Non-Market Valuation of Cultural Heritages in Ethiopia Using Travel Cost and Contingent Valuation Methods: An Application to Rock- Hewn Churches of Lalibela

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This is to certify that the thesis prepared by Addisu Anteneh, entitled: Non-Market Valuation of Cultural Heritages in Ethiopia Using Travel cost and Contingent Valuation Methods: An Application to Rock- Hewn Churches of Lalibela, and submitted in partial fulfillment of the requirement for the degree of Masters of Science in Economics (Resource and Environmental Economics) complies with the regulations of the university and meets the accepted standards with respect to originality and quality.

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To

The memory of Zewdu Abate

Abstract

Non-Market Valuation of Cultural Heritages in Ethiopia Using Travel Cost and Contingent Valuation Methods: An Application to Rock- Hewn Churches of Lalibela

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Addis Ababa University, 2014

The value of cultural heritage such as the Rock- Hewn Churches of Lalibela (RHCL), cannot be obtained using market price. Non market valuation technique has to be used to value them. However, such studies in the developing world in general and Ethiopia in particular are scarce. Therefore, the main purpose of this study is to estimate the total economic value of RHCL using non-market valuation methods. The total number of respondents used in the empirical analysis was 200. The study uses the Individual Travel Cost Method to estimate the use value of RHCL and the Dichotomous Contingent Valuation Method to investigate the mean WTP for the non use value of the RHCL. The truncated negative binomial method (TNBM) was employed to derive the demand function for use value of RHCL. The logit model and bivarite probit model were used to estimate the non use value of RHCL. To know basic determinants of maximum WTP we also applied the standard Tobit model. The regression result showed that travel cost, monthly income, age, education and knowledge are important determinants of the recreational demand of the site. On the other hand, the first bid price, the second bid, monthly income, and gender are important determinant of WTP for the non use value part of the site. The Tobit model depicted that income gender and age are important determinants of the maximum willingness to pay (MWTP). The result of the study also showed that the potential annual use value of the RHCL was estimated to be 759,687,113 ETB per annum and the annual non use value of the site is 42,525,661 ETB. Therefore, the annual total economic value of the site is approximately 42 times higher than the current revenue. Furthermore, the entrance fee that would maximize income was 11.32 USD per four days. Finally, we recommend that efforts should be made by the government and other relevant stakeholders to improve the site and maximize the benefits that can be derived from the RHCL. Future research areas are also suggested.

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Almighty God, I am fret about "What I have to say about you and your mother Virgin Saint Merry and how I express your heart full love?!" Let me declare as usual expressed by other saints" Thank you for your priceless love and good fatherhood"!

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List of Acronyms

CBA= Cost and Benefit Analysis

CS =Consumer Surplus

CVM= Contingent Valuation Method

DB-DC= Double Bounded Dichotomous Choice

ETB= Ethiopian Birr

GNP= Gross National Product

HPM= Hedonic Price Method

HTCM= Hypothetical Travel Cost Method

ITCM=Individual Travel Cost Method

ICOMOS= International Council on Monuments and Sites

ITCM =Individual Travel Cost Method

LL=Log Likelihood

MCT=Ministry of Culture and Tourism

ML= Maximum Likelihood

NB= Negative Binomial

NOAA= National Oceanic and Atmospheric Administration (USA)

OLS =Ordinary Least Square

TCM= Travel Cost Method

TNB= Truncated Negative Binomial

TP=Truncated Poisson

TNBM=Truncated Negative Binomial Model

TTC= Total Travel Cost

RDM= Recreation Demand Model

RHCL=Rock-Hewn Churches of Lalibela

RSE=Robust Standard Errors

RUM= Random Utility Method

UK=United Kingdom

USA =United States of America

USD=United States Dollar

UNESCO=United Nation Educational, Scientific and Cultural Organization

VIF= Variance Inflation Factor

WTA =Willingness-to-Accept

WTO=World Tourism Organization

WTP =Willingness-to-Pay

WTV =Willingness-to-Visit

ZTCM =Zonal Travel Cost Method

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Chapter One: Introduction

1.1. Background of the Study

Tourism is one of the world's fastest growing industries and is one of the largest industries in the world. It is also becoming a major source of income for many countries. The international tourism revenue amounted to 1.16 trillion U.S. dollars in 2013. This figure has been 475 billion USD in 2000 which shows that sector is growing very fast.[1]

The growth of the sector is due to a trend towards an increased specialization among travelers, tourist destinations, as well as services delivered to tourism industry. Therefore, the growth, economic significance and potential are phenomenal in both developed and developing world. However, the potential of the sector has not been exploited to its maximum capacity (Virginia Department of Historic Resources, 1998).

Of the different types of tourism, cultural tourism is often argued to be one of the most important and rapidly growing areas of global tourism. Because of people's preference to seek out uniqueness, cultural tourism which is unique in character has become a major new area of tourism demand. It is believed that almost all policymakers are now aware of the importance of cultural tourism and give more attention to the development of the sector and contribute to the economy. Heritage tourism, which is the broader category of "cultural tourism", is now a major pillar of the emerging tourism strategy of many countries (Richards, 1996). They have been popular attractions for both domestic and international tourists (Walsh et al., 1984). For example, over one quarter of all adults in

[1] This was retrieved from http://www.statista.com/statistics/273123/total-international-tourism-receipts/

the US reported visits to historic places or museums in 1996 (Walsh et al. 1984). Similarly, heritage tourism has been cited as one of Britain's most vital economic sectors. England has over 2,000 historic buildings, which are regularly open to the public, together attracting more than 70 million visits per year (Fyall and Garrod, 1998).

Ethiopia can be expressed as a mosaic of people and cultures, encyclopedia of geology, the cradle of humankind and civilization. The natural and interesting landscape, endowed with rich biodiversity, socked in history, culturally hospitable, traditionally sensitive, and intrinsically religious people put together Ethiopia a tourist paradise. As a result, many travelers, researchers, and tourists have been visiting the land since long ago. Most of them extensively have written and spoken of their unique and amazing experiences (Pankhurst, 2005).

Despite the country’s potential in attracting tourists and enhance the contribution of the sector to the economy, the country could not be able to benefit from the sector. For instance, Ethiopia’s share of the African tourism market in 2009 was less than 1 percent. By recognizing the potential as well as the problems of the tourism sector, the government of Ethiopia has set ambitious growth targets of doubling tourist arrivals from the current 500,000 to 1 million, and a twelve-fold increase in tourists’ expenditures, from US$250 million in 2010 to US$3 billion by 2015 (MCT,2012). In order to achieve these targets, the policy makers and other relevant stakeholders need to consult the experiences of other successful countries and conduct empirical studies on the current status, problems or constraints, and visitors’ valuation of the country’s tourist areas. It is important to for the government to get information based on a rigorous study on how tourists value tourist attraction areas in general and cultural heritages such as the Rock-Hewn churches of Lalibela in particular. The government's transformation plan has to be supported and guided by empirical researches which would be helpful for appropriate decision-making.

1.2. Statement of the Problem

Ethiopia is renowned for its distinctive historic buildings—including churches, monasteries, and fortress and—many of which date back to the medieval periods. These buildings are essential part of the cultural heritage of Ethiopia's people and make a great impression on tourists and visitors. The country has nine cultural heritages on the World Heritage Sites list. Most of these historical heritages including the Rock-Hewn churches of Lalibela have been visited by many domestic and international visitors. However, the country has not generated enough revenue from the sector. This is mainly due to lack of rigorous empirical studies on visitors valuation of the historical sites in addition to other complex socio-political problems. The visitation rates, economic values and entrance fees to be charged on visitors, project appraisals for conservation and other scientific analysis on how to set long-lasting plans to these resources are almost void in the country. Despite such kinds of empirical (scientific) investigations are important for prioritizing interventions, assigning funding and personnel, and establishing management decisions and policies.

The worlds' travel and tourism competitiveness report of 2013 ranked countries using indexes such as: environmental sustainability, safety and security of tourism sites, prioritization of travel & tourism, travel and tourism business environment and infrastructure, air transport infrastructure, ground transport infrastructure, tourism infrastructure, price competitiveness in the travel and tourism industry, travel and tourism in human, cultural, and natural resources. Ethiopia ranked 120th out of the total 140 countries (World Economic Forum, 2013). The low performance is due to lack of low affordable touristic offerings and hotels, poor entrance fees determination, unsatisfactory policies and regulations, low private-sector involvements, low performance in natural and cultural resource conservation and protection of touristic areas/facilities (World Economic Forum, 2013).

Recently most heritages including RHCL are threatened by both manmade and natural agents. Lack of appropriate funds and skilled personnel significantly contribute to the deterioration of cultural heritages in Ethiopia. It is timely and crucial to address these problems and look for resources which would help to preserve and maintain the heritages. Hence, it is timely to study and inform the government and other stakeholders on how to maximize the revenue from the tourism sector in general and cultural heritages in particular. The revenue could be used for preserving and keeping these resources from further damage so that it can be transferred to the future generation.

Therefore, agencies, organizations and the public whose attention is to preserve historic and cultural resources from the revenges of weather, pollution, and other harmful things, must compete conservation plan of these resources (give of equal opportunities) with other social goals and raise the following turning questions as a cornerstone to their decisions. What is the proper level of expenditure on cultural heritages? Given limited resources, priorities must be set among competing preservation and restoration goals and given many different types of cultural heritage and many pressing problems, which problem should be addressed first? Should preservation and restoration efforts be supported by only tax revenue? Should we raise taxes to increase spending on cultural heritages, or should we divert resources away from some other valuable foundations such as education, health care, or aid to the poor? Should cultural heritage goods be self-supporting through either user fees or donations and subscriptions?

In order to address these issues, non-market valuation techniques has been developed. However, there is no evidence whether there is a research regarding the recreational demand modeling and non-market valuation of cultural resources in Ethiopia using these techniques. Moreover, many people equate this place as recreational services with fun and religious purpose. They do not consider it as a subject for serious study. Hence we adopted this technique to estimate and analyze the value of cultural heritages (i.e. RHCL) in Ethiopia.

1.3. Objectives of the Study

1.3.1 General Objective of the Study

The main objective of this study is to examine non-market value of Rock- Hewn churches of Lalibela using TCM and CVM.

1.3.2 Specific Objective of the Study

Under the umbrella of the general objective, the following are the specific objectives of the study:

- Identify factors that determine visitors' maximum willingness to pay for conservation and protection of the RHCL.
- Estimate a recreation demand function for visiting the site and approximate the economic benefit of the site using CVM and TCM.
- Determine the optimum and efficient entrance fee that would be charged to visitors.
- Based on the results, provide alternative policy implications that enable relevant stakeholders to take appropriate action in order to improve the quality of this cultural heritage and its respective long-lasting benefits.

1.4. Significance of the Study

A lot of research work on valuation of historical sites has been done in many developed countries. However, in developing countries, limited attempts have been made to estimate the economic values of natural and cultural heritage resources. To our knowledge, no attempt has been made in Ethiopia to impute the economic values of any of the cultural heritages using valuation techniques. So, this study contributes to the existing limited economic literature on valuation of cultural heritages and can be used as a basis for related studies in the future. Moreover, the findings of this study could demonstrate the policy makers' ways of extracting the maximum benefit out of the potential tourists who want to visit the church. The revenue could in turn be used for improving the qualities of the site, keep this wonder heritage of the world without damage to the next generations and expand the type and variety of the services and then to minimize some of the challenges.

1.5 Scope and Limitations of the Study

This study confined to only one cultural heritage in Ethiopia. Budget and time constraints did not allow us to examine and compare the current study with other cultural and natural heritages in the country such as Axum monument, Semen Mountain and the like. Also the study is limited to a cross sectional data selected from visitors of RHCL in 2014 and future studies can consider the dynamic aspect by taking data on repeated time.

In addition, due to budget constraint the sample size is limited to 250 even if the site has international market extensions. Future studies have to take in to account these limitations when analyzing the non market value of cultural heritages.

1.6. Organization of the Study

The thesis is organized as follows. Chapter one has focused on the introduction of the study. In Chapter two, theoretical background of environmental valuation and a brief review of previous empirical literatures are presented. The methodological framework, travel cost and contingent valuation, the development of survey, data collection, and survey design issues are all described in detail in chapter three. In chapter four, sample descriptive statistics are presented. The empirical analysis and discussion on the main findings are presented in chapter five. Finally, the main findings of the study are concluded and some important policy implications are discussed.

Chapter Two: Literature Review

2.1 Theoretical Literature Review

2.1.1 General Concepts of Heritage and Cultural Heritages

There are various definitions of heritage. Heritage is associated with the word inheritance that is transferred from one generation to another. Heritage has been also defined as an inheritance or a legacy; things of value which have been passed from one generation to the next (Prentice, 1993). The International Council on Monuments and Sites (ICOMOS, 1999) defined heritage as:

"... a broad concept and includes the natural as well as the cultural environment. It encompasses landscape, historic places, sites and built environments, as well as biodiversity, collections, past and continuing cultural practices, knowledge, and living experiences. It records and expresses the long processes of historic development, forming the essence of diverse national, regional, indigenous, and local identities and is an integral part of modern life. It is a dynamic reference point and positive instrument for growth and change. The particular heritage and collective memory of each locality or community is irreplaceable and an important foundation for development both now and in the future..."

Heritage resources can be site and event attractions. Site attractions are all those, whether manmade or natural, indoor or outdoor, that are permanent and fixed to one spot. For example, the Rock-Hewn Churches of Lalibela is a site attraction. Event attractions are phenomena that may occur in the same place at a regular time each year but which are only temporary and could, at least in theory, move to a different site. For example, the Ethiopian Orthodox Church *MEZEMUR* (music) of Saint Yared at *MESKEL* (Saint Cross) ceremony on 27th of September is an event attraction (Yale, 1998).

UNESCO has defined heritage as cultural property and classified as visible and non-visible cultural heritage. The non-visible heritage includes language, religion, and customs while the visible aspects are moveable and immoveable heritage. Moveable heritage are the various forms of artifacts and fossils, whereas the immoveable heritage comprises the unique natural environment and the archaeological sites that include forts, castles and buildings (Rahman, 1996; Yale, 1998).

However, majority of researchers agreed that heritage resources are classified mainly into two: cultural heritage resources and natural heritage resources (Ashworth, 1995; Wahab, 1996; Sammeng, 1996; Smith, 2003).Therefore, such a classification of heritage resources is followed throughout this thesis and the definitions of each are examined.

Natural heritages are physical, biological, geological and physiographical formations with precisely delineated areas, which constitute the habitat of animals and plants of outstanding universal value from the point of view of science. Beaches, mountains, rivers, and other beauty spots are all examples of natural resources (Yale, 1998).

On the other side, **Cultural heritage** are anything which record the activities of each generation (past or present) practically, ideally, and materially. They may be defined as architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings, and combinations of features, which have outstanding universal value from the point of view of history, art, or science. Cultural heritage does not relate only to tangible works of art, but also to the intangible aspects of people's lives, traditions, and customs. For example, not only the Rock-Hewn Churches of Lalibela but also the general formalities of these churches for religious experiences in major church festivals are the cultural heritages of Ethiopia (Feilden and Jokilehto, 1998).

Cultural heritage goods are more or less similar to environmental goods in that they are typically public goods (Ready and Navrud, 2002). Therefore, they have two main properties. These are non-excludability and non-rival.

Non-excludable: mean that it is infeasible to keep users from enjoying the good. Cultural heritage good varies in their degree of exclusion. Viewing an artifact in a museum is an excludible activity - it is easy for the museum to keep someone out who do not pay for the entrance fee. However, sightseeing in an historic area of an old city for example Gondar city is typically not an excludible activity - it is impractical to try to charge admission to a living part of a city (Ready and Navrud, 2002).

Non -rival: mean that if two people can consume the public good at the same time without interfering on other's consumption of that good. One citizen’s consumption is non-rival to others and no citizen can be excluded from consumption. This aspect of cultural heritage is important because if a cultural heritage good is non-rival in consumption, then it will always be better to allow more people to enjoy it.

2.1.2. Use and Non-Use values of Cultural Heritage Goods

The value that a person gets from being able to enjoy a cultural heritage good is defined as the largest amount of money that person would willingly pay to have that opportunity-getting heritage (Garrod et al., 1996). For a cultural heritage site, the recreation use value that a visitor receives would be defined as the largest amount of money the visitor would be willing to pay, over and above any actual entry fee, to gain access to the site. The expected benefits(utilities), which tourists expect to receive from the use of an area, can affect visitor numbers, length of stay on site, number of visits per year, tax amounts collect from visitors and money spent within a particular region for conservation and management planning (Wahab, 1996). Hence, it is useful if the total recreation use value generated by the site as the sum of all the individual visitors' WTPs can be calculated (Ready and Navrud, 2002).

However, a cultural heritage site might generate recreation values even to those who do not visit the site. This is due to existence values and option values that will derive from using the site in the future. Non-use recreation value includes benefits that people enjoy because they know the site is being preserved (Ready and Navrud, 2002). Additionally, people may consume cultural good as visitors to cultural and historic sites, and may be willing to pay along with non-users to ensure their continued existence and availability for future generations (Willis, 2002). For instance, Bille (1997) itemizes non-use values of the Royal Theatre as follows: Recreational relax and leisure time, pride, educational benefit, bequest benefit, prestige benefit, etc.

In Ethiopia, even though a large proportion of the Ethiopian population never visits the *St. Yimihrana Kristos church* in Northern part of Ethiopia (particularly, in Northern Wollo 50 Kilo meters far from Lalibela city), they may an intension to willing to pay an option price for the possibility of being able to go there and for the non-use value of the church[2]. These benefits of cultural resource might be motivated by altruistic values, bequest values, option value, and existence values (Ready and Navrud, 2002). The existence values seem to reflect people's preferences, including their concern for, sympathy with, respect for, the rights or welfare of non-human beings, and their concern for and sympathy with efforts to avoid despoliation of irreplaceable historical sites, which are unrelated to actual or potential use to serve human ends (Pearce and Turner, 1990). Therefore, the total value of a cultural heritage good includes both use value and non-use value. The relative importance of these two categories of values varies widely among cultural heritage goods.

2.1.3. Valuation Models of Cultural Heritage Resources

Mostly, TCM and CVM were chosen as optimal non-market valuation methods for single-site cultural heritage resources amongst four non-market valuation methods (TCM,

[4] *"The Archangel Raphael instructed the blessed Yemrehana Kristos that the Lord had told him to build a stone sanctuary here, to clear out and cut the trees in the cave, and to burn them in a fire. After burning them Yemrehana Kristos found a large lake inside the cave, and was told to put logs in it, to put straw on them and on the straw put some mud, then put down some soil and build a monastery(Bibliography of St. Yemrehana Kristos(GEDLE YIMIHIRANA KIRSTOS))." The* **amazing** *church and you have to see in the future, if you have not experience of past visit!*

CVM, and Hedonic pricing method (HPM), choice modeling (CM), and RUM). This part deals with why TCM and CVM are the optimal methods for single site.

Many researchers mentioned the difficulties of adopting HPM in cultural heritage resources. Ready and Navrud (2002) argued that there are some practical problems in implementing the HPM for cultural heritage site. This technique will capture the value of the cultural heritage site only if the benefit from the cultural heritage site accrues only to those who live close to it. However, cultural heritage site tend to have important visitor use values and non-use values that cannot be captured by a housing price analysis. According to them, basically, people do not need to live close to a cathedral to visit it or to value the fact that it will be available for future generations. Nonetheless, HPM could be applied when selecting one site out of many similar except when one site is chosen without any alterative.

There is the other method to discuss, RUM. It is very similar to TCM (individual model) in terms of basic assumption and methodology. Both classes of models use observations on individual visits to sites and exploit travel cost as a proxy price. One essential difference between the models is the assumption about the recreationist's planning horizon. The TCM is a model of demand for the services of a site over a period of time, season, or year. On the other hand, the RUM describes how people choose among a group of sites each time a choice is to be made.

RUM of site choice is uniquely capable of investigating changes in site quality. Unfortunately, they are not well suited to predicting total visit numbers at a given site (Adamowicz et al., 1997). The RUM is useful when demand and value connected with recreation site's selection measures. However, those methods are not appropriate for evaluating the value of single site. In addition, RUM is not appropriate for evaluating total recreational value. It focuses on valuing the separate characteristics of a public good (Walker et al., 2002).

Choice modeling (CM) makes some of the basic stated preference approach but take somewhat different approach in related to defining what people are valuing, and how they are asked to reveal their preferences. Respondents asked to choose between alternative goods, defining in terms of their attributes. That means respondents are presented with various alternatives descriptions of a good , differentiated by their attributes and levels , and are asked to rank the various alternatives ,to rate them or to choose their most preferred. It includes price/cost as one of the attributes of the good; willingness to pay can be indirectly recovered from people's ranking, rating, or choices (Hanley et al, 2001). This may not appropriate to value cultural heritages since alternatives (attributes) may change totally the real existence (physical, ideal, material, religious....) of certain cultural goods. This may result the fading of its uniqueness and in turn may reduce total economic value of the site. More discussions for methods applied in this thesis are present below.

2.1.3.1 Travel Cost Method (TCM)

TCM approach was first suggested by Harold Hotelling in 1947 on the economics of recreation in USA national parks by the National Park Service using zonal models (Ward and Beal, 2000). Since then, the methodology was developed by others, including Clawson (1959), and Clawson and Knetsch (1966). TCM studies have consistently shown that as the price of access (cost of travel) increases, the visit rate to site falls. The TCM is usually estimated as a trip generating function such as the following:

$$V = f(P, Ts) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots. (2.1)$$

Where V is the visit rate and/or number of trips per year for zonal travel cost method and individual travel cost method respectively, P is the cost of travel to the site and T_s is a vector of travel costs to substitute sites.

TCM classified into zonal travel cost method and individual travel cost method models. However, both of them have rarely applied into cultural heritage resources than natural heritage resources. According to the research trend of outdoor recreation resources, the zonal model is mostly employed in the early stage. However, the individual model is recently common owing to its methodological advantages (Forrest et al., 2000). More discussions are presented below.

A. Zonal travel cost method (ZTCM)

In ZTCM, the recreation visitors residing at similar distances from a recreation site are aggregated in to zones. These zones can be countries, town, or a series of concentric rings around the recreation site. With information from on site survey about the number of trips from each zone to a recreation site and information on each zone's population, the visit rate of each zone is calculated. Visit rate is expressed as either visits per capita or visits per 1000 population. This visit rate is the dependent variable of the ZTCM (Ward and Beal, 2000).

B. Individual travel cost method (ITCM)

The ITCM is a survey technique and questionnaire is prepared and administered to a sample of visitors at a site in order to ascertain where they began their journey, demographic and attitudinal information, their frequency of visits to sites, and trip details such as purpose, length and associated expenditures. From these the cost of visits is calculated and related with other relevant factors to visit frequency so that a demand relationship may be established. The quantity variable is defined as the number of recreation trips and regressing on individual travel cost, travel time, and other demand shifters gives more precise estimates of parameters than the ZTCM (Ward and Beal, 2000).

According to Ward and Beal (2000), the main advantage of the ITCM is that it is more appropriate and efficient than the ZTCM when the objective of an analysis is to explain individual consumer behavior. They also argued that ITCM gave a demand curve more efficient than the ZTCM in the sense that there was more variation on variables such as tests and preference as well as on frequency of trips and travel cost.

On the other hand, limitations of the ITCM approach have been identified as follows. First, if most of the recreationists take one trip per season or per year, it is almost impossible to detect the demand curve by the individual approach (Freeman, 1979).This is because there will not be sufficient variation in the number of visit even if travel distance increases. Second, the individual observation approach does not include the potential recreationist who may become a user if the price is reduced or the quality of the recreation site improved. This leads to underestimation of aggregate visitation when a closer similar site is included (Ward and Loomis, 1986).

2.1.3.2 Contingent Valuation Method

CVM is a method of estimating the value that a person places on a good by asking people to report their willingness to pay directly to obtain a specified good, or willingness to accept to give up a good, rather than inferring them from observed behaviors in regular market places. Because it creates a hypothetical marketplace in which no actual transactions are made, CVM has been successfully used for commodities that are not exchanged in regular markets, or when it is difficult to observe market transactions under the desired conditions (Freeman, 1993). The term "contingent valuation**"** is derived from the nature of the method: responses are sought from individuals as to their actions contingent on the occurrence of a particular hypothetical situation. For example, individuals might be asked their maximum willingness-to-pay (WTP) to visit a national museum of Ethiopia contingent upon a charge being introduced or a museum being created. Alternatively, they may be asked to state the minimum amount of compensation required to maintain their original utility level, if the museum was closed to the public.

The first application of CVM was by Davis in 1963 in his research on the economic value of recreation in the Maine woods. Within ten years, CVM studies were becoming commonplace, and CVM was established as a technique for non-market valuation. CVM studies have now been conducted in over countries demonstrating the adaptability of the approach to different culture contexts.

CVM is a tool that can also estimate non-use values. Thus, it is required to value the non-use values of public goods such as wilderness and landscape preservation, biodiversity, value of preserving historical artifacts, monuments, and the character of old towns and villages (Freeman, 1993).

Many authors (Mitchell and Carson, 1989; Bateman et al., 1992) have identified the accuracy and validity of CVM estimation through different criteria. Mitchell and Carson (1989) agreed that contingent valuation could appear to be deceptively easy to design and execute to those who lack experience and training in survey research. Furthermore, according to Hanley et al. (2001) and Hanemann (1994), the fact that CVM has becomes widely used implies it has some advantages as a method.

- It is a generalized method in that it can be applied in an extremely wide range of situations.
- It is capable of measuring both use and non-use values depending up on situations. Non-use values have been found to be very important in many cases for cultural heritages. CVM questionnaires can also be designed so that the researcher gains some insight into why people value a given cultural good, and how this valuation changes when, for example, uncertainty surrounding the supply of the good changes.

Basically, underlying the use of CVM is the question of property rights. If the individual does not own the right to a good, then the relevant measure of utility of the good to the individual is the maximum he or she would be willing to pay (WTP) to acquire it. Conversely, if the individual owns the good, then the minimum the individual would be willing to accept (WTA) as compensation for its loss, is the relevant utility measure, since the individual would restore to his utility level before being deprived of the good by this amount. Most of the time, WTP and WTA are similar in magnitude for most goods which are close substitutes and for which the income effect is small. However, several experiments have revealed that WTP is typically 2 to 5 times the magnitude of WTA values for the same good and efficient than WTA (Garrod and Willis, 1999).

2.2 Empirical Literature Reviews

Although methods for valuing environmental goods and services began to be developed as far back as the 1970s, they only began to enter mainstream environmental economics and be widely applied to protected areas in the late 1980s. Much has not been done on valuation of environmental goods especially in developing countries. However, available empirical studies on valuation of both natural heritages and cultural heritages have assessed in this section.

2.2.1. Empirical Evidences from Developed Countries

This sub section focus on the empirical evidences of valuation of only cultural heritages because in developed countries (Europe, north and central America) many papers are written on this area.

Salazar and Marques (2005) value cultural heritage that intended to realize the social benefits of restoring an old Arab tower in Godella that is a small town near Valencia, Spain. They employed the contingent valuation method using face-to-face interviews with a random sample of local residents. The dichotomous choice with four bid levels and open-ended elicitation formats are both used. They argue that being younger; a shorter-term resident and higher bid level reduces the probability of accepting the bid. But they find that bid level does not have any impact on actual WTP. Moreover, the result shows that the aggregate WTP is 3 or 4 times greater than the estimated cost of restoring the tower.

Zanatta et.al (2004) conducted a research on the information and WTP in a contingent valuation study that was intended the value of the St. Erasmo in the Lagoon of Venice, Italy. They found that use of the lagoon and knowledge of St. Erasmo were found to decline with distance of a respondent's residence from the lagoon. A test of significance indicated that mean WTP for users and potential users were not statistically different from each other. Respondent WTP is found to increase with knowledge of St. Erasmo, current use of the Lagoon and expected use of the island once the public works programme is completed. WTP is also found to depend in predictable ways on income, educational attainment, and age.

Signorello and Cuccia (2002) estimated and captured the non- use value of heritage cities in case of Noto which is one of the historic former centers of the southern Sicilian an Italian heritage city well known for the Baroque style of its historical monuments and buildings.. Both double-bounded dichotomous choice and open-ended elicitation formats were used. The result from the logit model, show that the coefficients on bid level, whether it is the respondent's first visit or not, and educational levels are significant at the 5% level. Individual characteristics such as age and gender, membership of a cultural heritage organization do not appear to affect the likelihood of accepting the bid.

Similar studies can be found in other developed countries such as Whitehead and Finney (2003) study on the WTP of North Carolina residents on Submerged Maritime Cultural resources ; A study by Pollicino and Maddison (2004) on Oxford's Historic Buildings; A study by Mourato et al. (2002) on preserving cultural heritage in transition economies of Bulgarian monasteries, and A study by Scarpa et al. (1997) on Architectural and Visual Arts Heritage in Italy specifically the Rivoli Castle in Piedmont, Northern Italy. All of these empirical studies employed CVM to value the respective cultural heritage sites.

Poor and Smith (2004) applied travel cost of method to estimate the value of Historic St Mary's City of Maryland, which is considered to be one of the most significant archaeological and historic sites in the USA. This study was one of the first to employ a revealed preference methodology, the zonal travel cost model, to estimate the consumer surplus of a cultural heritage site. The authors analyzed three years of visitor sample data to compare three functional forms of visitor demand. The average of the annual individual consumer surplus measured range from approximately $8.00 to $19.26, depending on the functional forms used. When aggregated to the total number of individual paid visitors, the average annual benefit estimates range from approximately $75,492 to $176,550.

Susana et.al (2010) analyzed economic valuation of cultural heritage to a museum located in the Alto Douro Wine Region-World Heritage Site. They applied the travel cost method to estimate the of demand function in the museum of Lamego, which constitutes an important cultural item of the Alto Douro Wine Region, classified by UNESCO in 2001 as a world heritage site which is a living and evolving cultural landscape. A Poisson travel cost model was used for investigating variables that explain the probability of visiting the museum. The results confirmed that the probability of visiting the museum is positively influenced by the educational level, gender and negatively by the travel cost.

Vicente and Frutos (2011) applied the travel cost method to estimate the economic value of cultural goods in Blockbuster art exhibitions in Spain and investigate the potential of the travel cost method in measuring the social benefits derived from cultural goods. They found that the mean CS reaches a value of 63.64 € per visitor and the net marshallian CS 7.72 € per visitor. . Finally, they gave great emphasis on the growing significance of cultural activities and the importance their economic valuation by estimating demand function and calculating the consumer surplus associated with the provision of such goods.

2.2.2. Empirical Evidences from Developing Countries

This section presents past studies that applied the CVM and the TCM on valuation of heritage resources in developing countries. This includes valuation studies in both natural and cultural heritages since literatures regarding valuation of cultural heritages are scarce.

Carson et.al (2002) analyzed the economic benefits to foreigners visiting Morocco accruing from the rehabilitation of the Fes Medina. The study applies the contingent valuation method using a dichotomous choice WTP question and face-to-face interviews. Four hundred and seventy one valid responses were gathered from people either in Fes intending to visit Fes or who had visited Fes, and 126 visitors who had never visited and did not intend to visit Fes. The estimated mean WTP for the former group was USD 70, while in the latter group it was USD 312. Aggregate WTP was USD 58,113,000 per annum. Variables such as age, sex, and number of days spent in Fes did not affect WTP.

Thang (2009) applied total travel cost method to Yuelu Mountain Park in Changsha in China to assess the recreational value (access value) provided by this park. The travel cost demand function is estimated by using Poisson regression using survey data collected on-site. Average access values per trip were estimated to be € 0.75 for local and € 64.52 for non-local individuals producing aggregate annual access value of € 20.43 million. Based on the travel cost demand function, He argues that an entrance fee of € 5.43 would maximize the revenue collected from the visitors. This is more than doubling of the existing entrance fee.

Mladenov et al. (2007) conducted a study on the value of wildlife-viewing tourism as an incentive for conservation of biodiversity in the Okavango Delta in 2001 and 2002 using contingent valuation (CV) and travel cost (TC) approaches. In TCM, since people indicated that they would not make repeat visits as it is exotic and isolated place, they tried to solve the problem by asking the respondents 'what is the maximum amount of money that you would have paid to take the trip?'. Moreover, the choices were from the present cost to three times the present cost in increments of 0.5. This information was used to compute the consumer surplus of the site. The results showed that the quality of wildlife viewing was significantly correlated with willingness-to-pay (WTP) for preservation, and suggested that impaired biodiversity would negatively affect the value of this ecosystem. The combined CVM and TCM values totaled US$285 per person per annum. Extrapolated to the annual pool of visitors to the Delta in 2002, this translates to US$23 million, which is a large reservoir of funds from the tourism sector that could be used for preservation.

Amer and Said (2006) exercised two non-market valuation techniques that are to say the travel cost and open-ended contingent valuation methods to scrutinize the recreational pattern of Dibeen National Park in Jerash, Jordan. They estimated the use value that would be used to demonstrate the potential magnitude of this environmental amenity that cannot be ignored in policy making in Jordan. A survey of 300 individuals was used to elicit the recreational value of the park. The results from the Poisson model indicated that the demand for recreation would be negatively correlated with age, level of education, travel costs, and satisfaction. In this study, the CVM was used to estimate the willingness to pay for conserving and improving the services on the park through Tobit regression model. Of the 283 respondents, 74 respondents were not willing to pay for the quality improvement in the park. The results show that income and satisfaction have a positive and significant influence on WTP, while education and age have a negative and insignificant influence on WTP. Similarly, the mean willingness to pay for conserving and improving the services on the park was US$ 7.8.

Navrud and Mungatana (1994) used TCM to estimate the value of preserving the current flamingo population in Lake Nakuru National Park in Kenya, with respondents asked what percentage of their time in the Park was spent viewing and photographing flamingos. The annual recreational value of wildlife viewing in the Park was found to be USD 1.5 to 7.5 million, with the flamingos accounting for more than one-third of this. They showed that, in 1991 Kenya Wildlife Service‘s total revenue from entrance fees, royalties from hotels and lodges and camping fees was 5–10% of the observed recreational value, i.e. the Park had a much larger economic potential than was actually realized. Finally, they concluded that protecting the flamingos contributes both to nature conservation and financially to the social welfare of the country.

Alberini and Longo (2006) measured the value of cultural heritage sites in Armenia using a travel cost method. Their study is one of the few applications of the travel cost method for valuing cultural heritage sites. Their investigation show that (i) there are significant use values associated with the four study monuments, and (ii) conservation programs and initiatives that improve the cultural experience, or simply make it easier for the respondent to reach and spend time at the monument, are valued by domestic visitors and would encourage higher visitation rates. They argued that, actual and intended trips reported by the respondent's exhibit good construct validity, in the sense that they are well predicted by price, location, hypothetical scenario and other individual characteristics of the respondents.

The available empirical literatures on valuation of heritages in Ethiopia are scarce. The available but limited studies using valuation techniques are reviewed below.

Mahamud (1998) estimated on-site recreational benefit of Sodere recreation area in Ethiopia and measured the welfare effects of the existing problems of the site that were proposed to have negative impacts on the recreational qualities. Through applying the two standard procedures i.e. the travel cost and contingent valuation methods using primary data collected from a survey of 232 visitors at Sodere recreational area. He showed travel costs, visitor‘s income, mode of transport and experience on other substitute sites were major determinants of visits to the site which is inferred from TCM. On the other hand, age, education, family size, marital status and ethnicity of visitor‘s were not significant determinants of the visits to Sodere. In the CVM, the results showed that visitor‘s income, visitor‘s attitude towards the problems, and visitor‘s position and responsibility in the household were important determinants of the WTP responses. He estimated the value of the site to be US $1,403,442.1per year but the site authorities collect only 9 percent of this sum. This shows that much can be done to generate revenue for the support of quality improvement and expansion projects at the site.

Melaku (2007) applied individual TCM to measure the recreational economic benefit using on-site survey data from Bishangari lodge in Oromya region in Ethiopia. His paper uses a truncated count data demand model to estimate the user‘s value of access to this wilderness area based on a sample of 175 individuals. The regression results showed that distance, travel cost, number of days of stay at Bishangari, income, education, Weynee substitute site and group travel are important determinants of the recreation demand of the site. The coefficient of distance travel cost and the number of days stayed at the site presents negative and significant figure but the coefficient of income, group visits, education, and visit to Weynee lodge brought positive and significant influence on the site visitation. The recreational benefit computed from the regression analysis shows that the aggregate on-site recreational benefit per visit amounted to birr 820. The expected total annual benefit of the site was 3,943,500 birr. Records show that the enterprise is getting only about 25% of the true recreational benefit of the site. When compared to the net-economic benefits of the Bishangari lodge, the economic return the company collects is very low. This is particularly the case when the relative return to the ecotourism area is considered in terms of high accommodation costs and investment expenditures.

Mesfin (2010) on the recreational benefit of Wondo Genet recreational site and Sitotaw (2003) on the economic benefit of Wabi-Shebele-Langano applied the ITCM using truncated Poisson model. They showed that the average recreational benefit per annum is estimated to be Birr 7,899,301 for Wondo Genet recreational site and Birr 8,685,777 for Wabi-Shebele-Langano recreational site. The result of these two studies is quite similar since both are found in similar agro ecological zone and used similar methodology to estimate the annual benefit. In these studies, travel costs, visitors’ income, age, level of education, family sizes, and acquaintance with the site, were found to be major determinants of visits to the sites.

Andualem (2011) applied both ITCM and CVM to estimate the total economic value of Addis Ababa Zoo Park. He used the ITCM on 158 on-site visitors, to estimate the value of viewing wildlife of Addis Zoo Park and the DBDC Contingent Valuation Method on 90 respondents to investigate the mean WTP for the non use value of the park. He employed the seemingly unrelated bivarite probit model to derive the demand function for the recreational use value of wildlife and truncated probit model to estimate the non use value contribution of wildlife. His result showed that travel cost and monthly income are important determinants of the recreational demand of the site. Further, his CVM result showed that, the first bid price, monthly income, and age are important determinant of willingness to pay for the non use value part of wildlife. According to this study, the estimated annual total economic value of the park (both use and non use value of the park) is approximately 22.5 times higher than the current revenue.

The above review of empirical literature on the valuation of resources in different countries show that there are many factors that determine the value of and demand of resources directly or indirectly. However, the impacts of socio-economic variables are different on various studies presented above and some of them ignore the impact of these variables by simply estimating the aggregate WTP (for example, Scarpa et al (1997).

Moreover, even if, many valuation studies have been done on developed countries dominantly in those natural recreational areas, much has not been done in this area in developing countries except some Asian countries. One can find very few researches in Africa (example Morocco) and almost none in Ethiopia on cultural heritages. In Ethiopia, empirical evidences reviewed are concentrated on the recreational value of natural resources and its determinants and most of them ignore the non use value of resources except Mahamud (1998) and Andualem (2011).To our knowledge, there is no valuation study on cultural heritages in Ethiopia. Therefore this study tries to address these gaps in that first it shows the impact of different socio- economic variables on WTP in Ethiopian cultural resources i.e. RHCL; Second analyze the value of RHCL using TCM and CVM for use value and non use value part of the site, respectively. Finally, this study contributes to the literature on valuation of cultural heritages and can be used as a basis for future related studies.

Chapter Three: Data Source and Methodology

This section tries to discuss the nature and source of data and econometric strategies used for the empirical analysis.

3.1. Description of the Study Area

The study is conducted in a town known as Lalibela. It is found in the northern part of Ethiopia in the North Wollo zone of the Amhara regional state. Lalibela is found 642 Km north of Addis Ababa, the capital city of Ethiopia. The town is roughly 2500 meters above sea level. The holy city Lalibela was a capital of Ethiopia in 12th century. It is a town perching on a commanding view and surrounded by chains of mountains. In addition, the place is a wise possessing of the UNESCO's world heritage site and magnificent Rock-Hewn churches.

The Rock-Hewn Churches of Lalibela were one of the first twelve sites to be inscribed by UNESCO on the World Heritage List in 1978. The town has been expressed by peoples as famous for its monolithic rock cut churches, one of the Ethiopian's holiest cities second to Aksum with almost completely a population of orthodox Christian, center of pilgrimage for much of the country and symbolic representation of Jerusalem. During the reign of Saint *Gebre Mesqel* (Lalibela)[3] in 12th and early 13th century this town was known as Roha. The names of several places in the modern town and the general layout of the rock-cut churches themselves are said to mimic names and patterns observed by

[3] The saintly king was given this name (lalibela) due to a swarm of bees said to have surrounded him at his birth, which his mother took as a sign of his future reign as emperor of Ethiopia.

Lalibela during the time he spent in Jerusalem and the Holy land as a youth. Lalibela is said to have seen Jerusalem and then attempted to build a New Jerusalem as his capital in response to the capture of old Jerusalem by Muslims in 1187. As such, many features have Biblical names – even the town's river is known as the River Jordan.

The perplexing Rock Hewn Churches of Lalibela and its vicinity inspire many guests to visit city of Lalibela in particular and Ethiopia in general. Great many tourists stream to Lalibela town to applaud the rock-hewn churches of King Lalibela dated back about 800 years. The construction of these churches is said to have been done by King Lalibela himself and it is said that he had finished the work in 23 years of time. In the churches, everything has biblical implications. What is found here in Lalibela symbolically is found there in the holy city, Jerusalem.

Rock Hewn churches are grouped in to three with the reference frame of the river called Jordan. The first group north of Jordan river comprises six churches; Bete Medihanealem (The House of the Redeemer of the World), Bete Maryam(House of Mary), Bete Meskel(House of Cross), Bete Denagil(House of Virgins), Bete Debre Sina(House of mount Sinai) and Bete Golgota(House of Golgota or interchangeably called House of St. Michel). This group of churches symbolizes the Earthly Jerusalem. The second group (western group) contains only Bete Giyorgis(House of St. George) church and the third group (eastern part) contains Biete Amanuel, Beite Qeddus Merkoreus(House of St. Merkreous), Betie Aba Libanos(House of St. Aba Libanous who was saint father of Ethiopian Orthodox Church), Biete Gebriel-Rrufael and Bete Lehem.

All these churches are highly damaged by different internal and external factors and they demand quick conservation and research and development actions for their everlasting functions. Taking in to account these stricken ideas, we intended to estimate the value of these churches and assess the willingness to pay for conservation of visitors since they are one of the major stakeholders of these churches.

3.2. Data Collection and Survey Design

The data was obtained from both primary sources and secondary sources. The sample population was composed of tourists who visited the Rock-Hewn churches in 2014. The survey has been conducted from April 1, 2014 to April 17, 2014. and distribution of questionnaires was carried out during the daytime from 11 A.M. to 4 P.M. Respondents were approached and informed about the purpose of the survey in advance before participating in the survey for effective data collection . Respondents younger than age 18 were automatically excluded.

Depending on the availability of time and other resources and the purpose of the study different types of probability and non-probability sampling designs might be chosen. In this study, the probability sampling method was difficult for two reasons. Firstly, there was no specific information of population. Secondly, there was limited time and resources. Since the site has an international wide market extension, it costs too much time and money to employ probability-sampling method (Parson, 2003). However, NOAA report suggested that probability sampling could be proper for accurate CVM analysis (Arrow et.al, 1993). Therefore, we devised to interview every odd numbered visitor on site after they visited all churches at St. George church (the last visiting church for most visitors). That attempted to approximate simple random probability sampling for accurate CVM analysis as suggested by NOAA. Four research assistants who have at least college diploma were reemployed to conduct the survey. They were trained for two days before they started the actual survey.

Regarding the sample size, Calia and Strazzera (1998), in their study on bias and efficiency of single vs. double bounded CVM model define small sample size as sample of 100 or less; medium size a sample of 250-300; and large size as a sample of more than 1000. They conclude that even for a medium sample size, both CVM models perform well in giving point estimates for parameters and of the mean WTP. In this study, given the time and budget constraint only 250 visitors were participated in both the TCM and CVM survey. Accordingly, 150 respondents were foreigners and the remaining 100 respondents were domestic visitors.

The survey was conducted through on-site surveys with a selected sample of people visiting a site. This is because an on-site survey results in a higher response rate compared with other method of surveys (Parson, 2003). In addition to improving the response rate, this approach avoid answer from someone never visited the attraction. Moreover, it has an advantage of hitting the target population directly (Parson, 2003).

The direct-interview i.e. face to face interview method was used to collect data from sample visitors. Nevertheless, a self-administered questionnaire technique was occasionally adopted depending on the situation i.e. if the respondents have formal education to write and understand the given questionnaires. On average, it took 20 minutes to complete the survey. The questionnaire has three major parts. The first section aims to capture the background information on respondents. Section two has information regarding the journey to RHCL. Section three consists of questions relevant for the contingent valuation methods to elicit the WTP of the respondents to the site by setting a hypothetical market.

The hypothetical market was crucial since this cultural site has no well-defined market and it plays indispensible role for respondents to understand the issue in this market. The market explained the issue of damage to the site by natural as well as human made hazards and the issue of the effect of conservation and development programs. In addition, before we conducted the main survey, a pilot study was conducted in March 2014 in line with this hypothetical market. This helped us to revise some of the questions and chose the bid levels as per respondent's attitude.

Since the double bounded discrete elicitation method is used, the follow up question was set up by increasing the WTP if the respondents say "YES" to the first question and by decreasing the WTP if it is "NO". Double bounded discrete choice question was followed by an open-ended question. That is, respondents who agreed to the given bid levels were asked to specify the maximum amount they would be willing to pay for the continued provision of RHCL. Respondents who refused to pay the given bid were also asked to specify their maximum amount. In other words, if the answer to double bounded discrete choice was “yes-yes” the maximum WTP would be higher than the proposed bid. On the other hand, if the answer was “no-no”, the maximum WTP must be lower than the assigned bid.

To summarize, each individual was potentially asked to give three valuation responses: two discrete (YES or NO) and one continuous (maximum amount of contribution). For sample of respondents, this elicitation scheme generated a hierarchical data set. For the whole sample, the possible paths of response were as follows:

- ✓ No (WTP = 0).
- ✓ (Yes, Yes) + Continuous amount (Maximum WTP >the second higher bid level).
- ✓ (No, No) + Continuous amount (Maximum WTP < the second lower bid level).

It is clear that this combination of WTP question provides more statistical information to the analyst. Moreover, the questionnaire tried to expose the reasons for their respective responses to WTP. The study applied entrance fee as a payment vehicle to elicit consumer surplus as suggested by Langford and Kenyon (2000) and Parson (2003).

3.3. Model Specifications

3.3.1. Travel Cost Method

For TCM, individual methods of valuation have been employed rather than the zonal one. The only difference between these two methods is that: the individual model is based on micro data for annual trips, trip costs, and other socio-economic and personal variables and it is best for demand analysis. Due to the difficulties to address qualitative data (age, sex, and other socio- economic variables) through averaging and limitations of the zonal travel cost method (ZTCM) to describe individuals from different perspectives, this paper has employed individual methods of TCM.

We have considered the number of days spent on site as the dependent variable. Bell and Leeworthy (1990), Dharmaratne and Brathwaite (1998) and Kealy and Bishop (1986) also used a similar measure in their economic analysis of the importance of Saltwater Beaches in Florida , valuation of the Coastline for Tourism in Barbados , Theoretical and empirical specifications issues in travel cost demand, respectively. The number of trips per visitor was constant for most visitors and hence we cannot consider it as a dependent variable.

Count data models have become the standard in single site recreational demand models (Creel and Loomis, 1990). Regression models for this type are different from the classical regression model in that the response variable is discrete with a distribution that places probability mass at non-negative integer values only. In this study, as the sample was taken from the visitors only, we have a non-negative integer data as a dependent variable. Accordingly, count data model using ML estimator was employed rather than the application of Ordinary Least Square (OLS) to avoid biased estimates of the parameters.

The starting point for most cross-sectional count data analyses is the Poisson regression model. The Poisson regression model specifies that the random days spent Y take on the value y with: Where n = 1 ... N and y_i is the number of days spent on site by person[4].

[4] Assuming "one full day staying" for those respondents devoted only half day (only night or day time) to visit the site.

$$\Pr(Y = y_i) = \frac{e^{-ui}\, ui^{yi}!}{yi!}, y_i = 1, 2, 3, \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \text{(3.1)}$$

For a sample of *N* observations, the log likelihood function becomes:

$$lnL(\beta) = \sum_{i=1}^{N} \{y_i x_i' \beta - \exp(x_i' \beta) - ln y_i!\} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \text{(3.2)}.$$

Where P (*yi*) = the probability of spending y_i days on the site. This is the density function with μ_i which is most commonly known as intensity or rate parameter and mostly specified as$\mu_i = \exp(\beta_0 + \sum_{j=1}^{n} X_{ij} \beta_j)$, where X_{ij} is the vector of all demand covariates and, β_j is a conformable matrix of k x 1 parameter vector to be estimated. The Poisson model implicitly assumes its conditional variance of days spent equals its conditional mean. That is E(Y) =μ and V(Y) =μ. This shows the well-known equal-dispersion (equality of mean and variance) property of the Poisson distribution (Hellerstein and Mendelsohn, 1993).

However, most of the time, data on the number of days spent is over dispersed relative to the Poisson distribution. That is, the variance is larger than the mean for the data, because a few respondents (most of domestic respondents) have a large number of days spent while most respondents make only a few. This makes the Poisson model restrictive. Over-dispersion has qualitatively similar consequences to heteroscedasticity in the linear regression model. For cases where the over dispersion problem is serious, a widely used alternative is the negative binomial model. According to Yen and Adamowicz (1993), the probability density function of the Negative Binomial model is the following.

$$Pr\ (\mathrm{Y} = \mathrm{y_i}/\mu_\mathrm{i}) = \frac{\tau\left(\mathrm{y_i} + \frac{1}{\alpha}\right)}{\mathrm{y_i}!\,\tau\left(\frac{1}{\alpha}\right)} \left[\frac{\frac{1}{\alpha}}{\frac{1}{\alpha} + \mu_\mathrm{i}}\right]^{\frac{1}{\alpha}} \left[\frac{\mu_\mathrm{i}}{\frac{1}{\alpha} + \mu_\mathrm{i}}\right]^{\mathrm{y_i}}$$

In similar fashion, we can write it as follows:

$$\mathrm{Pr}(\mathrm{Y} = \mathrm{y_i}/\mu_\mathrm{i}, \alpha) = \frac{\tau\left(\mathrm{y_i} + \frac{1}{\alpha}\right)}{\tau(\mathrm{y_i} + 1)\tau\left(\frac{1}{\alpha}\right)} \left[\frac{\frac{1}{\alpha}}{\frac{1}{\alpha} + \mu_\mathrm{i}}\right]^{\frac{1}{\alpha}} \left[\frac{\mu_\mathrm{i}}{\frac{1}{\alpha} + \mu_\mathrm{i}}\right]^{\mathrm{y_i}} \dots\dots\dots\dots\dots\dots\dots\dots\dots.(3.3)$$

Where α is the over-dispersion parameter and the variance is $\mu_i(1 + k\mu_i)$ and mean equal to μ_i since *α>0 and μ>0.* If *α* equals zero, the Negative Binomial reduces to the Poisson model. The larger the value of *α,* the more variability there is in the data over and above that associated with the mean. The letter τ represents the gamma function. In our study, a likelihood-ratio test based on the parameter *α* is employed to test the hypothesis of no over dispersion. The test showed the rejection of the null hypothesis α=0(no over-dispersion) using the implied p- value which forced us to use negative binomial model rather than Poisson (Gorger and Carson, 1991).

In line with Fix and Loomis (1998), since the data was collected from the people who actually visit the site, we also used the traditional models for truncation. The models are truncated at zero as the data begins at one because everybody has visited the site at least once and for one night. If we fail to account for truncation, it will leads to estimates that are biased and inconsistent (Shaw, 1988; Creel and Loomis, 1990; Gorger and Carson, 1991; Yen and Adamowicz, 1993). Therefore, the density of the negative binomial distribution truncated at zero for the count (y) is given by (Grogger and Carson 1991):

$$\Pr(\mathrm{Y} = \mathrm{y}_i/\mathrm{Y} > 0) = \frac{\tau\left(yi + \frac{1}{a}\right)}{\tau(yi+1)\tau\left(\frac{1}{a}\right)}(\alpha\mu)^{yi}(1+\alpha\mu)^{-(yi+\alpha^{-1})}\left[\frac{1}{1-(1+\alpha\mu)^{-\alpha^{-1}}}\right] (3.4)$$

Having used the TNBM in this study, trip costs and visitors socioeconomic characteristics are considered in the empirical analysis. So, within the framework of the individual travel cost method, the single-site demand function has general form of (Fix and Loomis, 1998):

Number of days spent on site =f (travel costs, travel time, demographics, site attributes, configuration variables and satisfaction after visiting). That is:

$$DAYS_{ij} = \beta' X + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

$$\textit{and assume that } DAYS_{ij}/X_i \approx N(\mu;\ \sigma^2);\ \mu = \beta' X$$

Where $DAYS_{ij}$ is individual i's days spent on site j, X_i is vector of explanatory variables,

β_i is a parameter vector to be estimated, and $\mathcal{E}_i$ is an error term.

With this functional formulation, the linear form of specification is selected after modification and estimation of all functional forms. Specifically, the equation of individual visitors demand functions to RHCL can be formulated as follows:

$$\begin{aligned} DAYS_i = {} & \beta_0 + \beta_1 GEN + \beta_2 AGE + \beta_3 DMAR + \beta_4 OCC + \beta_5 DEMP + \beta_6 INCOM \\ & + \beta_7 FMSIZ + \beta_8 EDU + \beta_9 DENVA + \beta_{10} KNW + \beta_{11} FIRVIS \\ & + \beta_{12} DGRO + \beta_{13} SUBSITE + \beta_{14} PERVIST + \beta_{15} TRAVT + \beta_{16} TC \\ & + \beta_{17} OP - WTP + \beta_{18} SATSFAC + \mathcal{E}i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.6) \end{aligned}$$

Where $DAYS_i$=the total number of days spent on site by respondent 'i'.

AGE = Age level

TC = Travel cost

EDU = Education level

$FMSIZ$ = Family size

$DMAR$ = Martial status for respondents

$DENVA$ = Membership in any environmental groups

$DGRO$ = Number of individuals in a group tour including the respondents him/herself

$INCOM$ = Household's monthly income

KNW = Previous knowledge about the site

$DMAR$ = Marriage status

OCC = Occupation,

DEMP = Employment conditions

$FIRVIS$ = Visiting for the first time or not

$TRAVT$ = Total travel time

$OP - WTP$ = Opinion to pay for conservation

PERVIST =Total amount of pervious visit to the site

$SATSFAC$ = Opinion to the level of satisfaction.

$SUBSITE$ = Number of substitute sites suggested by the respondents

Estimating CS (consumer surplus) from the Method of Count Data Models

The benefit measures associated with Poisson and Negative binomial models will derive using the estimated parameter on the travel cost variable ($\boldsymbol{\beta_{tc}}$). Following Creel and Loomis (1990) and Su Thi Oanh Hoa (2012), the CS of Poisson and NB model per person per day is measured by:-

$$\frac{-r_o}{\beta_{tc}} \qquad (3.7)$$

Where $\boldsymbol{r_o}$ is the expected number of days spent from equation (3.6) given above evaluate at mean value of statically significant variables and $\boldsymbol{\beta_{tc}}$ is the coefficient of travel cost in the model. Once the parameters of the model are estimated, the surplus value for each individual in the sample is calculated and then aggregated over the population of users to arrive at a total access value.

3.3.2 Contingent Valuation Method

The econometric models for estimating WTP from dichotomous choice response data can be broadly divided into two major classes; parametric and non-parametric. This section explains the approach taken to estimation, and describes the econometric models used in estimating the WTP distribution (i.e. parametric models).

Unlike the non-parametric cousins, parametric models allow for the inclusion of covariates as explanatory variables. Comparing the nature and strength of the estimated WTP-covariate relationships with those suggested by economic theory provides a useful measure of construct validity for the study (Carson & Hanemann, 2005).

Parametric techniques for extracting WTP estimates from dichotomous choice data are generally either binary-response models that estimate the probability of a 'yes' response as a function of bid values and selected covariates, or interval-data models which use WTP intervals defined by bid values and responses as a dependent variable (Carson & Hanemann, 2005). Contingent valuation studies employing discrete-choice models typically adopt logit, probit, or bivariate-probit specifications to extract estimates of the latent WTP from dichotomous choice response data (Abdullah, 2009). Studies employing the interval-data approach typically adopt the canonical discrete choice contingent valuation model developed by Hanemann (1984).The models chosen for this study are the single bounded logit or probit model, the bivariate probit model, and the interval-data model. Since the purpose of the study is to assess the visitors' WTP for conservation of RHCL and to suggest mechanisms for cost recovery, the main objective of the WTP survey was to calculate mean/median WTP after estimated outcome of a parametric model that includes respondents' socioeconomic factors in the WTP function.

3.3.2.1 Single-Bounded Models

Though the development of more sophisticated approaches for estimation from double-bounded dichotomous choice data has reduced the popularity of single-bounded models, it is still common practice to compare the WTP estimates obtained from a single logit model of the responses to the initial bid with those produced by other specifications such as the single probit model (Carson & Hanemann, 2005). However, in this study, we used the logit model.

The single-bounded logit is estimated using the response data from the initial bid item only. Using single-bounded models to analyze the responses to the follow-up bid is inappropriate, since the value of the second bid presented to each respondent is endogenously determined by their initial response. As a result, the follow-up responses contain a selection bias, and will not conform to traditional Bayesian probability properties (Balana et al, 2012). Due to this selection bias, single-bounded models of responses to follow-up bid items will indicate misleadingly high acceptance probabilities for the high follow-up bids presented to respondents who accepted the initial bid, and misleadingly low acceptance probabilities for lower follow-up bid values presented to respondents who rejected the initial bid(Balana et al, 2012).

According to Calia and Strazzera (1998) the single bound method has its own attractive features other than the double bound. For example, it requires less information, it is easier to implement at data collection and estimation stages, and can avoid systematic bias in responses that are due to the introduction of the follow-up (for example, the so called "anchoring effect"). There for, we have applied the single bounded logit models for to take these outweigh advantages relative to double bounded model.

According to Hagos et.al (2012), the logit/probit model specifies an indirect utility function for each respondent. Assume that the representative visitor gains utility from improvement in RHCL and the two possible levels of site quality/conservation statuses involved are the status quo q^0 and a specific level of improvement (conservation actions), q^1. Hence, each visitor's utility function at status quo (no improvement) is:

$$U_{0i} = u\left(y_i, z_i, q_{0,\varepsilon_0}\right) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (3.8)$$

In addition, each visitor's utility function with improvement is:

$$U_{1i} = u\left(y_i, z_i, q_{1,\varepsilon_1}\right) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. \ldots \ldots \ldots \ldots \ldots \quad (3.9)$$

We can rewrite the above equations in to one equation as follows

$$U_{ji} = u\left(y_i, z_i, q_{j,\varepsilon_j}\right) \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \quad (3.10)$$

Where j=0,1 refers to the two different states of the site; i=1,2,.......,n refers to visitor i; U_{0i} and U_{1i} represents utilities at the status quo and the hypothetical improved scenario; y_i is the ith utility maximizer's (individual visitor i) discretionary income; z_i represents a vector of socio-economic, demographic, environmental and design variables(initial fee levels etc). Such incorporation of individuals' socio-economic variables into the CVM helps the researcher to gain information on validity and reliability of the CVM results and increase confidence in application of results obtained from the CV empirical analysis (Haab and McConnell, 2002). Moreover, q_i refers to the quality of RHCL before and after conservation actions and improvements; and ε_j represents other variables known to the utility maximize, but not observed by the researcher.

Note that when the quality of RHCL q changes from q^0 to q^1 (as the result of a change in policy), the visitor's utility also changes from $u(y_i, z_i, q_{0,\varepsilon_{0i}})\ to\ u(y_i, z_i, q_{1,\varepsilon_{1i}})$. Therefore, the condition that utility maximizer i answers "yes" to the offered price (bid) D_i is given by:

$$U_1(y_i - D_i, z_i, q_{1,\varepsilon_{1i}}) > U_0(y_i, z_i, q_{0,\varepsilon_{0i}}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (3.11).$$

Equation (3.11) states that visitor i will answer "yes" to the question about the offered price (bid) D_i if the visitor's utility at the improved level net of the required payment exceeds its utility at the status quo. However, since it is difficult to know the random preferences and can only make probability statements about "yes" or "no" responses, the probability of a utility maximize answering "yes" to the valuation question is consequent upon $U_1 > U_0$ (i.e., the utility maximizer is better at q_1 even with the required payment D_i). Hence, the probability of "yes" for utility maximizer i is given by:

$$pro(yes) = pro[U_1(y_i - D_i, z_i, q_{1,\varepsilon_{1i}}) > U_0(y_i, z_i, q_{0,\varepsilon_{0i}})] \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (3.12)$$

For parametric estimation of the above model, it needs to choose a functional form for $u(y_i, z_i, q_{1,\varepsilon_{1i}})$ and specify the distribution of the error term ε_{ji}. Generally, most applied empirical researches, whether they employed a random WTP model (Cameron and James 1987) or a utility differential model (Hanemann 1984), begins specification by assuming a utility function that is additively separable in systematic and stochastic components of preferences:

$$u_j\left(y_i, z_i, q_{j,\varepsilon_j}\right) = v_j(y_i, z_i, q_i) + \epsilon_{ji} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.13)$$

Given the specification in equation (3.13), the probability of utility maximizer i giving a positive response to the valuation question become:

$$\mathrm{pro(yes)} = \mathrm{pro}\left[\mathrm{v}_1(\mathrm{y_i} - \mathrm{D_i}, \mathrm{z_i}, \mathrm{q}_{1,}) + \epsilon_{1i} > \mathrm{v}_0(\mathrm{y_i}, \mathrm{z_i}, \mathrm{q}_{0,}) + \epsilon_{0i}\right]$$

$$= \mathrm{pro}\left[\mathrm{v}_1(\mathrm{y_i} - \mathrm{D_i}, \mathrm{z_i}, \mathrm{q}_{1,}) - \mathrm{v}_0(\mathrm{y_i}, \mathrm{z_i}, \mathrm{q}_{0,}) > \epsilon_{0i} - \epsilon_{1i}\right] \ldots\ldots\ldots\ldots\ldots.. (3.14)$$

Note that the probability of the utility maximizer *i* giving a negative response (i.e., rejects the improvement or conservation action) is given by:

$$pro(no) = 1 - pro(yes) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.15)$$

This equation is still too general for parametric estimation. However, since the systematic component of the preference function is linear in income and other covariates, the model can be simplified as:

$$v_i(y_i) = \alpha(D_i) + \beta z_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.16)$$

Where y_i represents the individual consumer's (utility maximizer *i*) discretionary income; z_i represents an *m*-vector of household socioeconomic, demographic, environmental, and design variables; and β is an *m*-dimensional vector of parameters. For the new scenario, in which the dichotomous choice question will require a yes or no response to some offered price Di, the probability that respondent i will answer yes to the valuation question is given by:

$$Pro(yes) = pro(\alpha(D_i) + \beta z_i + \varepsilon i) > 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.17)$$

To estimate equation (3.17), we assume that the error term is normally, independently, and identically distributed with mean zero and variance 1.

If we assume that $\eta = \varepsilon_{0i} - \varepsilon_{1i}$ and that $F_\eta(\Delta V)$ is the cumulative distribution function of η, then the probability that the visitor is willing to pay for the improvement is:

$$\mathrm{pro(yes)} = \mathrm{F}_\eta(\Delta \mathrm{V}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.18)$$

$$\mathrm{pro(no)} = 1 - \mathrm{F}_\eta(\Delta \mathrm{V}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.19)$$

$$Where\ \Delta \mathrm{V} = \mathrm{V}_1(\mathrm{y_i} - \mathrm{D_i}, \mathrm{z_i}, \mathrm{q}_1) - \mathrm{V}_0(\mathrm{y_i}, \mathrm{z_i}, \mathrm{q}_0)$$

In the logit model, $F\eta$ (…) is the logistic cumulative distribution function. As define it above, the unobservable individual visitor’s actual WTP for improved conservation service is Wi, with linear relation to the initial bid Di and the covariates, and the actual WTP for an individual can be presented as:

$$WTPi = 1\ if\ Wi \geq Di \quad and\ WTPi = 0\ if\ Wi < Di \dots\dots\dots\dots\dots\dots\dots (3.20)$$

With dichotomous choice contingent valuation, the i^{th} visitor (utility maximizer) is asked if it would be willing to pay the initial bid (Di) to get a given improvement in conservation management. This is a random variable. The probability of yes or no response can be presented as:

$$pro(yes\ to\ D_i) = pro(W_i \geq D_i) and\ pro(no\ to\ D_i) = pro(W_i < D_i) \dots\dots\dots\dots (3.21)$$

Having the above theoretical background of the model, we can specify the empirical model for logit as indicated by Madala(2001). We assume that there exists a distribution of WTP, denoted by W across the population of visitors to RHCL, with a mean $\mu w = z\beta$ and a variance δ^2_w (use equation 3.16 and 3.17 as a benchmark); we have:

$$W = z'\beta + \varepsilon \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (3.22)$$

Where ε has a cumulative distribution function (CDF) with a mean and variance $\varepsilon \sim CDF(0, \delta^2_w)$. If the probability density function (PDF) is bell-shaped, the CDF will be S-shaped, with values that fall between zero and one. The distribution that is typically used in this study is logistic. The PDFs for the logistic distribution with the mean equal to zero and variance $\frac{\pi^2}{3}$ are given by:

$$f(v) = \frac{e^v}{(1+e^v)^2} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (3.23)$$

The CDFs, give the probability that the random variable takes on a value less than or equal to v, $P\ (V \leq v)$ and is geometrically equal to the area under the bell shaped PDF to the left of v:

$$P(V \leq v) = \int_{-\infty}^{v} \left\{ \frac{e^y}{(1+e^y)^2} . \right\} dy \equiv F(v) = \frac{e^v}{(1+e^v)} = \frac{1}{(1+e^{-v})} \dots \dots \dots \dots \dots \dots . (3.24)$$

Where

$$P(V > v) = 1 - P(V \leq v) = 1 - \frac{1}{(1+e^{-v})} = \frac{1}{(1+e^v)} \dots \dots \dots \dots \dots \dots \dots \dots \dots . (3.25)$$

Where y is just a variable of integration. For symmetric PDFs, the mean, median, and mode all occur at the same value, which is the case for the normal and logistic functions.

W from the WTP is the latent variable. What we observe is either “yes” or “no” to the asking price, D. To connect the underlying latent variable model to the CDF, the conditional probability of a randomly selected visitor responding “yes” is just the probability that the visitor’s unobservable WTP is greater than the asking price.

From (3.25),

$$P(yes\ /\ Z) = P(W > D) = P(Z'\beta + \varepsilon > D) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(3.26)$$

$$= P(\varepsilon > D - Z'\beta) = P\left(\frac{\varepsilon}{\delta} > \frac{D}{\delta} - \frac{Z'\beta}{\delta}\right)$$

$$= P\left(V > \frac{D}{\delta} - \frac{Z'\beta}{\delta}\right) = \frac{1}{(1+e^{\frac{D}{\delta}-\frac{Z'\beta}{\delta}})}$$

To actually undertake the estimation, we use the STATA computer package, using Logit routine that estimate the parameters σ and β and provide "probability values" to test the hypotheses that the vector of parameters β equal zero. The approach is a form of maximum likelihood non-linear estimation. The Logit model takes the form of log odds (probability of saying "yes" vs. "no")

$$ni = logit(Pi) = \log\left(\frac{pi}{1-pi}\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.(3.27)$$

While assuming a linear relationship between ni and the independent variables:

$$ni = logit(Pi) = \log\left(\frac{pi}{1-pi}\right) = \sum_{j=1}^{j} \beta_j Z_{ij}$$

Solving for pi we get

$$Pi = \frac{\exp\left(\sum_{j=1}^{j} \beta_j Z_{ij}\right)}{1 + \left(\sum_{j=1}^{j} \beta_j Z_{ij}\right)} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.28)$$

This yields a Logit regression model or a generalized linear model with the Logit link function.

Whrer pi =probability of saying "yes" to the bid amount

β_j =Coefficients to be estimated

Z_{ij} = Variables that influence the probability including the bid amount

3.3.2.2 Double-Bounded Models

In this thesis, the double bounded dichotomous choice was also used. It was revealed in existing studies that the respond rate is high and starting point bias would minimize (Alberini et.al., 1997). However, Calia and Strazzera (1998) found that the double bound model may create additional complexities in the respondents that results in reduction in response rate but the efficiency gain from this method is guaranteed.

The Double bound dichotomous choice contingent valuation is preferred in terms of efficiency asymptotically to the single bound as justified by Hanemann et.al, (1991) and they stress that the double bound allows for the correction on the first bid price by the follow up and also results in less biased estimates. However, the validity of double bounded contingent valuation model depends more on the assumption that respondents consider the hypothetical market to be credible, and treat the decision as if it were a real purchase compared to the single bounded one (Carson, 2000; Alberini et al., 1997). In addition, dichotomous choice elicitation formats are considered the most believable as they simulate the conditions of purchase in most markets.

The double bound dichotomous choice model bases on the two observed dichotomous variables that are the first bid price answer and following follow up question. The BID_{1i} is for the first question and BID_{2i} is for follow up's .The dichotomous variables ANS_i's are assigned the value one and zero based on responses offered to bid BID_i's.

Regarding the estimation procedures, different models can be used depending on the situation. Where the WTP distributions estimated from the initial and follow-up bids differ interval-data models (which assume unchanging WTP) produce biased results and are unreliable. Further, single-bounded models fail to account for preference-discovery effects and make inefficient use of the available data. In these cases, it is appropriate to model both responses simultaneously but separately as a bivariate distribution (further discussion is presented below) (Alberini, 1995; Poe et al., 1997).

3.3.2.2.1 The Bivariate Probit Model

The bivariate-probit model proposed by Cameron and Quiggin (1994), simultaneously estimates separate distribution parameters for the WTP implied by the initial and follow-up bids producing with jointly distributed normal error terms (Alberini et al, 1997). The bivariate probit specification allows comparison of WTP distribution implied by each bid, and facilitates more rigorous interrogation of the relationships between the two WTP estimates and explanatory covariates (Alberini, 1995). This approach can effectively detect the presence of elicitation effects. It produces correct estimates with efficiency. So that bivariate probit CVM solves distortion which is introduced from the follow up questions of the double-bounded contingent valuation survey.

The bivariate normal distribution estimated by this model takes the form (Harrison, 2013):

$$ANS_1^* = \alpha_1 + \beta_i BID_1 + \sum \beta x_i + \varepsilon_1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. (3.29)$$

$$ANS_2^* = \alpha_2 + \beta_i BID_2 + \sum \beta x_i + \varepsilon_2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.30)$$

Correlation [ε 1, ε 2] = ρ

Where ANS_1 and ANS_2 are the binary WTP responses, BID_1 and BID_2 are the corresponding first and second bid values; x_i is a vector of respondent characteristics; the

β and α are the coefficients to be estimated. The covariance between the error terms from the estimated equations is denoted ρ (rho). The value of ρ provides a measure of the extent to which ANS_1 and ANS_2 are jointly determined – a value of zero would imply no correlation whatsoever between the error terms, and would support the use of bivarite model, whilst a value of 1 would indicate perfect joint determination, and the bivariate probit model would reduce to the interval-data model of Hanemann et al. (1991). Thus, where the value of ρ is close to 1, indicates support for the use of the interval-data model. For lower ρ values (below 0.7), the bivariate probit is preferred as the WTP distributions implied by the initial and follow-up responses differ (Alberini, 1995; Harrison, 2013).

The bivariate probit distribution can be estimated easily using the '**biprobit**' command in **STATA 12** after the test against the null hypothesis that the two equations can be independently estimated or the correlation between the two error terms is Zero. If The Wald test shows that the correlations between the two error terms are statistically different from Zero and the value of Rho is below 0.7, we can automatically use the bivariate probit model. Otherwise, we use the interval data model.

3.3.2.2.2 The Interval Data Model

An alternative to the bivariate probit, and amongst the most popular of approaches to estimating WTP from double-bounded response data is the model first proposed by Hanemann et al. (1991). This model is often referred to as the interval-data, or 'standard double-bounded' model. The Hanemann et al. (1991) model differs from the bivariate probit model in that it begins from the assumption that responses to the initial and follow-up bids are both based on the same stable and unchanging individual WTP value. Where bivariate probit models produce rho values approaching unity, this indicates joint-determination of the responses to the initial and follow-up bid values (Alberini, 1995). The Hanemann et al. (1991) interval-data model is both theoretically and practically superior to the bivariate probit model where rho values approach unity (Alberini, 1995).

As sited by (Harrison, 2013), the Hanemann et al. (1991) interval-data model, respondents was presented with two levels of bid where the second bid is contingent up on the first response. If YES for the first bid, the second bid, let us say B_i^u is an amount greater than the first bid B_i. If the response is to the reverse, the second bid B_i^d will an amount less than the first. Thus, there will four possible outcomes: both YES for the two bids, both NO for the two bids, YES followed by NO, and NO followed by YES. Let the likelihoods of these outcomes will denote as Υ^{yy}, Υ^{nn},Υ^{yn}, and Υ^{ny} respectively. Given a sound assumption that each respondent will maximize his or her utility, the formula for this likelihoods are as follows. In the first case we have B_i^u>B_i and

$$\Upsilon^{yy}\left(B_i, B_i^u\right) = \mathrm{pr}(B^i \leq \mathrm{maxWTP\ and\ } B_i^u \leq \mathrm{maxWTP})$$

$$= \mathrm{pr}(B_i \leq \mathrm{maxWTP}\ /\ B_i^u \leq \mathrm{maxWTP}) * \mathrm{pr}(B_i^u \leq \mathrm{maxWTP})$$

$$= \mathrm{pr}(\ B_i^u \leq \mathrm{maxWTP}) = 1 - G(B_i^u, \theta) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.31)$$

since $B_i^u > B_i$, $\mathrm{pr}(B_i \leq \mathrm{maxWTP} \mid B_i^u \leq \mathrm{maxWTP}) = 1$.

Similarly, with $B_i^u < B_i$, $\mathrm{pr}(B_i \leq \mathrm{maxWTP} \mid B_i^u \leq \mathrm{maxWTP}) = 1$

$$\Upsilon^{nn}\left(B_i, B_i^d\right) = \mathrm{pr}\left(B^i > maxWTP\ and\ B_i^d > maxWTP\right) = G\left(B_i^d, \theta\right) \ldots\ldots\ldots\ldots (3.32)$$

When YES followed by NO, we have B_i^u>B_i and

$$\Upsilon^{yn}(B_i, B_i^u) = \mathrm{pr}(Bi \leq maxWTP\ \leq B_i^u) = G(B_i^u, \theta) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.33)$$

And when NO is followed by YES, we have $B_i^d < B_i$ and

$$\Upsilon^{ny}(B_i, B_i^d) = pr(Bi \geq maxWTP \ \geq B_i^d) = G(Bi, \theta) - G(B_i^d, \theta) \ldots\ldots\ldots\ldots\ldots\ldots(3.34)$$

Given a sample of N respondents, where B_i, B_i^u, and B_i^d will be the bids use for the i^{th} respondents, the log-likelihood function takes the form

$$lnL^D(\theta) = \sum_{i=1}^{N}\{d_i^{yy} ln\Upsilon^{yy}(B_i, B_i^u) + d_i^{nn} ln\Upsilon^{nn}(B_i, B_i^d) + d_i^{yn} ln\Upsilon^{yn}(B_i, B_i^u) +$$

$$dinyln\Upsilon nyBi,Bid\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \ (3.35)$$

Where d_i^{yy}, d_i^{nn}n,d_i^{yn}, d_i^{ny} are binary valued indicator variables. Estimating this function by means of maximum-likelihood using STATA 12 is made straightforward by the '**doubleb**' command.

Having the above model specifications, according to Mitchell and Carson (1989), the reliability and validity of CVM model estimations are determined by the following factors. First, the contingent scenario in questionnaire should be inclusive plausibility, understandability, and meaningfulness. Second, elicitation method and questionnaire of WTP should be appropriate (Elicitation method of WTP should be appropriate, and the questionnaire regarding WTP should be designed carefully).

To set up suitable contingent scenario, the assumption was given that tourism developing plans in Rock- Hewn churches of Lalibela. In addition, it was mentioned that it would cost much to suspend developing plan and to conserve the environment of the site under this assumption. Since, this is an on-site survey so that visitors who have already looked around site were given their answers to questionnaire. The hypothetical market scenario developed for this study is based on the conservation plan of the site of lalibela: Bete Gabriel Rafael monitoring final report as outlined in the 2010 (see appendix 1)[5].

3.3.2.3 Maximum Willingness to Pay

Double bounded discrete choice question was followed up by an open-ended (or continuous valuation) question. Respondents who agreed to the given bid levels was asked to specify the maximum amount they would willingness to pay for the continued provision of RHCL. Respondents who refused to pay the given bid were also asked to specify their maximum amount. In other word, if the answer to double bounded discrete choice was "yes-yes" the maximum WTP would be 0higher than the posed bid. Vice versa, if the answer was "no-no" the maximum WTP must be lower than the assigned bid. TOBIT regression will deal these open-ended responses.

It is important to note that the dependent variable, or the WTP, is not fully observed and the dependent variable assumes zero values for a part of the samples. Because an OLS (ordinary least squares) estimator cannot be applied, it common to use a Tobit model for the observed maximum willingness to pay. Let the dependent variable the open ended part of the CVM method is MWTP which is a latent variable and do not observed when it is less than or equal to zero but observed if it is greater than zero. Following Long (1997) and Hagos et.al, the Tobit model for observed MWTP can be given by:

$MWTP_i^* = \alpha + \beta X'_i + \varepsilon_i$

$MWTP_i = MWTP_i^* \text{ if } MWTPi^* > 0$.. (3.36)

$\qquad = 0 \text{ if } MWTP_i^* \leq 0,$

[5] Source:www.ipogea.org

Where $MWTP_i$* is a visitor's unobserved maximum willingness to pay for conservation of the RHCL;

$MWTP_i$ is a visitor's actual maximum willingness to pay

X' is vector of independent variables;

β is vector of coefficients; α is the intercept; and

εi is disturbance term, which is assumed to be normally independently distributed, in other words, NID (0, σ2) and independent of x_i. Assuming that censoring point is zero, then:

$$\begin{aligned} \text{MWTPi} = {} & \beta 0 + \beta 1 GEN + \beta 2 AGE + \beta 3 DMAR + \beta 4 INCOM + \beta 5 FMSIZ + \beta 6 EDU \\ & + \beta 7 DENVA + \beta 8 DGRO + \beta 9 SUBSITE + \beta 10\ \text{RE} - \text{GOOD} \\ & + \mathcal{E} i \ if\ MWTP_i^* > 0 \\ = {} & 0\ otherwise \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.. \quad (3.37) \end{aligned}$$

Where AGE=age level

GEN= gender of the respondents

EDU=education level

FMSIZ=family size

DMAR=Martial status for respondents

DENVA=membership in any environmental groups

DGRO=number of individuals in a group tour including the respondents him/herself

INCOM=household's monthly income

RE − GOOD = Hypothetical visiting if the quality of RHCL is to be improved

SUBSITE=number of substitute sites suggested by the respondents

3.3.2.4 Methods of Estimating Mean /Median Willingness to Pay

Following Abdullah & Jeanty (2011), the mean WTP and 95% confidence intervals in this thesis are calculated using the approach developed by Krinsky & Robb (1986), sometimes known as the parametric bootstrapping approach. This approach operates by taking a large number of draws (50,000, in this study) from a multivariate normal distribution with means given by the regression coefficients, and covariance given by the estimated covariance matrix of the coefficients. A simulated WTP distribution is produced by estimating a WTP value for each draw using the regression equation. By removing the highest and lowest 2.5% of the estimated values, and estimate of the 95% confidence interval for WTP is obtained. The confidence intervals produced in this fashion are commonly referred to as percentile intervals. Despite its computational intensity, this approach to estimating confidence intervals is considered superior to other bootstrapping methods, as it does not require the assumption of a symmetrical WTP distribution (Hole, 2006). However, the mean WTP formula for interval data model of DBDCM is simply $X'\beta$ which is evaluated using the average values for the explanatory variables (Lopez-Feldman, 2009).

3.3.3 Definition of Variables and Expected Signs

Travel cost (TC)

Let us first discuss how the Travel Cost (TC) variable was constructed. It was involved from the implied total cost by visitors. For foreigners travel cost includes flight fare (which can be partitioned in to the number of sites if they were multi-destination visitors) and cost of their travels to Lalibela from Addis Ababa or other destinations where they were directly flight to Lalibela was taken. For domestic visitors, the travel cost can be the total expense paid to the owner of the car if they used public transport and travel cost per kilometers if they used their own car. Not all visitors came to visit only the RHCL especially the foreign visitors. In this paper, the flight fare (total travel cost from their home country to Ethiopia) was divided in to the number of sites which they intended to visit and the result was added to the total travel cost incurred in flight or other mode of transport from their near destination to Lalibela. Moreover, if they visit other sites in the way to Lalibela the proportion travel cost consumed was used to add in the total cost calculation. This approach was also applied for domestic visitors. However, domestic visitors were mostly single site visitors and no proportion of their total cost was applied.

Moreover, the time cost is subdivided into travel time and on-site time costs. Despite the fact that there has been disagreement among researchers in the design of the travel cost model, there is a consensus among scholars that opportunity cost of time should be incorporated in estimation of recreational demand (McConnell, 1992; Smith et al., 1983; Ward, 1984; Freeman, 1979). There is no agreed way of measuring the opportunity cost of time in existing literature. Most studies impute an hourly wage by dividing the reported annual income by the number of hours worked in a year. The fractions range from 0 to 1 in the literature, although a common convention is to use 1/3 of the wage as the value of time (Cesario, 1976). However, Amoako-Tuffour and Martinez-Espineira (2008) warn that a zero rate is only plausible for visitors who are students, retirees, unemployed or homemakers. This warning is quite genuine, as this set of visitors will otherwise not perform something productive should they decide not to visit the recreation site.

For those who have fixed working schedules, common fraction of the wage used to value time cost is typically from one third /one fourth of the wage to the full wage (Parsons, 2003; Haab and McConnell, 2002). Parsons et al. (2003) observe that the recreation demand literature has more or less accepted 25% as the lower bound and the full wage as the upper bound, although neither value enjoy full support.

This study was more suited on Amoako-Tuffour and Martinez-Espineira (2008) method as this is important for Ethiopia's current situation. For visitors who are employed, their opportunity cost of travel time is considered 25% of their estimated hourly wage rate. The reason for using 25% instead of a higher fraction or percentage as used in most TCM studies is simple. Most visitors who visit the site make a trip to the site during weekends or holidays. In addition, most people come to the RHCL mostly in the days that are free to do additional works. So, the use of 25% of the hourly wage rate as a measure of the opportunity cost of time seems plausible that centered both foreign and domestic visitors. For unemployed, the opportunity cost is zero. In computing the average hourly wage rate of visitors, it was important to assume a minimum of 40 hours and a maximum of 48 hours per week, which is typical of the Ethiopia economy[6]. Taking the average between these two ranges, give approximately about 176 hours a month. The visitor’s monthly income is then divided by this figure to get the average hourly wage rate. This is then multiplied by the reported travel time of the visitor and then by 25%, which is the opportunity cost of time. The onsite expenses are as reported in the questionnaires. The total travel cost (TTC) is then obtained by summing the travel cost, cost of travel time and on site time and onsite expenses.

[6] We used this for all foreign and domestic visitors due to difficulty to get data for foreigners.

DAYS is the number of days spent by visitors which is the dependent variable for travel cost method in our case instead of number of trips made by visitors per year

MWTP is a visitor's actual maximum willingness to pay for conservation of the site which is the dependent variable for Tobit model. Other variables are discussed in the following tables.

Table 3.1 Definition of Variables Other Than Total Travel Cost and Their Expected Signs

Explanatory variables	Descriptions	Expected sign on TCM	Expected sign on CVM
OP-WTP	Opinion to have WTP for conservation and 1=agree to pay and 0=disagree	Positive	Positive
EDU	Highest formal education attainment of the respondents	Positive	Positive
SATSFAC	Opinion of satisfactions after visiting the site ranked 1 to 5, where 1=extremely satisfied, 2=satisfied, 3=neutral, 4=dissatisfied and 5=extremely dissatisfied. But we make it a binary variables where 1=satisfied (1+2); 0=otherwise (3+4+5) for econometric analysis.	Positive	
GEN	This is the sex of visitor i. , where 1 for male and 0 for female	indeterminate a priori	indeterminate a priori
AGE	This is measured as the age in years.	Positive	Positive
INCOM	The disposable monthly income of visitor i.	Positive	Positive

SUBSITE	This variable represents the respondent's number of accessing the substitute cultural site. The demand for the site will rise when the probability of accessing more substitute site decreases.	Negative	Negative
FMSIZ	This is the family size is measured as the total number of people in the visitor's household.	Negative	Negative
DEMP	Employment conditions of the respondents: It represents whether the visitor is a full time employee or not, where 1 for a full time employee and 0 for otherwise,	Indeterminate a prior	Indeterminate a prior
KNW	This represents the number of years that visitors have known the site. It reflects the accumulated knowledge of visitor i about the site. It measures both the quantity and quality dimensions of visits, probably suggesting that longer acquaintance with the site reflects a greater degree of preference for the area.	Positive	
DMAR	Marital status of the visitor: 1=married, 0=otherwise	Negative	negative
OCC	Occupations: 1=employed if the visitor is working in a private sector, or government or self employed and 0 otherwise	Positive	
FIRVIS	Visiting experience of the visitors and	Negative	

	1=first visit, 0=others		
DGRO	This represents whether recreational trips are made in groups or alone. It is included as a dummy variable, where 1 for group trips and 0 otherwise,	indeterminate a priori	indeterminate a priori
DENVA	Membership in any environmental groups 1=yes and 0=no.	indeterminate a priori	indeterminate a priori
PER-VIST	Previous visiting experience of respondents on RHCL	indeterminate a priori	
TRAVT	Total travel time as reported by respondents	indeterminate a priori	
RE-GOOD	Hypothetical visiting if the quality of RHCL and if yes for revisit having quality improved=1 and if not=0.		positive

Note that: The white boxes in the expected signs' column of the two models of the table shows the variables which is not available in a given model (CVM or TCM)

Chapter Four: Descriptive Analysis

This chapter focuses on the statistical results for respondents' background and the descriptive results of the survey.

4.1. Summary Statistics of Socio Economic Variables

Though the original sample of respondents was 250, only 200 questionnaires (80%), 106 foreigners and 94 domestic visitors were included in the analysis. The main reason for this was language barrier. We have come across with many foreigners who cannot speak English. In addition, some respondents were reluctant to participate in the survey. The summary of the descriptive statistics of the variables used in the empirical analysis are presented in table 4.1.

The average age of respondents was 38.9 and 36.15 years and average family size 2.72 and 3.06 for foreign and domestic visitors respectively. The mean income of visitors was Birr74828 (US$3867.699) and Birr 2193 (113.351 US$) for foreigners and domestic visitors per month respectively. Moreover, only 20.75% and 22.34% of foreign and domestic respondents have reported that they have been members of environmental group respectively and the rests were not.

Apart from the above variables, data were collected on mode of transport, whole recreation visiting experience and total travel time. More than 65 percent of foreign and 49 percent of domestic visitors were traveling in a group, either with their friends, families or work colleagues. This study also found that the average number of previous visit were 1.7 and 11 for foreign and domestic respondents, respectively. The high number of visits for domestic visitors is mainly due to the frequent travel to the church for religious purpose. Regarding total travel time, the mean travel time were 23.92 and 22.62 hours for foreign and domestic visitors.

Table 4.1 Descriptive Statistics of the Socioeconomic Characteristics of Visitors

Variables	Foreign visitors				Domestic visitors			
	Mean	St.Dev.	Min.	Max.	Mean	St.Dev.	Min.	Max.
GEN	.58	.49	0	1	.57	.49	0	1
AGE	38.9	12.6	21	67	36.15	14.00	19	79
DMAR	.424	.49	0	1	.46	.50	0	1
OCC	.773	.42	0	1	.72	.44	0	1
DEMP	.54	.50	0	1	.60	.49	0	1
INCOM	74827.5	58436.85	544	33533	2193.47	1393.12	150	7500
FMSIZ	2.72	1.69	1	8	3.06	1.83	1	8
EDU	18.23	4.20	8	25	13.56	5.95	0	23
DENVA	.20	.40	0	1	0.22	.41	0	1
KNW	8.27	7.71	1	35	21.21	12.43	1	60
TRAVT	23.92	9.14	2	48	22.62	19.87	1	72
DGRO	.65	.478	0	1	.43	.49	0	1
PERVIS	1.73	1.72	1	12	11.18	23.37	1	178
TC (‘000)	40.29	29.95	8.74	190.6	2.01	1.40	0.21	8.02
MWTP	1412.81	492.54	387	3869	59.55	44.34	1	250
REGOOD	.60	.94	0	4	3.37	2.61	1	13
VISTWEL	1	0	1	1	2.05	2.36	1	15
SATSFAC	.70	.45	0	1	.80	.39	0	1
DAYS	4.19	3.03	1	14	5.81	7.03	1	41

Source: Own computation based on survey data

Note that: St.dev. = standard deviation, Min. = minimum value, Max. =maximum value, Fre. =frequency (total number of observations) and Number of observation =106(foreign) and 94(domestic)

DAYS= Days Spent on Site by visitors which is dependent variable in travel cost model

('000) in the table shows variables whose value in the table is putting after dividing the original mean by 1000 only for convinces.

From the above descriptions, one can be observe that there are significant differences between domestic and foreign visitors in terms of travel cost, number of visits per year, number of time spent on site and household's monthly income.

4.2 Bid Responses and Willingness to Pay for Conservation of the Site

Among all valid interviews, only 16% of them stated that they refused to pay for the improvement of the site. These are treated as protest bidders. Low protest rate here can be viewed as strength of the survey. The percentage of respondents who were willing to pay for conserving the site is in line with the issues raised under the hypothetical scenarios presented in this section (as shown in figure 4.1).

Most of the respondents (92.5% of foreigners and 91.5 % of domestic visitors) have responded 'yes' to question on their willingness to pay for the conservation of the site. This indicates that both domestic and foreign residents are concerned about the conservation of the site which in turn confirm that the site as international value.

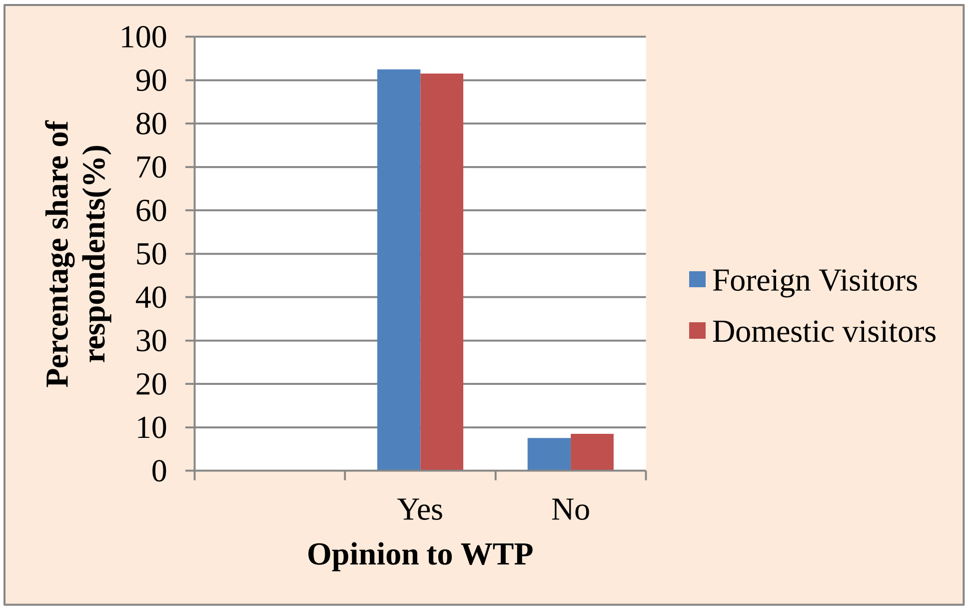

Figure 4.1 Distribution of Respondents' Opinion about Willingness to Pay

Source: Own computation based on survey data

Respondents were also asked to indicate the reasons for their willingness to pay. As we can observe in figure 4.2, Options (for the society as a whole), bequest (for the next generation), indirect use values (for their own benefit), and religious values were some of their specific motivations to WTP. Overall, the respondents strongly recognized different non-use values related to conservation of RHCL. This question was intended to gauge respondents' attitude towards conserving site and to compare the use values with non use values of the site. Among the four motivations considered the future use value (for my own self) (15.31% of foreign and 15.12% of domestic respondents) motive of maintaining the site appears to be least important. The most important reasons for their WTP were non-use values (for religious purpose, for next generation, for the society as a whole and others) which accounts above 84% of both foreign and domestic respondents. Based on this stratification, positive willingness to pay is found significantly related to the way respondents rate the importance of non-use motivations. This result will be very important to classify total non market value of Rock-Hewn Churches of Lalibela resulted from contingent valuation methods as use and non-use values and to compare the use value part of CVM with non market value of the site calculated by TCM (which is considered as a measure of only use values of resources).

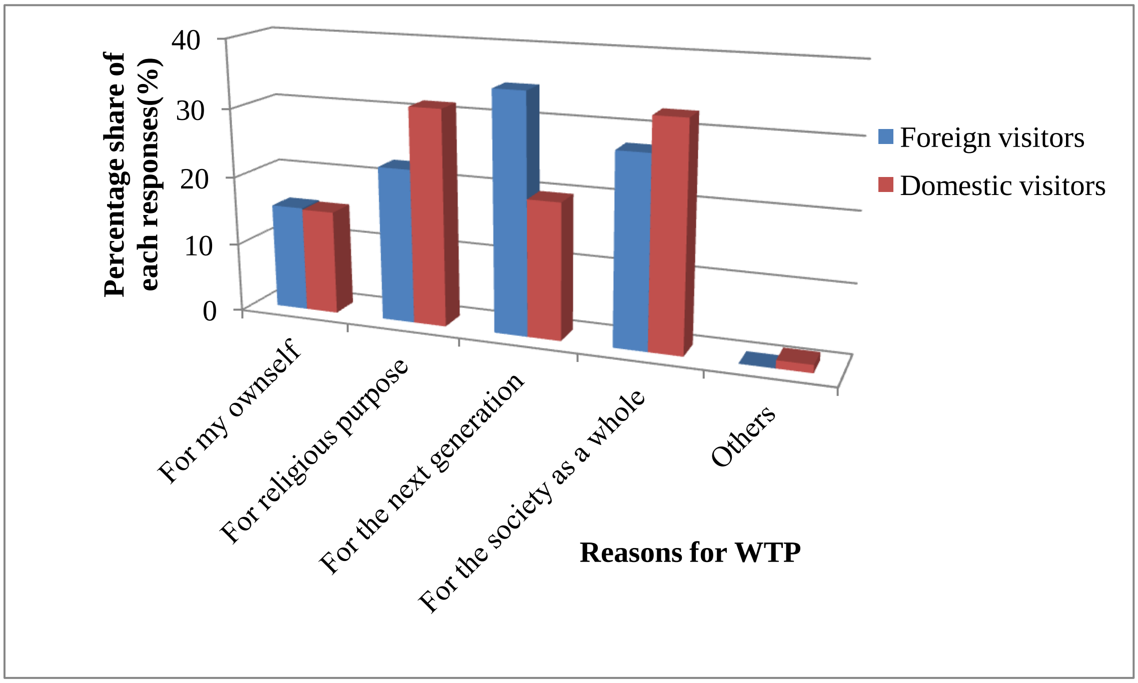

Figure 4.2 Reasons for Respondents' Positive Opinion to Willingness to Pay

Source: Own computation based on survey data

Both foreign and domestic visitors who are not willing to pay states that maintaining and preserving the site is mainly the responsibility of the government. Some others believe that their contribution will not solve the problem of conserving the site.

In the double-bounded analysis, as mentioned in Chapter 3, we can get four type of answer:

- ❖ "Yes-Yes" if the respondents agree to pay the first bid and the second bid;

- “Yes-No” if the respondents agree to pay to the first bid but do not agree to pay the second bid;
- “No-Yes” if the respondents do not agree to pay the first bid but agree to pay the second bid; and
- “No-No” if the respondents do not agree to both the first and the second bid.

From Figure 4.3, more than 35% of the foreign respondents and domestic respondents are a “Yes-Yes” saying each. It is also obvious that more foreign respondents refuse to pay any amount shown to them where 21.43% of the respondents say “No-No” as compared to domestic visitors, which is 15.29%. The total Yes-Yes response for both bid prices is 78.57%, which shows that the selected bid prices used for the main survey worked out well (Using Kernel density estimation for the stated WTP six WTP bid prices was identified from open ended WTP elicitation format and almost three quarter of the respondents showed their willingness to pay.)

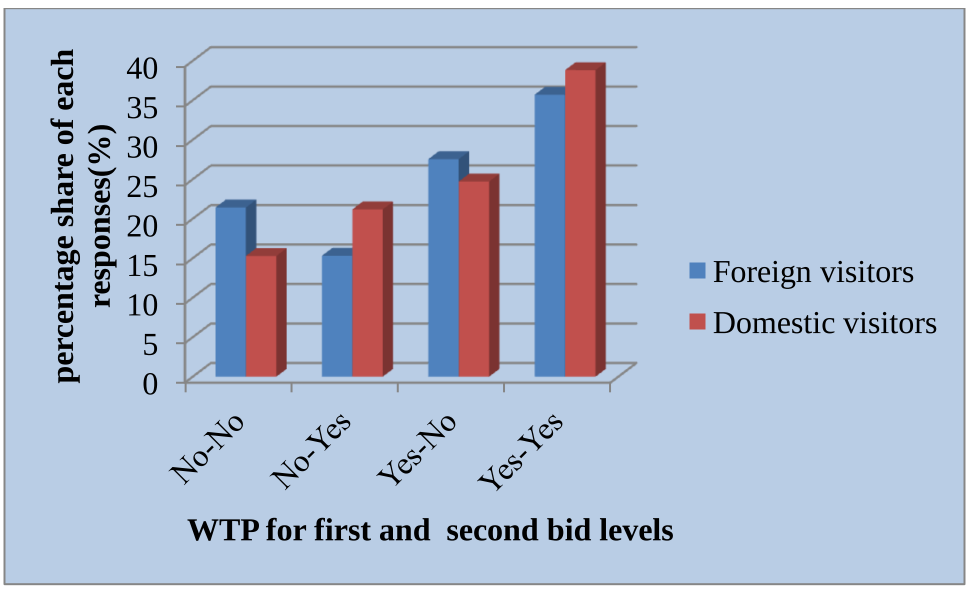

Figure 4.3 Distribution of Willingness to Pay for Double Bounded Form of Questions

Source: own computation based on survey data

Chapter Five: Results of Econometric Analysis

This chapter focuses on the results from the econometric analysis of both the TCM and the CVM methods. The first section presents the results from using the TCM method followed by the results from using the CVM method.

5.1 Data Cleaning, Management and Specification Test

In a survey data set we should expect to encounter so many problems. The problems of multicollinearity (the problem when an approximate (near) linear relationship among the explanatory variables leads to unreliable regression estimates) and heteroscedasticity (violation of classical linear regression assumptions due to variations of the error term across observations) are very common in cross section data. The data should be cleared before it is used for the analysis purpose.

The problem of multicollinearity can be detected by looking at the correlation matrix between the variables (see appendix 2). However, when we have more than two explanatory variables, whether multicollinearity is a serious problem or not for making inferences on parameters will depend on other factors (rule of thumb methods of detection multicollinearity) besides simple correlation coefficient(Maddala, 2001). Hence VIF[7] is computed and if the value is greater or equal to 10, it is possible to expect that there could be a potential problem. But the greatest VIF value is 2.97 which is very

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[7] VIF indicates the factor by which the variance of each variable is inflated compared with the hypothetical situation where there is no correlation between any of the other explanatory variables (Gujarati, 2003).

small (see appendix 3). Therefore, there is no strong colinearity between the variables and all are included in the regression.

The presence of heteroscedasticity is detected by using both Brush Pagan test and Cameron & Trivedi's decomposition of IM-test. Both examine the null hypothesis that the variance of the residuals is homogenous. Since the p-value of Brush Pagan test is very small, we would have to reject the hypothesis of homogeneity of the error term (see appendix 4). This problem is addressed by using the robust standard error for the model.

The other possible problem of survey data is the presence of outliers. An outlier is an observation that lies in an abnormal distance from other values in a random sample from a population that could have a negative effect on our estimators. There are no official rules to identify outliers. To check for outliers we use the added-variable plots. Since all data points seem to be in range, we can conclude that there no significant outliers (see appendix 5).

Another assumption of the regression model that impact the validity of all tests (p, t and F) is that residuals behave ‘normal’. If residuals do not follow a ‘normal’ pattern then there should check for omitted variables, model specification, linearity, functional forms and re-examine theory. After generating the residual, two graphs (kernel density plot and Standardize normal probability plot**)** and a non-graphical test which is the Shapiro-Wilk test were used to check normality. The two plots show that residual seems to follow a normal distribution. Shapiro-Wilk test is applied to check the null hypothesis of normal distribution of the residuals (Green, 200). Here the p-value is 0.03962 we failed to reject the null (at 99%) (See table A6 of appendix 6). So, residuals seem normally distributed.

5.2 Results of Travel Cost Method

The Count Data Models (Poisson and Negative binomial model) are mostly applied for ITCM since the dependent variables of the ITCM are non-negative integer. Since all observed visitors have taken at least the current trip with at least one night spent on site, and non-visitors are not observed, the sample is also truncated at zero. Because of this, truncated data models are used to estimate the demand curve for recreation using data from an on-site survey of visitors to RHCL. The linear specification is employed to estimate the benefit of recreation area. This is due to the poor results captured by the other functional forms (Tang, 2009).

In this study, we apply the truncated negative binomial model to estimate the use value of RHCL. The model fit of truncated Negative Binomial model is better than truncated poison model as the value of log-likelihood (LL) is relatively low in the former (see appendix 7).

Regarding over-dispersion of the model, α (alpha) coefficient in TNB is significantly different from zero, which shows the existence of over dispersion in the model (Likelihood-ratio test of alpha=0 is rejected at 1% significant level). In this case, it is obvious that TNB model is selected to derive RDM (regression demand model).

To test the overall significance of the TNB model, we use the log-likelihood ratio (LR) (Greene, 2000). Therefore:-

LR = -2(Restricted Log-likelihood - Unrestricted Log Likelihood)............................ (5.1)

Where Restricted Log-likelihood=log-likelihood with β=0 which is -498.56493.

Unrestricted Log Likelihood=log-likelihood in specified models (normal model) which is equal to -416.54281.

Therefore LRTNBM=-2(-498.56493-(-416.54281)) =164.04424

However, at 1% significance level, the table (critical) value of the test with 18 degrees of freedom (χ^2_{18}) is 37.16.Since the computed value is greater than the critical (tabled) value; we can reject the null hypothesis, which says all independent variables are irrelevant at 1% significance level. Thus, the model used in this study is significant at 1% significance level. This implies that the estimated model exhibits an overall significance.

5.2.1. Determinants of Recreational Demand and Use Value of RHCL

The regression results are presented in table 5.1. The analyses were carried out using STATA version 12. Most of the estimated coefficients have the expected signs. The characteristics of the respondent such as, age, household income, education level, and knowledge about the Rock Hewn Churches of Lalibela (KNW) are all significant and have a positive effect on the number of days spent on the site. Similarly, membership in any environmental group and visitor’s visiting experience are also significantly and positively related with the number of days spent on the site. On the other hand, variables such as gender of the visitor, travel cost, and travel time are significant and negatively related with the number of days spent on the site.

The coefficients of total travel cost is negative which means that the higher the cost is for the trip; the lower is the visit rate (number of staying days). This is consistent with expectations (i.e. the demand theory, which stipulates that when the price of travel increases then the number of visits will decrease), and is a necessary condition for the TCM model to be valid. More specifically, the coefficient is significant at 1% confidence level. This is quite standard in the TCM literatures (Parsons, 2003). Travel cost, as a price variable with negative sign is the main result of the recreation demand model, suggesting downward slopping demand curve. However, price here is not very sensitive to the demand. This happened due to the insensitivity of number of staying days to the total travel cost i.e. even if there exists a negative relationship between them, the onsite travel cost part is mostly small as compared to other costs and visitors may consider other socio-environmental, and suitability of the site to decide to stay more or less other than the travel cost part.

The coefficient of household income is positive although the effect on the demand is quite small. The result is often encountered in travel cost demand models (Creel and Loomis, 1990).The positive relation between household income and the number of staying days as proxy of visit rate indicates that the more income of visitors, the more visits/days onsite. This seems reasonable, because when the income of an individual increases then the individual might be willing to substitute wage for leisure. On the other hand it is natural that people are willing to pay more for normal goods when their income increases. One explanation for the positive relation is that the visit to the site is a normal good.

Basically, the household income has two effects, substitution effect, and a complementary effect. On one hand, the complementary effect, which is the direct influence of income on the number of days devoted on site, means that higher income of the family lead to more days they will take on the site. On the other hand, the substitution effect stems from the impact of income on travel cost. The total cost of the trip contains two factors, round trip travel cost and time cost. The latter is correlated with income. The more income one has the higher opportunity cost of traveling and staying days which lead to the lower visit rate and staying days on site. Thus, the final sign of the coefficient of household income depends on the weight of the two effects. If the substitution effect outweighs the complementary effect, the sign of the coefficient will become negative.

However, in our case, the complementary effect outweighs the substitution effect, and then sign of the coefficient become positive. However, the household income here is not very sensitive to the demand. This small marginal effect of income may be due to the reason that the entrance fee to the site to domestic visitors is zero and the dumbfounding and cultural nature of the site which are less income sensitive than those natural heritage resources for foreign visitors.

The coefficients of age and age-squared are positive. The possible explanation for this might be peaceful, cultural, and religious places are more enjoyable to older people than the relatively younger ones. As people gets older, they may know more about the site and want to devote much time on the site due to the peculiar nature of the RHCL. In addition to this, the desire of old people to have more leisure and having low responsibility in other socio-economic aspects of their life may also contribute to the desire to stay more in the site. Moreover, the gender variable shows that female are more willing to stay more than male visitors. This is difficult to explain.

Knowledge about the site (KNW) is important determinants of a recreation demand at RHCL and it is significant at 5 percent level. That is the higher the number of years an individual has information about the RHCL, the larger the staying days on site to confirm more and to fill their knowledge gap about the site which is also true for making more trips to RHCL.

The variable EDU (maximum number of years devoted for formal education by an individual) presents positive sign and significant at 1% level of significant, which may suggest that as the number of years of education increased awareness to this kind of goods also increase and they may initiated to know more and to write more about the site they observe which in turn demanded more days on site.

The variable FIRVIS (dummy first visit) has positive and significant effects in both models. The respondents visiting for the first time in the cultural site are likely to take larger days on site. This result may be attributable to the relatively revelation nature of the site from time to time.

The negative sign on coefficient of the variable total travel time indicated that the longer trip duration is likely to reduce both trip frequency and the number of staying days on site, consistent with Creel and Loomis (1990).

The respondents who are a member of any of the environmental groups are more likely stay more number of days and higher trips to RHCL. This result may be attributable to their knowledge on environmental protection and resource conservation and hence attach more value to this kind of historical heritages than those who are not a member of environmental groups.

Table 5.1: Maximum Likelihood Estimation of Truncated Negative Binomial Model (Robust)

Variables	Truncated Negative Binomial Model			
	Coefficient(RSE)	Z-statistic	Marginal Effects	Mean Values
GEN*	-.18(.094)*	-1.93	-0.65	0.58
AGE	.01(.003)***	3.32	0.04	37.64
AGESQU('000)	. 007(.003)**	2.21	0. 4	1586.53
DMAR*	.02(.109)	0.27	0.10	0.445
OCC*	.009(.036)	-0.33	0.03	0.75
DEMP*	-.03(.115)	-0.33	-0.13	0.575
INCOM('000)	4.12e-04(1.10e-04)***	3.74	0. 02	40694.84
FMSIZ	-.03(.031)	-1.05	-0.12	2.885
EDU	.12(.046)***	2.69	0.44	16.04
DENVA*	.59(.108)***	5.45	2.53	0.215
KNW	.01(.005)**	2.44	0.04	14.355
FIRVIS*	.22(.120)**	1.91	0.80	0.58
DGRO*	-.08(.096)	-0.87	-0.30	0.55
SUBSITE*	-.01(.044)	-0.26	-0.04	0.835
PERVIST	-.00007(.002)	-0.03	0.0001	6.175
TRAVT	-.004(.003)*	-1.3	-0.01	23.315
TC('000)	-.002(2.93e-04)***	-7.33	0. 00767	22298.77
OP -WTP*	-.08(.134)	-0.64	-0.31	0.92
SATSFAC*	.07(.118)	0.63	0.26	0.755
DAYS				4.97
_CONS	.64(.325)**	1.97		
No of obs	200			
Wald chi2(18)	398.19			
Prob > chi2	0.000			
Pseudo R^2	0.3956			
Log likelihood	-416.54281			
Alpha(α)	.1012534(.0413253)**			

Source: model estimation based on survey data

Note that: ***= 1 percent level of significance, ** =5 percent level of significance and * =10 percent level of significance:

Numbers in parenthesis are RSE (robust standard error)-values

(*) on the head of the variables is dy/dx for discrete change of dummy variable.

('000)= shows the variables whose coefficient have to be multiplied by 1000 in the interpretation.

5.2.2. Recreational Benefit Estimation of the RHCL (Use Value Estimation)

To calculate recreational benefit, a simple demand function can be estimated by using the coefficients and the mean values of significant variables reported in table 5.1. The estimated demand function is:

$$DAYS(days\ spent\ on\ site) = 3.138495 - 0.0000767TC \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5.2)$$

Once the demand function has been estimated, the consumer surplus provides an approximation of the welfare associated with visiting the site. Formally, based on equation above, the consumer surplus is equal to:

$$CS = -\frac{ro}{\beta tc} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5.3)$$

Where r_0 is the average number of days spent on site estimated by using the coefficients and the associated mean values of significant variables.

Where r_0 is r* and it is equals to $exp(\beta 0 + \beta 1GEN + \beta 2AGE + \beta 3AGSQU + \beta 4INCOM + \beta 4EDU + \beta 5DENVA + \beta 6KNW + \beta 7FIRVIS + \beta 8TRVT + \beta 9TC)$ which is evaluated at mean value of each significant variable given above.

From the estimated regression equation, expected number of staying days is calculated equal to 1.43. Individual consumer surplus for RHCL trip:

$$CSi = -\frac{roi}{\beta tci} = -\left(-\frac{1.43}{0.0000767}\right) = 18{,}252.934\ Birr \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5.4)$$

Total recreational benefit of RHCL is computed by multiplying individual consumer surplus by the annual number of visits[8]. With the total number of visitors to the RHCL of 41,620 (from Lalibela city administration report, 2013), then the total recreational benefit is estimated to be 759,687,113 ETB (39,266,606.6915 USD) per year.

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[8] It is difficult to get information on number of days spent by visitors per year and by taking in to account days spent as a proxy variable for trips per year, we have to just take the total number of trips to calculate total recreational benefit of the site. This, however, may underestimate the use value of the site.

5.2.3 Maximum Entrance Fee Determination

The maximum entrance fee that can be charged depends on how responsive the trip demand function is to price changes (i.e. travel cost). This is what is referred to as price elasticity of demand. With a linear function, price elasticity coefficient is between 0 and infinity. The maximum entrance fee is occurs at point where price elasticity is one (Tang, 2009). With the individual demand function given in equation 5.2, it can be estimated as follows:

The trip elasticity of trips cost (price elasticity) is given as

$$\frac{\Delta T}{\Delta P} X \frac{P}{T} \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (5.5)$$

Let DAYS spent on site=T and TC=P, then from the given equation, $\frac{\Delta T}{\Delta P} = \frac{\partial T}{\partial P} = -0.0000767 \approx \frac{\partial T}{\partial f}$

Where f=is the entrance fee per annum.

We can write the trip elasticity of entrance fee as

$$\frac{\Delta T}{\Delta f} X \frac{f}{T}$$

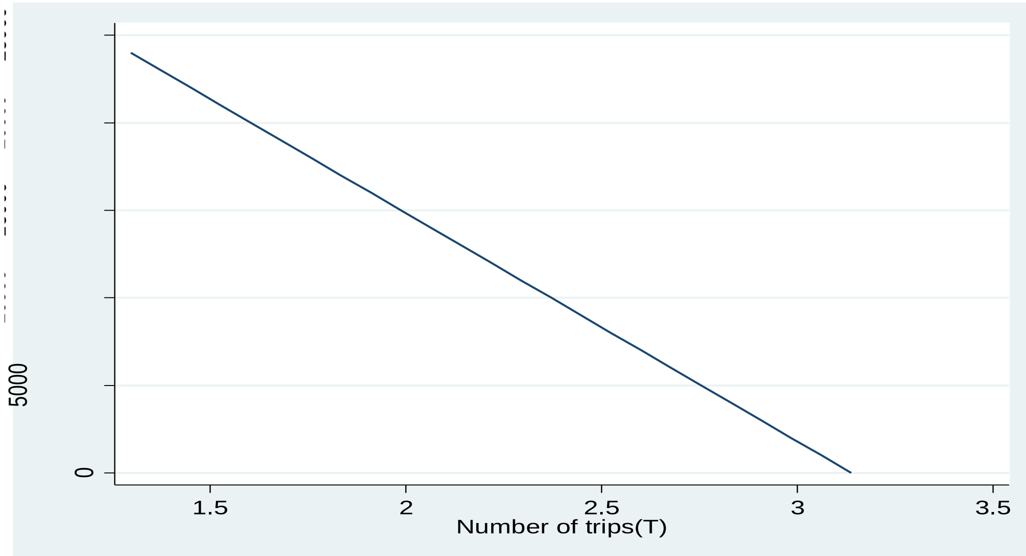
Now using the individual function above and the trip elasticity of entrance fee, the following table is displays the various elasticity at different annual entrance fees and number of days spent on site.

Table 5.2: Elasticity Computation for Maximum Entrance Fee

Entrance fee(f) in Ethiopian Birr	Number of trips(T)	Elasticity	Remark
1	3.138418	2.44E-05	Inelastic
1000	3.061795	0.025050665	Inelastic
2000	2.985095	0.051388649	Inelastic
3000	2.908395	0.079115801	Inelastic
4000	2.831695	0.108345002	Inelastic
5000	2.754995	0.139201705	Inelastic
6000	2.678295	0.171825732	Inelastic
7000	2.601595	0.206373398	Inelastic
8000	2.524895	0.243020007	Inelastic
9000	2.448195	0.281962834	Inelastic
10000	2.371495	0.323424675	Inelastic
11000	2.294795	0.367658113	Inelastic
12000	2.218095	0.414950667	Inelastic
13000	2.141395	0.465631049	Inelastic
14000	2.064695	0.520076815	Inelastic
15000	1.987995	0.57872379	Inelastic
16000	1.911295	0.642077754	Inelastic
17000	1.834595	0.710729071	Inelastic
18000	1.757895	0.78537114	Inelastic
19000	1.681195	0.866823896	Inelastic
20000	1.604495	0.956064058	Inelastic
21000	**1.527795**	**1.054264479**	**Unitary elastic**
22000	1.451095	1.162845989	Elastic

Source: model estimation based on survey data

And graphically we can see the relationship between entrance fee and number of days spent (number of trips) as follows:



Source: Own computation

From table above, the maximum entrance fee that maximize revenue is approximately ETB 21,000 (1085.445$) per annum or ETB1750 ($90.454) per month or ETB 219($11.34) per 4 days. It is at this entrance fee that the elasticity co-efficient becomes one. This result is lower than the current amount charged by the churches' administration which is 50$ per 4 days to foreign visitors. However, currently there is no entrance fee paid to visit the site by domestic visitors.

This result can be summarized from two basic perspectives to domestic visitors. These are from moral perspective and from economic perspective (conserving the site through entrance fee). From the moral perspective, charging such amount to domestic visitors (much of them are religious visitors) will be unfair and unreligious. It may also result in difficult resistance and opposition. This is still the main reason for zero entrance fees for domestic visitors. However, from economic point of view, it is plausible to charge such amount to conserve the site for its everlasting utilization and satisfactions of both current generation and future generation.

Regarding foreign visitors, charging \$11.32 per 4 days rather than \$50 will increase the number of days spent on the site and the number of people traveling to visit per year, keep other things constant. This in turn has two positive spillover effects (basically economic effects). One, if the number of days spent by visitors increases the entrance fee to the site increases by \$11.32 for each additional 4 days. This could enhance the incomes of the surrounding community (hotel owners, tour guide persons, etc.) directly or indirectly. Two, if the entrance fee is decrease, other things being equal, the number of tourists may increase which will in turn compensate the decline in revenue due to the decrease in entrance fee. Here charging the same price for foreigners and domestic visitors may not be logical. Hence, further research is needed in order to differentiate and determine the price for the domestic and foreign visitors.

5.3 Results of Contingent Valuation Method

5.3.1 Estimation of the Willingness to Pay for the Non Use Value of RHCL

In this section we analyzed and present the results from single-bounded models and double bounded models. Finally, the determinants of maximum willingness to pay are discussed.

5.3.1.1 Single-Bounded Models

The results from the single-bounded logit and probit models are very similar, confirming the popular wisdom that for analysis of dichotomous choice response data the choice between these specifications is essentially arbitrary (Carson & Hanemann, 2005). In our cases, logit and probit models produce almost similar mean WTP values of ETB 100.26 and ETB 102.08 for domestic visitors and ETB 1826.10 and ETB 1812.31 for foreign visitors respectively. In both cases, the full multivariate models produced mean WTP estimates that closely approximated those of their bid only equivalents (see appendix 10). Therefore, in our case the result from the single-bounded logit model is presented in table 5.3 and used for both domestic and foreign visitor's case to estimate mean willingness to pay.

As we can see from table 5.3 below, with the exception of education (for foreign visitors), all of the covariate relationships correspond with their expected signs. The variable for EDU is registered with unexpected sign even it is a significant variable at 10% level (Harrison, 2013).

The first bid price is found to be the main variable that affects WTP in both cases. The first bid price is significant at 5% significant level for both domestic and foreign visitors. An increase in the first bid price will reduce the probability of the respondent‘s willingness to pay for the conservation of RHCL, holding other variables constant. It is consistent with the theory of demand. The bid coefficient is negative, implying the downwards sloping demand curve, which is expected for a normal or luxury good. But, the marginal effect of bid level is very small and it shows the irresponsive nature of the site on WTP answer and this is because of the visiting demand of cultural heritage resources is not sensitive to bid level rather than its peculiarity and originality(Wahab,1996 and Ready and Navrud, 2002).

DMAR is significant at for both domestic and foreign visitors case even it has negative impact on the first case and positive impact on the second case. This is due to less married samples in the domestic case and vice versa (as shown in the summery statistics given chapter four).

Table 5.3 of the logit model of domestic visitors shows the effects of the bid prices and different socio economic factors on respondents' willingness to pay. As it was expected for the first bid price answer, explanatory variables; such as the first bid price (BID1), GEN, DMAR, and INCOM and DGROUP have the expected sign. But the coefficient of the variable REGOOD is registered with unexpected sign even it is a significant variable at 5% level. This may due to the fact that the main visiting purposes of the cultural heritage sites are different from those of the natural heritage sites i.e. most domestic visitors are spiritual tourists and demanded the peculiarity and originality of the site then they may hesitate to willing to pay for conservation and improvement not to lose its peculiarity, amazing, original and spirituality nature due to practices for conservation. It was deduced that the visiting demand of cultural heritage site is less sensitive to the variation of the quality of the site than the visiting demand of natural heritage site.

Therefore, the response for the first bid for visiting demand if improvement is relatively small and may have negative (Han,2004).

Similarly, the Logit model of foreign visitor's case also shows the effects of the bid prices and different socio economic factors on respondents' willingness to pay. As it was expected for the first bid price answer, explanatory variables; such as the first bid rice (BID1), DMAR, and INCOM are registered the expected sign. Moreover, the model produces mean WTP values of ETB 100.26 for domestic visitors and ETB 1826.10 for foreign visitors respectively.

Table 5.3: Coefficients Reported by Single-Bounded Logit Model

	Logit model estimation			
Variables	Domestic visitors		Foreign visitors	
	Coefficient(RSE)	Dy/dx	Coefficient(RSE)	Dy/dx
BID1	-.0042 (.002)**	-.004(.003)	-.002 (.001)**	-.0005(.0002)**
GEN	2.15(1.300)*	.27 (.165)*	-.35(.571)	-.06(.105)
AGE	-.03(.034)	-.003 (.003)	-.02 (.021)	-.004 (.003)
DMAR	-1.52 (.795)*	-.16 (.101)*	1.05 (.588)*	.18 (.093)**
INCOM	.002 (.0005)***	.0002 (.00007)***	.00036(.0001)***	6.74e-06 (.00000)***
FMSIZ	-.12 (.317)	-.01(.033)	.147(.202)	.027(.039)
EDU	.29 (.419)	.03(.039)	-.50 (.291)*	-.09(.053)*
DENVA	.60(1.416013)	.05(.113)	.072 (.786)	.013 (.144)
DGRO	1.98 (.951)**	.20 (.100)**	.66(.561)	.12(.111)
SUBSITE	-.381(.275)	-.04(.032)	-.12(.138)	-.02 (.025)
REGOOD	-.56(.206)**	-.05 (.024)**	.42 (.293)	.07 (.053)
CON	.67(2.671)**		3.71 (2.390)	
Mean WTP	100.26		1826.1	
95% Confidence interval	(-190.52; 407.45)		(1504.61 ; 3660.31)	
Log Likelihood	-22.771805		-46.755	
Wald Chi 2	32.02(0.0008)		17.63(0.0906)	
Pseudo – R2	0.5988		0.2692	

Source: model estimation based on survey data

Note that: ***= 1 percent level of significance, ** =5 percent level of significance and * =10 percent level of significance: Numbers in parenthesis are RSE (robust standard error)-values

5.2.1.2 Double-Bounded Models

Two double-bounded parametric models were employed in this analysis; the bivariate probit model proposed by Cameron & Quiggin (1994) and the interval-data model proposed by Hanemann *et al*. (1991). The results of these estimations are presented below.

The rho value estimated for the bivariate probit model measures the correlation between the error terms from the two response equations, taking on a value between -1 and 1, where -1 indicates perfect negative correlation, zero indicates that the responses are separately determined, and 1 indicates perfect joint-determination.

The value of rho for the bivariate probit model is 0.2109849 and -0.7004663 for domestic and foreign visitors' case for the full model including covariates respectively. This indicates the use of bi-varaite probit for domestic and interval data model for the foreign cases respectively (we discuss the chose models for each case below).

More over the Wald test of rho=0 in domestic case shows the correlations between the two error terms are statistically different from Zero at 1% level of significance and leads to choose of Bi-varaite probit model.

However, for foreign visitors' case, it is impossible to reject the null hypothesis that the two equations can be independently estimated or the correlation between the two error terms is zero. In such conditions we can estimate the model independently but the value of rho is more than 0.7 and supports use of the Hanemann et al. (1991) interval-data model as the preferred double-bounded specification (Alberini, 1995).

Table 5.4 and table 5.5 show the effects of bid prices and different socio economic factors on respondents' willingness to pay. From table 5.4 of the domestic visitors case, as it was expected for the first bid price answer, explanatory variables; such as the first bid price (BID1), second bid price(BID2), gender(GEN), marital status(DMAR), households' income(INCOM) and mode of transport(DGROUP) have the expected sign.

But the sign for the variable REGOOD is unexpected and significant at 5% level. This may be due to the fact that the main visiting purposes of the cultural heritage sites are different from those of the natural heritage sites. It is due to the fact that the visiting demand of cultural heritage site is less sensitive to the variation of the quality of the site than the visiting demand of natural heritage site. This may damage their insights about the peculiarity and originality of the site which the main reasons to visit it. Then they hesitate to pay more for improvements of the site no to loss its historical backgrounds, keep other things constant.

The first bid and second bid prices as expected are found to be the main variable that affects WTP and significant at 10% and 1%, respectively. It shows, if bid price increases, then the probability of the respondent‘s willingness to pay for the conservation of RHCL will decreases, holding other variables constant. Therefore, any change in bid price will have an inverse effect on the first WTP answer but its effect is not large.

Respondent‘s household income is expected to affect respondent‘s both first and second WTP answer positively. It is significant at 1% and 10% for first and second WTP answers respectively. An increase in the monthly income of an individual increases, his/her willingness to pay for the non use value part of RHCL will increase.

As shown in table 5.5, education shows negative sign in interval data model of foreign visitors' case. Negative relationship between WTP and education could be anticipated in some cases, as more educated respondents are likely to engage more critically with the scenario presented to them in the hypothetical market and more likely to refuse for WTP. More educated respondents are more likely to be familiar with such reasons (Harrison, 2013). A more comprehensive analysis of the covariate relationships observed in each model is presented in the following sections.

Since the bivariate probit model estimates two WTP values – one for each bid equation the mean WTP of the overall model is obtained by taking the mean of these values, producing a mean WTP of ETB 114. The estimates of mean WTP produced by the double-bounded models are not too different from those of the single-bounded models. While, the preferred interval-data model estimates for foreign visitors mean WTP to be ETB1418.061.

Table 5.4: Estimated Coefficients from Double-Bounded Models (Bi-varaite probit model)

Bivariate Probit Model				
	Domestic		Foreign	
	Coefficient(ANS1)	Coefficient(ANS2)	Coefficient(ANS1)	Coefficient(ANS2)
BID1	-.01 (.011)*		-.001 (.0007)**	
BID2		-.02 (.006)***		-.002 (.0007)***
GEN	1.06(.615)*	.53(.348)	-.26(.324)	-.22(.313)
AGE	-.01(.018)	-.01(.015)	-.01(.012)	.0004 (.011)
DMAR	-.97 (.456)**	.38 (.447)	.59(.338)*	-.22 (.321)
INCOM('000)	.1(.03)***	. 03(.01)**	.002 (6.07e-04)***	9.22e-04 (3.11e-04)***
FMSIZ	-.03(.12)	-.16 (.108)	.09(.115)	-.03(.112)
EDU	.14 (.190)	-.28(.123)	-.29(.166)*	-.15(.137)
DENVA	.35(.758)	.23(.477)	.08 (.442)	-.12 (.356)
DGRO	1.05(.477)**	.84 (.332)	.39 (.326)	-.01(.30)
SUBSITE	-.17(.137)	-.01(.110)	-.07(.088)	-.002 (.090)
REGOOD	-.27(.108)**	-.01(.110)	.26(.171)	.08 (.141)
CON	-.24(1.279)	1.74(.832)	2.13(1.359)	3.17 (1.315)**
Mean WTP	114	114.08	1828.44	1828.44
Rho	.21		-. 7004	
Wald test of rho=0	chi2(1) = 5.4759 and Prob > chi2 = 0.00193		chi2(1) = 1.15359 and Prob > chi2 = 0.2828	
Log Likelihood	-61.548		-104.65	
Wald Chi 2	67.21 (0.000)		37.63(0.02)	

Source: model estimation based on survey data

Note that: ***= 1 percent level of significance, ** =5 percent level of significance and * =10 percent level of significance**: and** Numbers in parenthesis are RSE (robust standard error)-values

Table 5.5: Estimated Coefficients from Double-Bounded Model (interval data model)

Interval data model				
	Domestic		Foreign	
	Coefficient(RSE)	Marginal effects	Coefficient(RSE)	Marginal effects
BID1		-.004(.002)*		-.0005(.000)**
BID2		-.009(.002)***		-.0007(.0002)***
GEN	13.10(6.35)**	.25(.141)*	-26.06 (56.82)	-.07(.104)
AGE	-.60(.29)**	-.004(.003)	-.97(2.14)	-.004 (.004)
DMAR	3.04(9.43)	-.18(.11)*	59.03(62.20)	.18(.098)**
INCOM	.0142 (.003)***	.0002 (.0000)***	.003 (.0007)***	6.59e-06 (.0000)***
FMSIZ	-3.76(2.16)*	-.01(.03)	-10.93(20.33)	.03(.038)
EDU	-5.19(2.55)**	.03(.038)	-55.32(28.02)**	-.09(.052)*
DENVA	5.93(8.36)	.05 (.130)	1.27 (69.35)	.02(.141)
DGRO	15.45(6.51)**	.20 (.094)**	84.23(57.45)	.13(.111)
SUBSITE	-2.09(1.79)	-.04(.031)	-19.37(15.66)	-.02(.028)
REGOOD	-2.23(1.42)	-.06(.026)**	1.80(30.48)	.081(.054)
CON	75.36(15.08)***		1469.80(136.7)***	
Mean WTP	98		1418	
Log Likelihood	-122.88		-155.76	
Wald Chi 2	72.71(0.0000)		25.16(0.005)	

Source: model estimation based on survey data

Note that: ***= 1 percent level of significance, ** =5 percent level of significance and * =10 percent level of significance:

Numbers in parenthesis are RSE (robust standard error)-values

5.3.2. Summary of WTP Estimates

The econometric model describes how decisions concerning WTP can be used to estimate the average WTP in the population. The mean WTP estimation was made using the two WTP bid price answers. The estimation was conducted in two steps. The first step was estimation of the model. The second step is finding the mean WTP. To estimate the mean WTP the study resort to simulating confidence intervals with the Krinsky Robb procedure. The Krinsky Robb method uses random draws from assumed multivariate normal distribution to generate new parameter vectors. Table 5.6 presents a summary of the WTP estimates produced by all of statistically selected valuation models used in this study.

Table 5.6: Summary of WTP Estimates Produced by All Models

Model	Descriptions	Mean WTP(domestic)	Mean WTP(foreign)
Logit	Single-bounded logit model		ETB1826.10
Logit	Single-bounded logit model	ETB 100.26	
Bivariate probit	Double-bounded bivariate probit Model	ETB 114	
Interval data model	Double-bounded interval data Model		ETB1418.061

Source: own computation based on survey data

5.3.3. WTP Aggregation

To obtain an estimate of the aggregate WTP of visitors for the attainment of conservation target, the representative WTP values summarized in Table 5.6 must be aggregated across the relevant population (Hanley & Spash, 1993; Arrow *et al.*, 1993; Carson & Hanemann, 2005). As discussed in Section 4.1, the population of interest to this study is defined to include the 41,620 visitors, of which 25,128 were foreigners and 16,492 were domestic visitors (culture and tourism bureau, 2012/13). This information can be used to aggregate WTP as shown table 5.7. Table 5.7 provides a summary of the aggregate WTP values obtained from the mean household WTP values computed from each of the models estimated in this study

Table 5.7 A Summary of the Aggregate WTP values

Model	Mean WTP (domestic)	Mean WTP (foreign)	Aggregate WTP for visitors (25,128 were foreigners and 16,492 were domestic visitors)
Logit		ETB 1826.1	ETB 45,886,241
Logit	ETB 100.26		ETB 1,653,488
Total for single bounded models			ETB 47,539,729
Bivariate probit	ETB 114		ETB 1,880,088
Interval data model		ETB1418.0	ETB 35,631,504
Total for double bounded models			ETB 37,511,592

Source: own computation based on survey data

The total economic value of RHCL is therefore found by the sum of the use value and the non use value of the site. Based on the above finding the use value contribution of RHCL was estimated to be 759,687,113 ETB and the non use value of RHCL of the site is ETB

42,525,661 (which is the average of single bounded is and double bounded estimates) per annum. Therefore; the total economic value of the RHCL is estimated to be 802,212,774 ETB.

5.4 Determinants of Maximum Willingness to Pay

The results of the Tobit model are presented in table 5.8 than the OLS as the estimated model from OLS was poor relative to Tobit model estimations. Gender, household income, and the number of substitute sites are common significant variables in both domestic and foreign cases. Age of the respondent, family size and group dummy (visiting the site in group or not) are found to be significant in the case of domestic visitor' maximum willingness to pay. On the other hand, marital status and revisiting opinions after site improvement are significant only for foreign respondents.

Except household's income, group dummy and revisiting opinions after site improvement (for foreign case); other variables have a negative effect on the amount of MWTP. Respondents that have higher demand for future visit, have a higher demand for improved of the site and willing to pay more for foreign visitors. This variable is insignificant in domestic case since domestic visitors were more or less religious visitors who were not guided by site improvements rather by religious perfection of the site.

The group dummy is positively correlated with the amount of WTP and is significant at 10 percent for domestic respondents. This is due to the fact that respondents who came together for visiting may have better awareness in terms of preserving and conserving the church and hence have a higher WTP for RHCL.

Respondents that do have substitute sites have a lower demand for conservation of RHCL and willing to pay less in both cases. Consistent with the theory, respondent's income positively and significantly (at 1 percent) affected their maximum willingness to pay. Compared with females, male respondents have negative effect on the MWTP which is significant at 1 and 10 percent for domestic and foreign cases, respectively. Family size for domestic respondents and marital status for foreign respondents are negative and significant at 10 percent. The other variables considered (education and membership in any environmental group) have no significant effect on the amount of MWTP for conserving the RHCL.

Table 5.8 The Tobit results on determinants of maximum willingness to pay

Tobit regression		
	Domestic visitors	Foreign visitors
Variables	Coefficients(RSD)	Coefficients(RSD)
GEN	-31.03(6.26)***	-199.45(110.7)*
AGE	-.75(.23)***	3.79(3.55)
DMAR	9.41(8.05)	-186.92(102.71)*
INCOM	.016(.001)***	.006(.001)***
FMSIZE	-2.88(1.57)*	29.61(36.5)
EDU	1.74(2.15)	51.30(50.95)
DENVA	12.77(9.50)	-20.08(106.99)
DGRO	11.99(5.97)*	-97.57(101.77)
SUBSITE	-3.09(1.62)*	-76.21(32.12)**
REGOOD	1.40(1.21)	91.32(51.93)*
CONS	55.33(11.86)	742.18(265.99)
F(10, 84)(Prob > F)	28.18(0.0000)	
F(10, 96)(Prob > F)		5.31(0.0000)
Log pseudo likelihood	-407.067	-748.16414
Pseudo R2	0.1247	0.0464

Source: own estimation based on survey data

Chapter Six: Conclusion and Recommendations

6.1 Conclusion

The main aim of this study was to analyze and estimate the total economic value of Rock-Hewn Churches of Lalibela using non market valuation techniques such as CVM and TCM. Demand models and value of cultural heritage resource (RHCL) was illustrated. The study is timely and justified by the fact that cultural heritages have both economical and social contributions to the country. Specifically, the tourism industry provides a number of economic returns in the form of foreign exchange earnings, employment generation, individual income and government revenues. In this regard, the potentials for using this cultural and religious site as an instrument for economic growth and development are quite enormous. Although some developments have been recently witnessed in the sector, cultural heritages are still largely considered from the limited aesthetic and touristic functions. In this respect, valuation can show and quantify the actual and potential contribution of cultural heritages to national economic growth, employment and income to local livelihoods. Therefore, this study attempted to measure the use value and the non use value of Rock-Hewn churches of Lalibela through the application of the travel cost method and the contingent valuation method, respectively.

The use value of RHCL is estimated from data collected through the TCM, which helped to find the current recreational benefit of the site. The non use value part uses data from the CVM scenario which help to find the future recreational, spiritual, economical and social opportunity if the stated scenario is going to be applied. This can be explained by the amount of money that people are willing to pay to conserve and protect the everlasting and flabbergast world heritage site.

The regression results showed that significant variables such as gender (GEN), travel cost (TC) and travel time (TRAVT) have negative impacts on the number of days spent on site (demand to the site). Furthermore, it is identified that age(AGE), household income(INCOM), education level (EDU), knowledge about the Rock Hewn Churches Of Lalibela(KNW), membership in any environmental group(DENVA), and visiting experience (FIRVIS) have positive impact on the number of days spent on site. The results showed that there was a negative and significant relationship between travel cost and the number of days spent on RHCL for all visitors (local and non-local) in the year under consideration. This means as the travel cost increases, the number of recreational visitors reduces so for the number of days spent on site, which is consistent with the theory of travel cost. This shows that visitors are responsive to changes in travel cost.

The positive and significant relationship between the level of education and the number of visits (staying days) made to the RHCL is due to the fact that most individuals with higher level of education are usually knowledgeable and have an enthusiasm to see cultural heritages. The positive relationship between age and the number of days spent on site can be explained from the point of view that older individuals are usually demanded to stay on cultural heritages especially religious places including the RHCL whilst younger individuals may engaged in a lot of responsibilities and if not they demanded to visit more of natural heritages to get much happiness. According to scholars, the length of stay of cultural heritage visitors is longer than that of natural resource visitors and the age, income and education level of cultural heritage visitors are higher than those of natural resource visitors (Fletcher, 1996 and Smith, 2003). The positive relationship between monthly disposable income and the number of recreational visits (the number of days spent on site) shows that visits to RHCL was considered as a normal good by visitors.

As estimated by the count data model, the study found the mean consumer surplus per individual to be 18,253 ETB per year. This surplus represents only one category of total recreational value but it is sufficient to overturn approximate estimates of the opportunity cost. And the total use value of the site is approximately estimated to be 759,687,113 ETB per annum. The significance of visits to the RHCL and its value cannot be over emphasized even more is left unwritten to the site, as most respondents have indicated high level of significance of the site and their respective satisfactions during the survey.

Maximum likelihood estimation with the binary probit/ logit models of SBDCM and bivarite models of DBDCM are employed to derive CVM in this study for domestic and foreign visitors respectively. Willingness to pay for the non-use value part of RHCL is found to be affected by the first bid levels, and monthly income in all models applied to CVM. The study evaluates the mean WTP for RHCL using the estimated results. On average, non use value of RHCL of the site is 42,525,661 ETB (which the average of single bounded is and double bounded estimates) per annum.

The total economic value of RHCL is therefore found by the sum of the use value and the non use value of the site. Based on the above finding the use value contribution of RHCL was estimated to be 759,687,113 ETB and the non use value of RHCL of the site is 42,525,661 ETB (which the average of single bounded is and double bounded estimates) per annum. Therefore; the total economic value of the site is estimated to be 802,212,774 ETB. However, further research is necessary to establish the validity of this assertion since the study used a sample of relatively small size due to time and budget constraints.

The study also showed that visitors to Rock-Hewn Churches of Lalibela are willing to pay up to $90 for foreign visitors and 95 ETB for domestic visitors, which is more than the current entrance fee. However, the result of the study proved that the total amount that the authority collects through entrance fee from visitors does not reflect the actual and efficient consumer willingness to pay. Even if visitors are willing to pay more than the current entrance fee for conservation programs, the entrance fee which is expected to maximize the annual income and efficient is computed to be set at 11.32$ per four day (since this is the first study in RHCL with financial, time and other implicit and explicit constraints, it might helpful for future sensitivity analysis rather than taking as it is).

6.2 Policy implications

RHCL is the most representative venue and the number of tourists has rapidly increased. However, little is done on research and development sector in this cultural heritage and it is in state of damage unless the necessary and timely measures are going to make in the near future. Therefore, it is vital to estimate the recreation demand and value of this cultural heritage. In line with the findings of this study, the following policy implications are drawn.

First, The Ministry of Culture and Tourism has to pay satisfactory monthly salary to priests and others who provide services in RHCL. Having done this, setting appropriate management plan and socially optimal entrance fee to capture long run benefit of the site.

Second, efforts should be made to improve monitoring of the site by local authorities and make the site so gorgeous rather than capturing only the profits without thinking about the future. In the event that the government and church administrations intend charging an entrance fee for engaging in visits at the RHCL, the computed maximum entrance fee could be used as a guide on the fee structure to gain funding with other multi-dimensional benefits.

Third, there is a need to improve the facilities around the site so that visitors can extend the number of days they can stay there and hence spend more. Also the rate of re-visitors to the site will increase. This would in turn enable the relevant authorities to increase the revenue obtained from RHCL.

Fourth, since out of the total value estimated by CVM, in average 25% of value is spiritual value part of the non- use value. Taking this in to consideration, UNSECO has to take in to account the religious value of the site in registration to its documents.

Fifth, the city administration has to stand to make the site clean. It has to make toilets, sewerage and other facilities at the right place with the right quality.

Finally, future research is necessary to fully examine the robustness of the welfare values derived from the site to be used for management decision in the long run. This study suggests that future studies can be conducted on the non use value of RHCL in order to confirm this finding.

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Appendixes

Appendix 1: Survey Questionnaire

Addis Ababa University

Faculty of Business and Economics

Department of Economics

A TRAVEL COST AND CONTINGENT VALUATION SURVEY QUESTIONNAIRE FOR ESTIMATING THE ECONOMIC VALUE OF ROCK-HEWN CHURCHES OF LALIBELA

Supervisor_______________ Interviewee number ________

Date of interview__________

Name of Interviewer _________

Dear Sir/Madam,

WELCOME TO THE PRESTIGE HERITAGE SITE, ROCK-HEWN CHURCHES OF LALIBELA!

Hello, how are you. Thank you in advance for giving time for this interview. My name is ________________. This interview is a main body of a research Mr. Addisu Anteneh is working with and he is a postgraduate student in Economics at the University of Addis Ababa, Ethiopia. This research is in partial fulfillment for the awarded of MSC in economics and as a part of his research, he is evaluating the demand for cultural Site in Ethiopia particularly the Rock-Hewn churches of Lalibela. **I would be grateful if you would complete the following questionnaire**. Now you are randomly selected and asked to give about your travel and on-site information, your perception and observation regarding the site. The questions focus on your valuation of the cultural heritage Rock-Hewn churches of Lalibela. The questionnaire takes approximately 20-30 minutes to complete. The information you provide us will be kept strictly confidential.

Thank you very much for your time and co-operation in advance.

I. DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENTS

- Please put (**X**) on space provided and fill the blank space based on the given questions.

1. Nationality___________

2. Gender. Male ____ Female__

3. Age ____years.

4. Marital status

Single____ married____ divorced ___ others_____

5. What is your occupation?

Self-employed___Retired____Government_____servant____ Housewife_____

Student ______Unemployed______Private Sector____other (please specify) _________

- Basis of employment

Full time _____ part time ___ others please specify_____

6. Where are you currently working?

In Ethiopia _____ In your country of origin_____ other_________

7. How much is your household's disposable income per month? (If you are student please state parents' income) ______and please state the currency ______

8. How many members in your household are there including yourself? ________

9. What is your formal educational background (please, specify years spent to your education)?

Primary school____Secondary school____Undergraduate school_______ Postgraduate school_______Over postgraduate ________informal education___illetrate_____

10. Are you a member of any environmental group/non-governmental organization?

Yes ____ No______

If **YES**, please state the name of the group ______________

II. RESPONDENTS' ANSWER ON TRAVEL AND VISITATIONS

11. Country of origin i.e. your place of departure (If Ethiopian pleases state **town** and **region**) _______

12. How many years ago have you known about Rock-Hewn Churches of Lalibela? ______

13. How did you come to Rock -Hewn churches of lalibela?

13.1 Your country of origin to Ethiopia, Addis Ababa (**only for foreigners**)

Air ______________________ other (Please specify) _______________________

13.2 Your accommodation in Addis Ababa to and from Rock- Hewn Churches of Lalibela

Air____ by Car____ by Train________ Other (Please specify) ________

13.3. Your journey from and to RHCL to and from other parts of the country (**for domestic visitors**)

own car (specify the type) _____on foot_____Minibus_______

By bus______ by plane______ others (please specify) ___________

14. Where did you start your visitation in Ethiopia? _________________

15. From where you are directly going to RHCL _____ and how much time it takes____

16. Is this your first visit to this site? Yes ___________ No__________

17. If **NO** for question 16, how many times have you visited this site?

17.1. over the last 12 months (Including current visit) ___________

17.1. Total previous years (Including current visit) ______________

18. Are you visiting Rock -Hewn churches of lalibela alone or with other people at this time?

Alone ___________ with other people__________

18.1. If you choose **with other people,** whom do you visit here with?

Family ___ Boy/Girl friend ___ Friends/Relatives____Group (Colleague) ____ Group (school) _____ Group (religion) ___Group tour___

18.2. How many members in your party do you have including yourself? ____________

19. When did you arrive at this site in your calendar? _______________ (Day/Month/Year)

20. How long have you stayed here in lalibela (from arrival to departure)?

Less than one night________ One night________ Two nights_________

Three nights_________ four nights _______ More than five nights________

21. How many days do you plan to stay for total trip in Ethiopia? ________________

22. What is your total travel time, with **your return included**? Alternatively, how long did it take you to get to this site? ___________________________

- From your home to your accommodation in Ethiopia ________days/hours /minutes.
- From your accommodation in Ethiopia to RHCL _________days /hours/minutes

- From your village/town/city to RHCL ____________days/hours/minutes**(for domestic visitors)**

23. Have you visited other recreation sites on your way to RHCL (Rock-Hewn Churches of Lalibela)? Yes _______ NO______

24. Do you plan to visit other recreation sites on your way back to home?

    Yes_______ No_______

If you are answered **YES for question 23and 24** please specify the name of the site and their gate fees, the days stay and total cost while you visit:

Number	Name of the site visited	Gate Fee	Time spent at the site (days)	Total Cost On Each Site	Currency Of Payment
1	Bahir Dar				
2	Gondar-Fasiladas				
3	Semen Mountain National Park				
4	Ruins of Axum				
5	Addis Ababa				
6	Harar Jugol				
7	Konso cultural land features				
8	lower valley of Awash				
9	Others(please specify----------)				

25. How many are the numbers of other substitute sites you have considered when deciding to visit Rock-Hewn Churches of Lalibela__________________

26. Is the Rock-Hewn Churches f Lalibela your main destination for this trip?

    Yes ___________No____________

27. How much money in total do you think you have spent for the journey to Rock -Hewn churches of lalibela alone and after arrive at this site (per person/ per day)(use the following tables as a benchmark)?

The splits of the total expenditure per person can be present as follows

- Please, fill in the blanks in the following table.

Activities	Amount of money spent (USA dollar or in Ethiopia birr Other(please specify)
Transportation	
Petrol for your car	__________________
Bus fare/flight fare	__________________
Boat/ferry	__________________
Others	__________________
At the RHCL	
Entrance fee	__________________
Accommodation	__________________
Meals	
Entertainment	__________________
Shopping	__________________
Payment for guide	__________________
Payment for scout	__________________
Fee for photographic services	__________________
Fee for renting camping equipment	__________________
Staying Fee	__________________
Souvenir	__________________
Other expenses	__________________

- ❖ If in tour package, state the amount you paid for package to this Rock -Hewn churches of lalibela alone _________________ (specify the kind of currency you paid)

28. How much did you get if you were at your job other than visiting these churches?

______Unit of currency

29. How many hours did you work per day? ____________

III. CVM /WTP questions

I would now like you to read the following, which tells you about Rock- hewn churches.

It is important for you to read in order to answer the following questions.

Suppose the following statement is true:

The ROCK HEWN CHURCHES OF LALIBELA play a large role for Ethiopia in terms of religious center and distinction, cultural perfection, social communication, and economic improvement. Their role as a genuine insight of past generation technological progress, as cultural dealings, political contact as well as for social and economic relations of countries of the world make it distinctive. Moreover, it is the major source of tourism income for our country Ethiopia and in turn, a source of foreign currency and play indispensable role for all visitors who visit Ethiopia for their recreational accumulation of utility. However, there are many qualms about the long-lasting existence of these churches. ***Erosion due mainly to weathering is damaging the stone surfaces of all the churches, so that restoration is a mat of urgency.*** *Moreover, no special legal framework is provided to protect the Rock-Hewn Churches except the general law, Proclamation No. 209/2000, which has also established the institution in charge, the Authority for Research and Conservation of Cultural Heritage (ARCCH). Nevertheless, it faces difficulty in the harmonization of the different projects and effective coordination between the partners. The boundary for the property has not yet been clearly delineated and a buffer zone has not yet been provided. Due to these, the government proposed a deliberate plan to address such problems related to the site itself, the surrounding environments, and tourists who visit the site. A four-year Conservation Plan was established in 2006 but this has yet to be fully implemented. There is a need for stronger planning controls. There is also a proposal to build a big modern style hotel and an amusement park around this RHCL in order to attract more tourists and increase tourism revenue for the area. Moreover, the government proposed to reconstruct the airline destination to lalibela to be attractive and serviced throughout the year. One more it planned to use the more advanced technologies to conserve these churches from whether damage and to fulfill infrastructural services in the city including water, road, telecom, internet and other services.*

Right now, the authority is **charging nothing** to every domestic visitor and 50 USD to foreign visitors (950 ETB) to this site, but as you see, charging 50 USD for only foreign visitors is not enough to perform activities for better improvement *and the government* has been suggested that domestic visitors should pay for the conservation through their admissions fees. *Do you support this proposal?*

*YES*________ *NO* _____

*If you say **YES** you are going to the **WTP** question and if you response **NO**, you have to respond the reasons behind this.*

<u>NOTE:</u> Even if the current entrance fee for Rock -Hewn churches of Lalibela is <u>50 USD</u> per adult for foreign visitors, there is no payment for domestic visitors

30). If the entrance fee is set to be <u>10 ETB</u>, are you willing to pay for this amount?

Yes ______ No_______

30.1). If your response is **YES**, if the new entrance fee is set to be <u>15ETB</u> instead, are you still willing to pay for this amount?

Yes _____ No______

30.2). If you response is **NO** if the new entrance fee is <u>5ETB</u> instead, are you willing to pay for this amount? Yes_________ No_________

31. What is your maximum willingness to pay (for only YES-YES or NO- NO answers for question 30, 30.1, and 30.2? _________________

32. If you are **not willing to pay at all**, what is your reason (choose from the given alternatives below)?

A. I feel the problems do not affect the site quality in the way described

B. I do not believe paying will solve the problem

C. I believe the preservation of the site will take place without my contribution

D. I failed to understand the question

F. I believe the Government should provide all the cost

G. Others (please specify) ______________________________

33. If **YES**, what is the **reason for your willing to pay** to this site?

A. for my own, benefits B. for the next generation C. for religious practice

D. for society as a whole E. other, (specify) ___________

34. How well do you feel you understand the issues rose in this questionnaire (about the development planes and management actions stated above)?

Very well _________well enough ________ not so well_________ not at all_______

35. If the above stated programme failed and the historic scenery of Rock -Hewn churches of lalibela is damaged, would you have any intention to visit the Rock -Hewn churches of lalibela again in the future? Yes ______ No_______

If your response is YES, please go to question 36.

If you response is NO, please go to question 37.

36. How many times are you willing to visit here in 12 months? ________________

37. If the historic scenery of Rock -Hewn churches of lalibela is improved as stated above , would you have any intention to visit the site again in the future?

Yes __________ No______________

If your response is YES, please go to question 38.

If you response is NO, please go to question 39.

38. How many times are you willing to visit this site in 12 months? _____________

39. Do you want to visit Rock -Hewn churches of lalibela again in the future if there is no any change? Yes __________ No__________

40. What is your satisfaction level for your visit to Rock -Hewn churches of lalibela, this time?

A. Extremely satisfied B. Satisfied C. Neutral D. Dissatisfied

E. Extremely dissatisfied

41. Do you feel this questionnaire provided you with?

A. Too much information B. about the right amount of information

C. not enough information

42. How would you describe your experience of Rock -Hewn churches of lalibela?

Better than I expected _____ As I expected_______ worse than I expected _________

Thank you for your cooperation!!!!!

Appendix 2: Pair Wise Correlation among Variables Employed in the Estimation

Table A2: Pair Wise Correlation among Variables Employed in the Estimation

	GEN	AGE	DMAR	OCC	DEMP	INCOM	FMSIZ
GEN	1.0000						
AGE	-0.0413	1.0000					
DMAR	-0.0126	0.5133	1.0000				
OCC	-0.0218	0.1521	0.0547	1.0000			
DEMP	0.0881	-0.0878	0.0575	-0.5354	1.0000		
INCOM	0.0803	0.0975	0.0357	-0.1061	0.0434	1.0000	
FMSIZ	0.1400	0.1371	0.4983	0.0496	-0.0389	0.1408	1.0000
EDU	-0.0078	0.1716	0.0759	0.1298	-0.1108	0.2172	0.0026
DENVA	0.1494	0.1659	0.0457	0.1387	-0.0178	-0.0183	-0.0073
KNW	-0.0111	0.3480	0.2369	0.1419	-0.0377	-0.3367	0.1937
FIRVIS	0.0353	-0.3427	-0.2573	-0.0707	0.0061	0.1495	-0.1131
DGRO	-0.1181	-0.0131	0.0010	-0.1281	0.0356	0.1336	0.0665
SUBSITE	0.0467	-0.0361	0.0434	0.0761	-0.0981	-0.0042	0.0572
PERVIST	-0.0038	0.2507	0.1360	0.1058	-0.0765	-0.1765	0.0957
TRAVT	0.0533	-0.0904	-0.0600	-0.0709	0.1841	-0.0055	-0.1511
TC	0.0136	0.1633	0.0105	-0.0157	0.0119	0.5869	-0.0281
OPWTP	0.0105	0.0073	0.0786	-0.0494	0.1193	-0.0450	-0.0611
SATSFAC	0.0570	0.1313	0.0422	0.1586	-0.0194	-0.0597	-0.0042

	EDU	DENVA	KNW	FIRVIS	DGRO	SUBSITE	PERVIST
EDU	1.0000						
DENVA	0.4361	1.0000					
KNW	0.2760	0.4032	1.0000				
FIRVIS	-0.0647	-0.0972	-0.4959	1.0000			
DGRO	0.0153	-0.0159	-0.1896	0.2281	1.0000		
SUBSITE	-0.0952	-0.0700	-0.0398	0.0467	0.0010	1.0000	
PERVIST	0.0421	0.2537	0.3650	-0.3648	-0.1804	-0.0204	1.0000
TRAVT	-0.0145	-0.0343	-0.1704	0.2452	0.1427	-0.0091	-0.3047
TC	0.1309	-0.1063	-0.3314	0.1510	0.1181	-0.0219	-0.1826
OPWTP	-0.1189	-0.0700	-0.0832	-0.0269	0.0296	0.1114	-0.1859
SATSFAC	0.0018	0.1000	0.1781	-0.1550	-0.0479	0.0219	0.0841

	TRAVT	TC	OPWTP	SATSFAC
TRAVT	1.0000			
TC	0.0445	1.0000		
OPWTP	0.1246	0.0890	1.0000	
SATSFAC	0.0157	-0.0406	0.1748	1.0000

Appendix 3: Multicollinearity Diagnostics Using Variance Inflation Factor

Table A3: Multicollinearity Diagnostics Using Variance Inflation Factor

Variable	VIF	1/VIF
PERVIST	2.97	0.336811
FIRVIS	2.33	0.429255
KNW	2.33	0.429772
INCOM	2.01	0.496883
DMAR	1.98	0.506306
TC	1.91	0.522944
AGE	1.86	0.536958
OCC	1.84	0.543885
DEMP	1.75	0.570210
EDU	1.72	0.581646
FMSIZ	1.64	0.610727
TRAVT	1.35	0.740001
DENVA	1.31	0.761466
DGRO	1.16	0.859057
GEN	1.15	0.866598
OPWTP	1.13	0.881101
SATSFAC	1.11	0.900960
SUBSITE	1.05	0.948567
Mean VIF	1.70	

Appendix 4: Heteroscedasticity Test

Table A4: Heteroscedasticity Test

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity			
Ho: Constant variance Variables: fitted values of TRIPS chi2(1) = 30.45 Prob > chi2 = 0.0000			
Cameron & Trivedi's decomposition of IM-test			
Source	chi2	df	p- value
Heteroscedasticity	189.01	177	0.2548
Skewness	34.97	18	0.0095
Kurtosis	0.69	1	0.4060
Total	224.67	196	0.0784

Appendix 5: Outlier Diagnostics using *avplots* Command

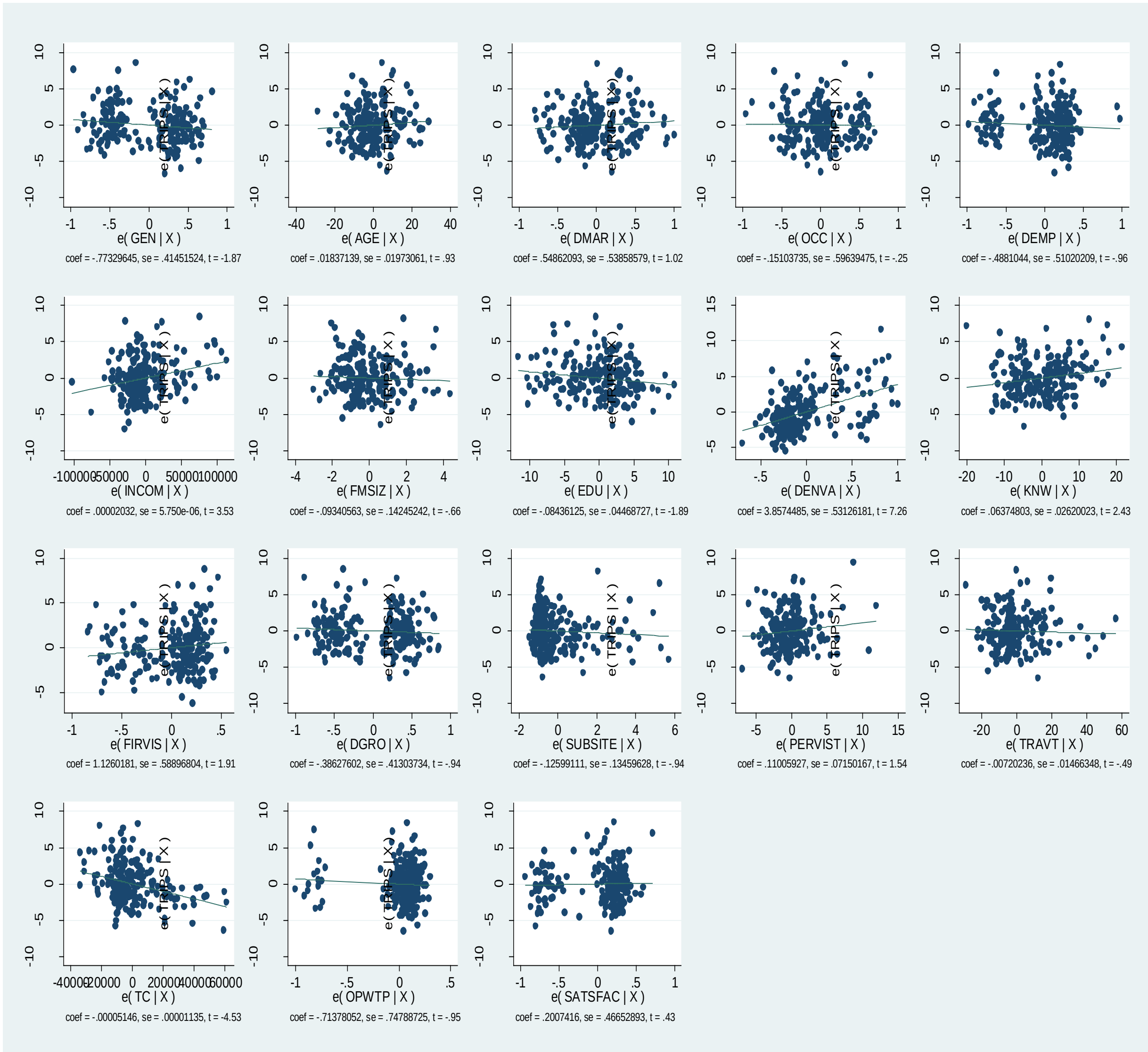

Figure A5 Outlier Diagnostics Using ***avplots*** Command (added-variable plots).

Appendix 6: Check for Normality in the Residuals

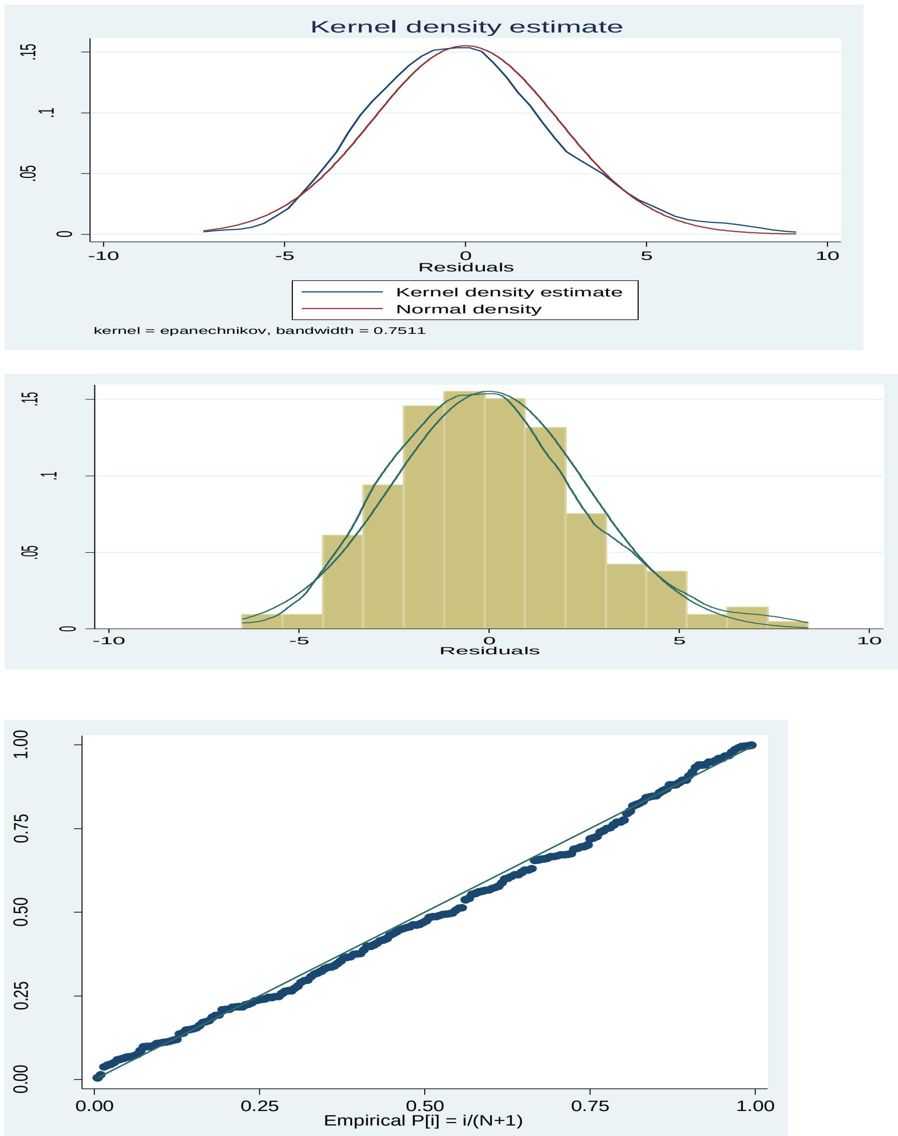

Figure A6. Check for Normality in the Residuals

Table A6: Test of Normality of the Error Term

Shapiro-Wilk W test for normal data					
Variable	Obs	W	V	Z	Prob>Z
e	200	0.98563	2.144	1.755	0.03962

Appendix 7: Maximum Likelihood Estimation of Truncated Poisson and Truncated Negative Binomial Model (Robust) – Full Model

Table A7: Maximum Likelihood Estimation of Truncated Poisson and Truncated Negative Binomial Model (Robust) – Full Model

Variables	Truncated Poisson		Truncated Negative Binomial	
	Coefficient(RSE)	Z-statistic	Coefficient(RSE)	Z-statistic
GEN	-.2142373(.091909)**	-2.33	-.1816723(.0941295) *	-1.93
AGE	.0111022(.0035316)***	3.14	.0120396(.003624)***	3.32
AGESQU	.0000666(.0000345)***	1.93	.0000742 (.0000335)**	2.21
DMAR	-.0190098(.1045372)	-0.18	.0292327(.1097512)	0.27
OCC	.0005428(.0358792)	0.02	.0095804(.0362339)	-0.33
DEMP	-.0427451(.1133185)	-0.38	-.0381086(.1153404)	-0.33
INCOM	3.92e-06(1.14e-06)***	3.43	4.12e-06(1.10e-06)***	3.74
FMSIZ	-.0171543(0 .029579)	-0.58	-.0335491(.0319487)	-1.05
EDU	.1308494(.0453475)***	2.89	.1238578(.0460476)***	2.69
DENVA	.6070385(.1014824)***	5.98	.5917022(.1084866)***	5.45
KNW	.0140497(.0058132)**	2.42	.0133083(.0054642)**	2.44
FIRVIS	.2438957(.1136131)**	2.15	.2287392(.1200383)**	1.91
DGRO	-.1102934(.0941979)	-1.17	-.0843103(.0967463)	-0.87
SUBSITE	-.0081482(.0466581)	-0.17	-.0115086(.0443532)	-0.26
PERVIST	-.0007291(.0020239)	-0.36	-.0000708(.0026311)	-0.03
TRAVT	-.0048374(.003374)*	-1.43	-.0047007(.003622)*	-1.30
TC	-.0000207(2.99e-06)***	-6.94	-.0000215(2.93e-06)***	-7.33
OP -WTP	-.0485767(.1162186)	-0.42	-.085704(.1349361)	-0.64
SATSFAC	.0954647(.1093832)	0.87	.0748656(.1180132)	0.63
_CONS	.6333074(.3202097)**	1.98	.6408417(.325532)**	1.97
No of obs	200		200	
Wald chi2(18)	487.37		398.19	
Prob > chi2	0.0000		0.0000	
Pseudo R^2	0.3956			
Log likelihood	-423.47797		-416.54281	
Alpha(α)			.1012534(.0413253)**	

Note that: ***= 1 percent level of significance,

** =5 percent level of significance,

* =10 percent level of significance:

Numbers in parenthesis are RSE (robust standard error)-values.

Appendix 8: Total Tourist Arrival to Rock Hewn Churches of Lalibela for Two Consecutive Years Based On the Report Prepared by Lalibela City Administration (2013)

Table A8: Total Tourist Arrival to Rock Hewn Churches of Lalibela for Two Consecutive Years Based On the Report Prepared by Lalibela City Administration (2013)

Year	Tourist arrivals		
	Foreign tourist	Domestic tourist	Total
2010/2011	35,437	15,492	50,929
2011/2012	25,128	16,492	41,620

Appendix 9: Currency Transaction Rate Used Based On Information from Commercial Bank of Ethiopia in Terms of Birr

Table A9: Currency Transaction Rate Used Based On Information from Commercial Bank of Ethiopia in Terms of Birr (Ethiopian Standard Currency)

Currency	Transaction rate in terms of ETB
US DOLLAR	19.3469
EURO	26.8264
POUND STERLING	32.3500
SWISS FRANK	22.0628
SWDISH KRONER	2.9557
NORWIGIAN KRONER	3.2470
DANISH KRONER	3.5930
JAPANESE YEN	0.1905
CANADIAN DOLLAR	17.6153
SAUDI RIAL	5.1588
UAE DIRHAM	5.3725

Appendix 10: Coefficients Reported by Single-Bounded Logit and Probit Models

Table A10: Coefficients Reported by Single-Bounded Logit and Probit Models

	Domestic visitors				Foreign visitors			
Variables	Logit model		Probit modl		Logit model		Probit model	
	Coefficient	Dy/dx	Coefficient	Dy/dx	Coefficient	Dy/dx	Coefficient	Dy/dx
BID1	-.0429395 (.0245702)*	-.00454 (.00314)	-.0238515 (.0115534)**	-.00491 (.00285)*	-.002739 (.0013165)**	-.0005094 (.00024)**	-.0016306 (.0007579)**	-.0005297 (.00024)**
GEN	2.158402 (1.300651)*	.27146 (.16587)*	1.0994 (.6077068)*	.25123 (.14118)*	-.3564319 (.5712647)	-.0653304 (.10576)	-.2330702 (.3267478)	-.0747313 (.10451)
AGE	-.0354082 (.0346299)	-.00374 (.00371)	-.0189706 (.0180409)	-.00390 (.00393)	-.0235724 (.0218674)	-.0043842 (.00389)	-.0134395 (.0126146)	-.0043656 (.00402)
DMAR	-1.528121 (.7956448)*	-.16906 (.10178)*	-.8761286 (.4774071)*	-.18426 (.11017)*	1.058434 (.588599)*	.189011 (.09359)**	.599509 (.3397157)*	.1881192 (.09865)**
INCOM	.002362 (.0005988)***	.00024 (.00007)***	.0013608 (.00030)***	.00028 (.00007)***	.0000363 (.0000124)***	6.74e-06 (.00000)***	.0000203 (6.21e-06)***	6.59e-06 (.00000)***
FMSIZ	-.1268847 (.3178459)	-.01341 (.03341)	-.0537729 (.1473997)	-.01108 (.03079)	.1477591 (.2028944)	.0274817 (.03942)	.1016026 (.1158688)	.0330038 (.03849)
EDU	.2921664 (.4199789)	.03089 (.03946)	.1641039 (.2019483)	.03382 (.03843)	-.5011177 (.2911008)*	-.0932027 (.05344)*	-.2894719 (.1642048)*	-.0940299 (.05266)*
DENVA	.6076369 (1.416013)	.05575 (.11364)	(.3035843) .7921804	.05594 (.13016)	.0720913 (.7865883)	.0132892 (.14438)	.0692794 (.4448854)	.0222577 (.14195)
DGRO	1.981687 (.9512643)**	.20035 (.10095)**	1.077213 (.4757832)**	.20746 (.09407)**	.6602305 (.5617116)	.1288435 (.11101)	.4008713 (.3276892)	.1347942 (.11182)
SUBSITE	-.3818451 (.2751429)	-.04037 (.03295)	-.2323282 (.1429561)	-.04788 (.03199)	-.1230997 (.1388595)	-.0228953 (.02552)	-.070241 (.0883098)	-.0228166 (.02865)
REGOOD	-.561193 (.2065282)**	-.05933 (.02497)**	-.3219827 (.1125774)***	-.06636 (.02687)**	.4262688 (.2936919)	.0792816 (.05324)	.2519047 (.1716277)	.0818268 (.05487)
CON	.6725213 (2.671652)**		.3708672 (1.394528)		3.715899 (2.390316)		2.206398 (1.383657)	

Declaration

I hereby declare that this thesis is my own work and has never been presented in any other university or I have not plagiarized in the preparation of this assignment and have not allowed anyone to copy my work. All sources of materials used for this thesis has been duly acknowledged.

Declared by:

Name: ______________________________

Signature: ___________________________

Date: _______________________________

As thesis advisor, I hereby confirm that this thesis is the output of research undertaken by Addisu Anteneh under my supervision and that it be submitted for the M.Sc. degree award.

Confirmed by Advisor: **Abebe Damtie(PhD)**

Signature: ___________________________

Date: _______________________________

Addis Ababa University, November, 2014

Addis Ababa, Ethiopia