section of the questionnaire measures your financial risk tolerance. As a result, you are required to respond to the following question and tick the appropriate option that applies to you.

| # | Item | |
|---|---|---|
| 34 | In general, how would your close colleague farmer describe you in terms of risk taking? | |
| Answer choices ✔ (tick one) | A | A real gambler |
| | B | Willing to take risk after completing adequate research |
| | C | Cautious |
| | D | A real risk avoider |
| 35 | You've won the overall best farmer award in your District and you've been asked to choose one of the following as your award, which would you take? | |
| Answer choices ✔ (tick one) | A | GH₵ 1,000 worth of agro input |
| | B | A 50% chance at winning GH₵ 5,000 worth of agro input |
| | C | A 25% chance at winning GH₵ 10,000 worth of agro input |
| | D | A 5% chance at winning GH₵ 100,000 worth of agro input |
| | | |

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| 36 | | As a farmer, you have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you got news that your farm is burnt. You would: |
|---|---|---|
| Answer choices ✔ (tick one) | A | Cancel the vacation |
| | B | Take a much more modest vacation |
| | C | Go as scheduled, reasoning that you need the time to prepare and start a new farm |
| | D | Extend your vacation, because this might be your last chance to go with a "VIP BUS" |
| | | |
| 37 | | If you unexpectedly received GH₵ 10,000 to invest, what would you do? |
| Answer choices ✔ (tick one) | A | Deposit it in a bank account |
| | B | Invest it in irrigation facilities |
| | C | Invest it in a new maize seed variety **purported** to be higher yielding and resistant to pest |
| | | |
| 38 | | In terms of experience, how comfortable are you investing in rain fed agriculture? |
| Answer choices ✔ (tick one) | A | Not at all comfortable |
| | B | Somewhat comfortable |
| | C | Very comfortable |

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| | | |
|---|---|---|
| 39 | | When you think of the word "risk", which of the following words comes to mind first? |
| Answer choices ✔(tick one) | A | Loss |
| | B | Uncertainty |
| | C | Opportunity |
| | D | Thrill |
| | | |
| 40 | | Some experts are predicting prices of major cash crops in Ghana to increase in value; price of cereals *including maize* may fall, however, experts tend to agree that farms supported by the government through its Planting for Food and Jobs intervention are relatively safe. Most of your investment assets are now in government supported maize fields. What would you do? |
| Answer choices ✔(tick one) | A | Keep the maize farm |
| | B | Sell the maize farm and put the total proceeds into cash crops |
| | C | Sell the maize farm and put half the proceeds in the bank and the other half into cash crops |
| | D | Sell the maize farm, put all the money into cash crops, and borrow additional money to put into cash crops |
| | | |

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| 41 | Given the best and worst case returns of the four investment choices below, which would you prefer? | |
|---|---|---|
| Answer choices ✔ (tick one) | A | GHℂ 500 gain from maize produce (best case); GHℂ 0 gain/loss (worst case) |
| | B | GHℂ 2,000 gain from maize produce (best case); GHℂ 500 loss (worst case) |
| | C | GHℂ 6,500 gain from maize produce (best case); GHℂ 2,000 loss (worst case) |
| | D | GHℂ 12,000 gain from maize produce (best case); GHℂ 6,000 loss (worst case) |
| | | |
| 42 | In addition to whatever you own, you have been given GHℂ 2,000. You are now asked to choose between; | |
| Answer choices ✔ (tick one) | A | A sure gain of GHℂ 1000 |
| | B | A 50% chance to gain GHℂ 2,000 and a 50% chance to gain nothing |
| 43 | In addition to whatever you own, you have been given GHℂ 4,000. You are now asked to choose between; | |
| Answer choices ✔ (tick one) | A | A sure loss of GHℂ 1000 |
| | B | A 50% chance to lose GHℂ 2,000 and a 50% chance to lose nothing |

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| 44 | | Suppose a relative left you an inheritance of GH₵ 10,000, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select? |
|---|---|---|
| Answer choices ✔ (tick one) | A | Deposit it in a saving account |
| | B | Invest in rainfed agriculture and irrigated agriculture |
| | C | Use money to invest in a number of new maize varieties **purported** to be high yielding and resistant to pest |
| | D | Invest in the storage and trade of agricultural commodities |
| | | |
| 45 | | If you had to invest GH₵ 10,000 in your maize agribusiness, which of the following investment choices which spans from low risk investment, medium risk investment to high risk investment would you find most appealing? |
| Answer choices ✔ (tick one) | A | GH₵ 6,000 in land purchase, GH₵ 3,000 in farm machinery purchase, GH₵ 1,000 in new seed varieties |
| | B | GH₵ 3,000 in land purchase, GH₵ 4,000 in farm machinery purchase, GH₵ 3,000 in new seed varieties |
| | C | GH₵ 1,000 in land purchase, GH₵ 4,000 in farm machinery purchase, GH₵ 5,000 in new seed varieties |
| | | |
| 46 | | Your trusted friend and neighbour, an experienced Agriculturist, is putting together a group of farmers to start an agribusiness which includes massive maize production. |

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| | | The farm could pay back 50 to 100 times the investment if successful. If the farm is a **bust**, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest? |
|---|---|---|
| Answer choices ✔ (tick one) | A | Nothing |
| | B | One month earning from your farm business |
| | C | Three month earning from your farm business |
| | D | Six month earning from you farm business |

## SECTION D: BIG FIVE PERSONALITY TRAITS

This section uses the Goldberg's big five personality trait scale to measure your personality traits which are categorized as follows; openness, conscientiousness, extraversion, agreeableness and neuroticism. You are required to score each item from 1 to 5.

Where **1**= Strongly Disagree (SD),

    **2** = Disagree (D),

    **3** = Neutral (N),

    **4** = Agree (A), and
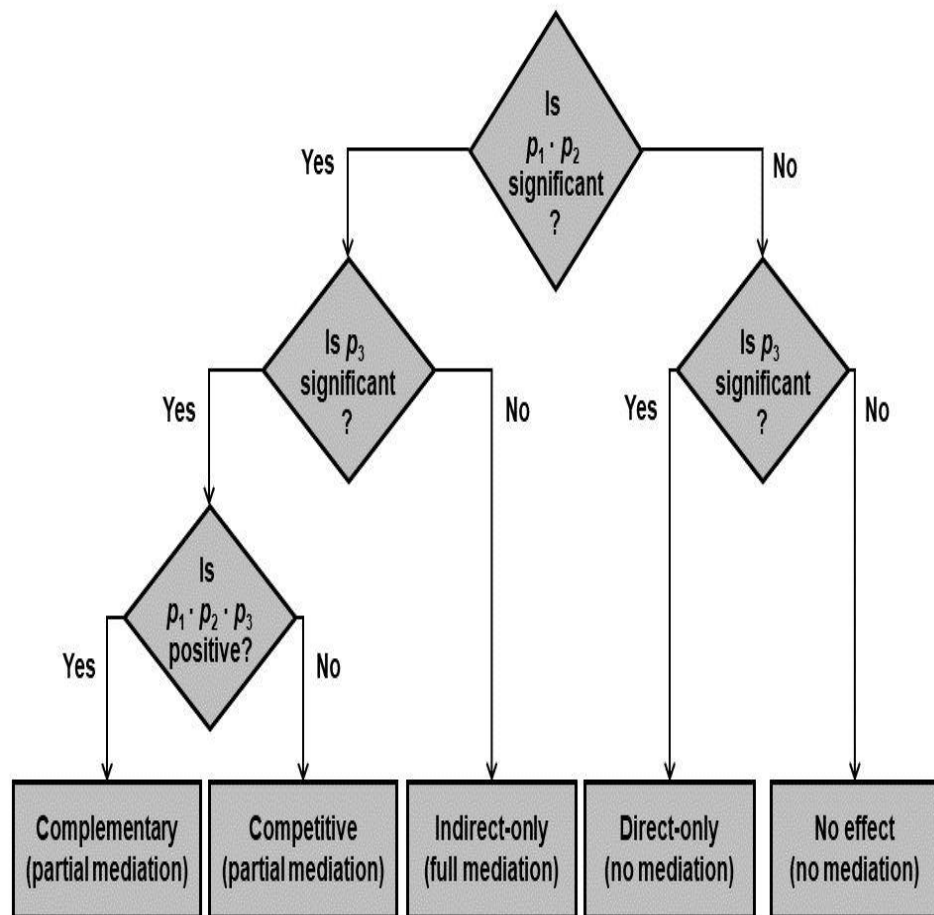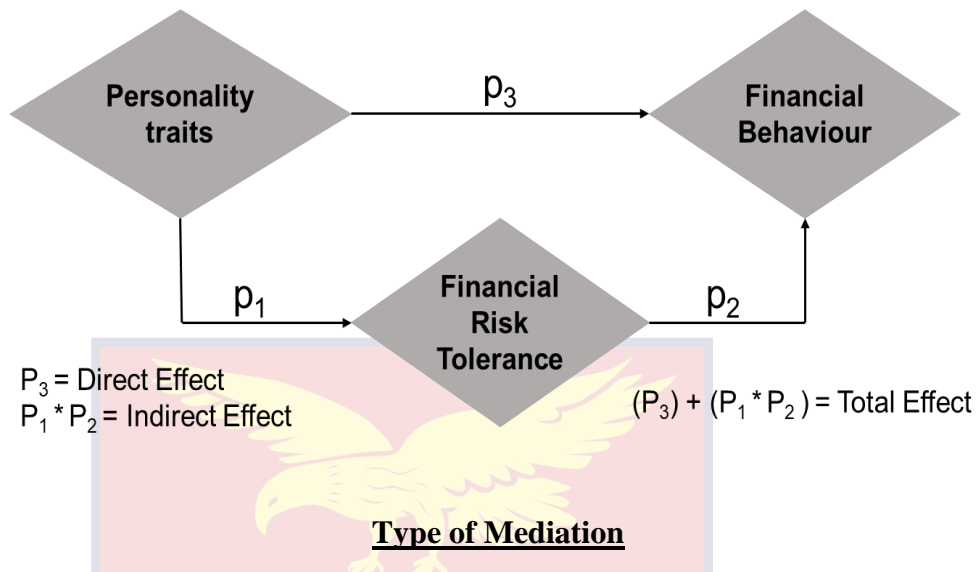
    **5** = Strongly Agree (SA)

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| # | INDICATOR | 1 | 2 | 3 | 4 | 5 |
|---|-----------|---|---|---|---|---|
| **(O) OPENNESS** | | | | | | |
| 47 | Have a vivid imagination | | | | | |
| 48 | Have excellent ideas | | | | | |
| 49 | Am quick to understand things | | | | | |
| 50 | Spend time reflecting on things | | | | | |
| 51 | Am full of ideas | | | | | |
| **(C) CONSCIENTIOUSNESS** | | | | | | |
| 52 | Am always prepared | | | | | |
| 53 | Pay attention to details | | | | | |
| 54 | Get chores done right away | | | | | |
| 55 | Like order | | | | | |
| 56 | Follow a schedule | | | | | |
| **(E) EXTRAVERSION** | | | | | | |
| 57 | Am the life of the party | | | | | |
| 58 | Feel comfortable around people | | | | | |
| 59 | Start conversations | | | | | |
| 60 | Talk to a lot of different people at Parties | | | | | |
| 61 | Don't mind being the center of Attention | | | | | |
| **(A) AGREEABLENESS** | | | | | | |
| 62 | Am interested in people | | | | | |
| 63 | Sympathize with others' feelings | | | | | |
| 64 | Take time out for others | | | | | |

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| 65 | Feel others' emotions | | | | | |
|----|-----------------------|---|---|---|---|---|
| 66 | Make people feel at ease | | | | | |
| **(ES) EMOTIONAL STABILITY** | | | | | | |
| 67 | Am relaxed most of the time | | | | | |
| 68 | Seldom feel blue | | | | | |
| 69 | Am not easily bothered by things | | | | | |
| 70 | Rarely get irritated | | | | | |
| 71 | Seldom get mad | | | | | |

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

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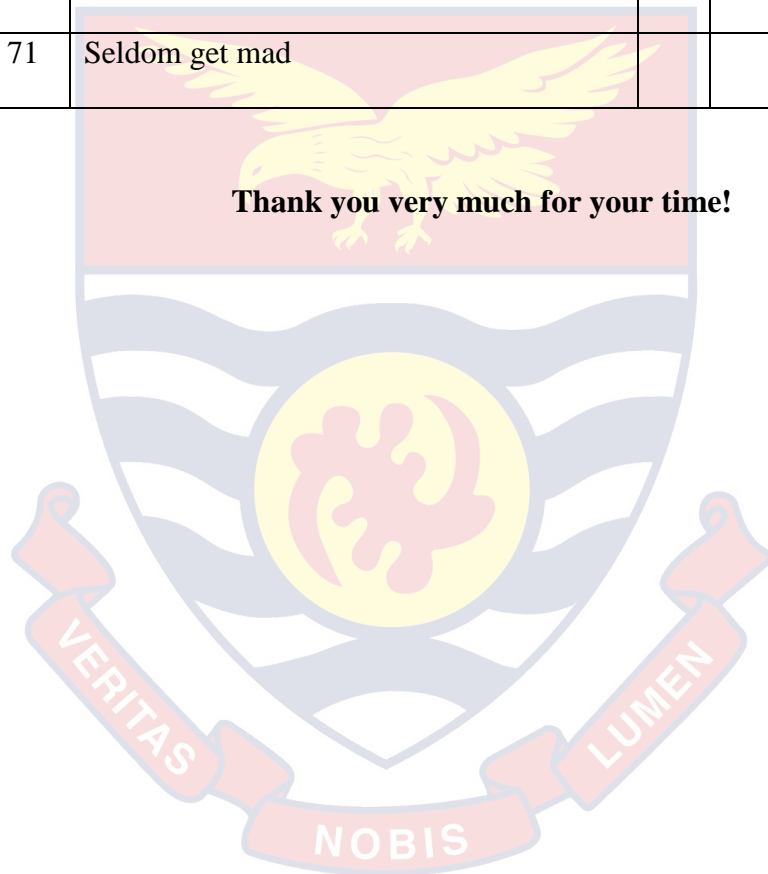
**APPENDIX B: GUIDE ON THE TYPE OF MEDIATION IN PLS-SEM**

**Mediation Model**



$P_3$ = Direct Effect
$P_1 * P_2$ = Indirect Effect

$(P_3) + (P_1 * P_2)$ = Total Effect

**Type of Mediation**



| | | | | |
|---|---|---|---|---|
| Complementary (partial mediation) | Competitive (partial mediation) | Indirect-only (full mediation) | Direct-only (no mediation) | No effect (no mediation) |

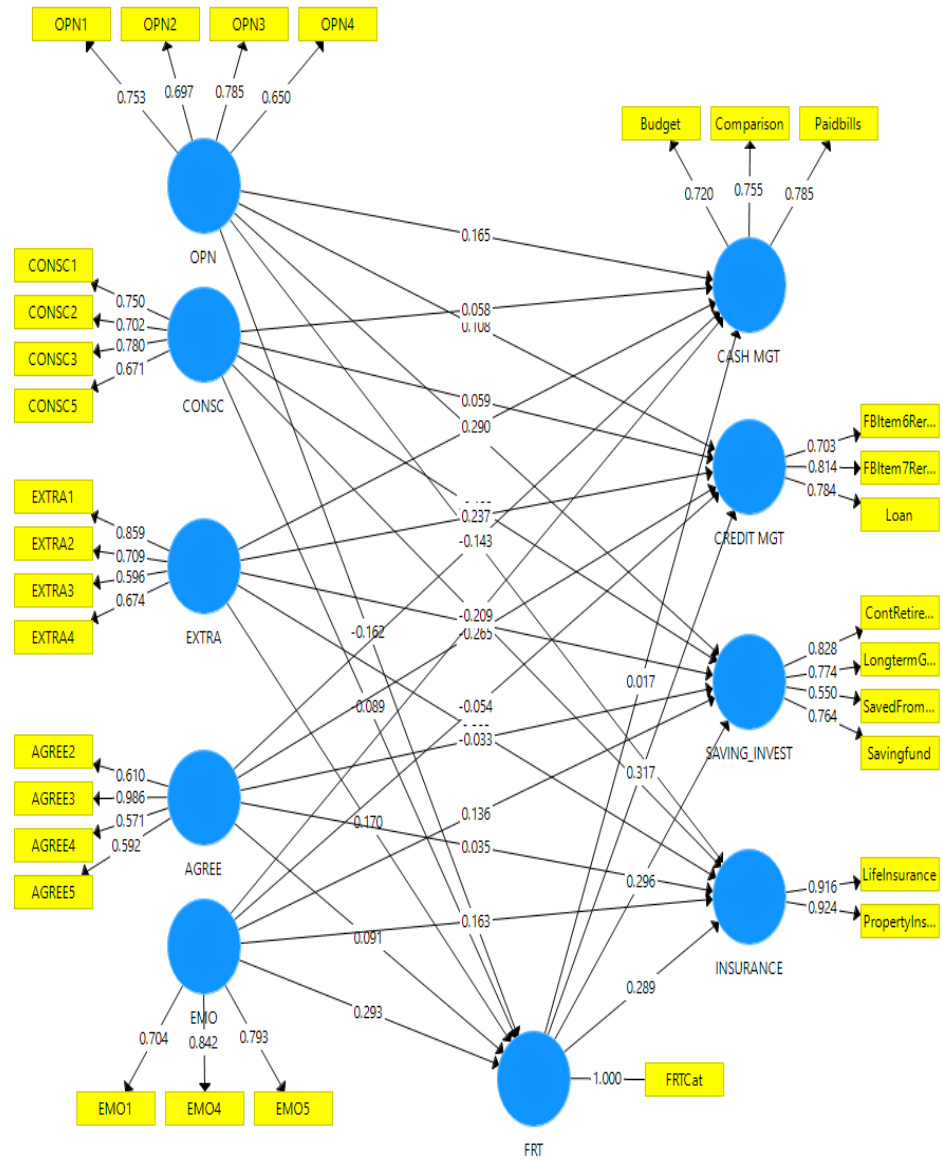Source**:** Zhao, Lynch, & Chen (2010)

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## APPENDIX C: MEASUREMENT AND STRUCTURAL MODEL

## AFTER ANALYSIS



Source: Field Survey, (2020)

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