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Determinants of Residential Real Estate Prices in Bahir Dar City

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A THESIS SUBMITTED TO THE DEPARTMENT OF LAND AND REAL PROPERTY VALUATION, INSTITUTE OF LAND ADMINISTRATION, BAHIR DAR UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN LAND AND REAL PROPERTY VALUATION

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ACRONYM

ADLI	Agricultural Development Led Industrialization
ANRS	Amhara National Regional State
Birr	Ethiopian Currency
BoFED	Bureau of Finance and Economic Development
CBD	Central Business District
CESCR	International Covenant on Economic, Social and Cultural Rights
CLRM	Classical Linear Regression Model
CSA	Central Statistical Authority
E.C.	Ethiopian Calendar
FDRE	Federal Democratic Republic of Ethiopia
FGD	Focused Group Discussion
GDP	Gross Domestic Product
LAOs	Land Administration Offices
LIS	Land Information System
MoUDC	Ministry of Urban Development and Construction
MUDHCo	Ministry of Urban Development, Housing and Construction
OLS	Ordinary Least Square
RICS	Royal Institution of Chartered Surveyors
SPSS	Statistical Package for Social Science
SSAs	Sub-Saharan Africans
UN	United Nations
UNESCO	United Nation Educational, Scientific, and Cultural Organization
UNUDHRs	United Nation Universal Declaration of Human Rights
WB	World Bank

ABSTRACT

The price of a residential real estate is not determined arbitrarily rather it results from the implicit price of housing attributes concerning structural, neighborhood and environmental characteristics. Market participants lack sufficient information about determinant attributes to undertake transactions. The process and procedure in the residential real estate market are complex both for the sellers and buyers. This makes the involvement of brokers compulsory. This study analyzed the determinants of residential real estate prices using a cross-sectional data collected from 286 randomly selected residential real estate buyers. A multistage sampling technique has been used to select sample respondents. In this study, both descriptive analysis and econometric model (Hedonic price model) have been used to analyze the data. The descriptive analysis result indicates prices of residential real estates estimated by municipalities; and reported by buyers and sellers for title transfer purpose are respectively 3.62 and 3.04 times lower from the actual sales price of houses. Most of residential real estates are hold with freehold system and have no accessible road or have access to dirt type road. The econometric estimation result shows that plot size, building current price, location, and wall finishing material are common and significant determinants of real/actual and estimated price levels. Over these common determinants, the estimated price level is significantly affected by the existence of subsidiary buildings and by the tenure system under which the property is possessed. Whereas, that of real transaction/actual selling price is significantly influenced by the roof of the main building. The findings of this study call scale-up of residential real estate market and its price determination practice in Bahir Dar city in particular and in Ethiopia in general. In addition, concern has to be given in increasing the supply of land, improving the transaction process and valuation skill of appraisers. Finally, principles and regulations on real estate transactions, price estimations and on the rate of payments have to be modified and adjusted with the market situation.

Keywords: hedonic   price   model,   determinant,   residential   and   real   estate

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Real estate refers to land and anything fixed, immovable or permanently attached to it such as buildings and fences (Pagourtzi *et al*., 2003; Ouma, 2013; Kagendo, 2011). Similarly, the business dictionary defines it as land and anything fixed, immovable, or permanently attached to it such as appurtenances, buildings, fences, improvements, roads, shrubs and trees (but not growing crops), sewers, structures, utility systems, and walls. The immobility aspect of land and attached resources distinguishes it from other goods and services. Title to real estate normally includes the title to air rights and surface rights which can be bought, leased, sold, or transferred together or separately (Fra, 2013).

Real estate could be categorized into residential and non-residential properties. Residential real estates are properties that serve as housing or a dwelling and encompass single-family, duplex and other multi-family homes including condominiums, bungalows, and maisonettes (MoUDC, 2014). The non-residential properties encompass commercial, industrial, hotel/motel, institutional and recreational buildings (Fra, 2013).

Real estate accounts for between half and three-quarters of the national wealth of the developed world (WB, 2011). Investment on it comprises 2 to 8 percent of GNP and from 10 to 30 percent of gross capital formation in developing countries (Sisay, 2006).

The growth or decline of real estate sector considerably affects the general growth or decline of a country's economy (Gaspareniene *et al*., 2014). The real estate market with dramatic multiplier effect is a key economic indicator plays a very important role in any economy (Golob *et al*., 2013). In most countries, real estate is generally households' single largest investment and hence real estate price risk may be considered to be the major risk they face (Glindro *et al*., 2011). Fluctuations in residential real estate prices tend to have a bigger wealth effect than those of financial assets.

The right to housing is a basic human right the satisfaction of which serves as a basis for the enjoyment of all other rights (Dejene, 2015). Article 11(1) of the International Covenant on Economic, Social and Cultural Rights (ICESCR) clearly recognizes the right to adequate

housing. According to the United Nation Universal Declaration of Human Rights (UNUDHRs); General Comment 4, The Right to Adequate Housing (1991), mainly addresses its affordability which means the cost of adequate housing should not be so high that it compromises the ability of a household to satisfy other basic needs. However, more than 72 percent of Sub Saharan Africans (SSAs) are leaving in slum areas because of inability to afford housing under a formal system. Specifically, Ethiopia stands in violation of its duty to realize the right to housing as recognized under international treaties it ratified and included in its own Constitution (Dejene, 2015).

According to the estimates made employing a methodology developed by the UN-Habitat, Ethiopian cities contribute to close to 40 percent of the national GDP but the role of the principal sector in the urban areas so-called real estate sector did not have a significant contribution (MUDHCo, 2015). Even if the real estate sector has a multidimensional effect on the economy, it did not get much emphasis in Ethiopia. Concerning operational problem on investment in housing, Ethiopia becomes one of the developing countries to allocate a very low percentage on the housing sector, which is estimated to be 2.5 percent of its national income. This figure is below the minimum standard set by the United Nations for developing countries, which is 6 percent of GDP (Esayas, 2008).

During the socialist regime, the government expenditure on real estate sector accounts for only 8.3 percent of the total economic service outlays. Not only in this regime but also in the current government from the period 1992-2004 the expenditure to the sector is 8.8 percent, which shows only negligible growth of 5 percent in 12 years. Nevertheless, very recently due to natural increase, migration, economic policy Agricultural Development Led Industrialization (ADLI) with its consequence of industrial expedition, and other factors (mainly political motives), housing problem has become one of the areas that call for the attention of the government. This being the case, the government has recently put particular focus on urbanization and housing development for urban dwellers (Eshete and Teshome, 2015).

One of the root cause to the problem of informal settlement and urban sprawl is lack of affordable housing. The failure of cities to answer it which is further exacerbated by the speculative tendencies on house price bubble by brokers *(Delalas)*, informal real estate developers, and corrupt bureaucrats and administrators (MUDHCo, 2015; Rahman *et al*., 2008).

Since the government, which is the major supplier of land, is not supplying land adequately, citizens will be forced to search for other outlets and options. These include illegal and/or informal settlement and squatting, illegal and/or informal transactions from individuals, which is a transaction that cannot be captured by the government. This is a case where a recent event has been observed at fringes of the city at which conflict raised between informal settlers and the government. Low formal land supply and low property sales would mean the transaction is undertaken underground without evidence and knowledge of the municipalities. This, on top of the socio cultural and political turmoil, would also remarkably slow down the revenue from property transfer tax and fee (MoUDC, 2014).

Land for construction of residential housing is allowed only through lease system (with allotment and auction). A household that wants to maximize its utilities than cooperative housing or auction is forced to look for residential houses in the housing market. This is because the free allocation of land for a residential purpose was prohibited by the proclamation No. 80/1993. The 2011 proclamation ratifies the former proclamation and even strict the alternatives by stating all properties including under freehold system have to be transformed in to the lease system.

The factors that specify the housing demand provided by pleasure and preferences have been the qualities of the demanded house. Real estate market in general and residential real estate market, in particular, is a heterogeneous market and each house has different distinctive characteristics. Houses' having different characteristics results in having different values and prices. The characteristics of a real estate may affect its value positively or negatively so that an implicit price occurs. Actors in residential real estate market lacks full and perfect knowledge about these implicit attributes, potential transactions and price determination. Mostly in residential real estate market there is inevitably a marked asymmetry of information between market participants (Sisay, 2006; Ghysels and Plazzi, 2012).

1.2 Statement of the problem

Traditional house price prediction, which we are now following is based on the cost of production, sale price comparison, or income capitalization method that did not critically portray and evaluate implicit attributes. Therefore, the availability of a house price prediction model that appraise inherent attributes of a residential real estate helps to fill up an important information gap and improve the efficiency of the real estate market (Limsombunchai, 2004).

According to Kagendo, (2011) residential real estate is a multi-dimensional commodity, characterized by durability, structural inflexibility as well as spatial fixity. There are usually hundreds of forces at work (usually unseen) which culminates in a selling price for a real estate. He points out that real estate sellers try to sell for as much as they can while buyers try to buy for as little as they can. Prices of residential properties are generally under the influence of local, regional, national and international economic conditions (Ferlan *et al*., 2017; Yang, 2000; Watkins 1998; Goodman, 1998). These determinants can be categorized as property specific factors (factors relating to the property itself or microeconomic factors) and market-related factors (factors related to the market as a whole or macroeconomic factors) (Galati *et al*., 2011; McMillan *et al*., 1980; Malpezzi, 1999; Sirmans *et al*., 2005). However, most of researchers from global perspective targets towards macroeconomic factors. Macroeconomic determinants are addressed rarely in Ethiopia, but nothing is done regarding microeconomic (property specific) determinants.

The analysis of the determinants of residential real estate prices is important because of not only its affordability effect but also its impact on economic and social conditions. Firstly, real estate prices determine home ownership which has a positive effect on residential mobility, residents' health and other social consequences (Cohen and Karpavičiūtė, 2017). Secondly, real estate price fluctuation is closely connected with construction markets and the whole economic status (Jureviciene *et al*., 2008; Cohen and Karpavičiūtė, 2017).

For developments made, for services delivered and to cities to be self-sustained in their budget municipalities should have to estimate and determine the price of the residential real estate legitimately for the transaction tax and fee collection. Lack of updating of regulations, the rate of payments and the information about properties have created a problem for the city administration to collect the required revenue from residential real estate tax or transaction charges. Residential real estate has to be valued by semi-skilled technician whenever they are transacted, and there is no standard valuation procedure across sub-cities. Residential real estate market participants usually get into collusion to get evasion from their tax burden and this is the crucial problem of Ethiopian cities (Ozlu, 2015). The newly calculated Ethiopian tax bills presented to all property transactions indicated that they are currently paying around a quarter of what they should pay mainly due to lack of actual price data (Tom, 2016).

The way and the manner how brokers operate are not clearly known. In addition, whether their involvement facilitated or impeded the process of real estate transaction needs to be identified. Information about who owns what is difficult to verify; squatting appears to be the rule rather than the exception. The legal and administrative systems for establishing, recording and transferring title are inadequate and outdated (Albouy *et al.*, 2016; Mengie, 2015).

1.3 Objective of the study

The general objective of this study is to assess residential real estate price determinants to get a new level of predictive and prescriptive evidence for Bahir Dar city.

The specific objectives of the study are:
- ➢ To identify the practices and challenges of residential real estate transactions in Bahir Dar city.
- ➢ To identify the principal actors in the residential real estate market.
- ➢ To undertake empirical analysis about factors that determine the price of residential real estate.

1.4 Research questions

1. What sorts of processes and procedures are there in residential real estate market? And what are the challenges in real estate marketing?
2. Who are the principal actors in the residential real estate market? And what are their roles in real estate transaction?
3. What are the basic determinants of the price of a residential real estate?

1.5 Significance of the study

An accurate prediction on the house price is important to prospective policy designers, real estate developers, real estate agents, researchers, implementers, real estate owners, investors, appraisers, tax assessors and other real estate market participants, such as mortgage lenders and insurers.

The findings of this study might be used by the government and other policy-making bodies, such as Bahir Dar city administration, as a guideline in formulating and developing

policies concerned with residential real estate sector of the economy. The municipality, as the regulator of real estate sector of the city, would benefit from the findings of this study as it would be enlightened on the various approaches that real estate agents can adapt to figure out the prices of properties. Information gathered through this study would help the government to formulate appropriate policies and strategies, which can improve the development of the real estate sector.

In addition, it is hoped that the findings of this study will add to the knowledge that rarely exists in the field of real estate sector in Ethiopia and it can be used as a benchmark for further studies in the sector. The study will further contribute to fill the gap in the literature concerning the factors that determine the prices of real estate.

Moreover, real estate brokers will be benefited from this study by getting information about real estate patterns and thus be able to recommend their clients accordingly. It is also expected that the results of this study will be important to the lenders, especially those who advance mortgages as they would find it useful to assist them in fine-tuning loan advancement decisions to real estate investors and owners.

Even if not advanced in Ethiopia, the result of this study can be useful for financial analysts in providing information necessary for advising their clients in financial decisions.

Furthermore, since the study will draw attention to the determinants of residential real estate prices, it will help real estate investors to make informed choices in the real estate property investment.

1.6 Scope of the study

The scope of the study has been limited only to the residential real estate than other types of real estate. This is because, residential real estate prices matter for macro-prudential purposes, as well as for socio-demographics than other real estate types. The rationale for this is that according to most studies, residential real estates are important for the protection of life, human worth and dignity than commercial and industrial uses. Moreover, residential real estate produces more satisfaction per unit of capital; and thus generate more welfare than other types (UN Habitat, 2011; Golay, 2016). Dealing with more on residential real estate than any other type is,

therefore, expected to be a quick remedy for shelter problem and for multi-dimensional urban poverty alleviation.

The study carried out in Bahir Dar city administration. This study site has been chosen, because it is the center of agglomeration of business activities as primate cities due to less number of other competitive growth centers within the zone and in Amhara region at large.

There is lack of background information about residential house marketing practices, current residential houses price determination and its challenges. The dramatic increase in the price of residential real estate, which seems a housing bubble, induced problems in the city. This study has relied on a one year and three-month cross-sectional data collected from the selected residential real estate transactions of the selected sub-cities. Besides, the study has been used a sample of 286 sampled residential real estate transactions from three sampled Sub-cities.

1.7 Limitation of the study

The study has been undertaken in Bahir Dar, the capital city of Amhara Regional State with the main objective of assessing the determinants of price of residential real estate. However, this study has been limited by the following factors. First, there is no properly recorded residential real estate price data (price index) and hence the research did not show the price and its determinants trend over time. Second, it is constrained by lack of previous empirical studies on determinants of price of residential real estate in the study area and hence it is difficult to compare and contrast the research findings locally. Third, this study has not addressed macroeconomic determinants of residential real estate in the study area since it only address microeconomic (house specific characteristic) determinants. Lastly, the study has not considered other types of real estate (example commercial, industrial, institutional) and hence it did not show any comparison among different use types of real estate.

1.8 Organization of the study

The study has been organized with five chapters. The first chapter including this part is the introduction where the background, problem statement, objective, scope, research question, significance and limitation of the study have been discussed. The second chapter examines theoretical and empirical literatures relevant to residential real estate. Chapter three focuses on

methodological issues such as the research design, sampling method, data collection, and estimation to come up with empirical result. The descriptive analysis and the econometric model have been presented in the fourth chapter. Finally, conclusion, recommendation and policy implications have been presented precisely.

CHAPTER TWO: LITERATURE REVIEW

2.1 Definition of real estate market and price of residential real estate

Real estate market is an arrangement by which buyers and sellers are brought together to determine a price at which a particular property can be exchanged (Harvey, 1992). Players in the real estate market are sellers, buyers and advisers/brokers. The real estate market, as a natural place for the occurrence of real estate, is under constant change depending on the behavior and activities of market participants, as well as the influence of the surrounding elements (Van der Krabben, 1995; D'Arcy and Keogh, 1998).

Real estate market is one that is characterized by almost predictable cycles of booms and busts (Smith, 2010). The former are the periods when the prices in market soar and almost inevitably, they are followed by other periods when the prices plummet. Real estate has its own unique characteristics that makes difficult its marketing system as compared to other products these unique characters include (Olsen, 1969).

a) *Durability:* Real estate is durable meaning building can last for decades or even centuries, and the land underneath is practically indestructible. Because of this, real estate markets are modeled as a *stock/flow market*. The stock of real estate in any period is determined by the existing stock in the earlier period, the rate of deterioration of the existing stock, the rate of renovation of the existing stock, and the flow of new development in the current period. The effect of real estate market adjustments tends to be mitigated by the relatively large stock of existing buildings.

b) *Heterogeneity:* Every unit of real estate is unique in terms of its location, the building, and its financing. This makes pricing difficult, increases search costs, creates information asymmetry and greatly restricts substitutability.

c) *High transaction costs:* Buying and/or moving into a home costs much more than most types of transactions. These costs include search costs, real estate fees, moving costs, legal fees, land transfer taxes, and deed registration fees. Transaction costs for the seller and buyer typically range between 1.5 percent and 6 percent of the purchase price.

d)   *Long time delays:* The market adjustment process is subject to time delays due to the length of time it takes to finance, design, and construct new supply and also due to the relatively slow rate of change of demand. Because of these lags, there is great potential for disequilibrium in the short run. Adjustment mechanisms tend to be slow relative to more markets that are fluid.

e)   *Both an investment good and a consumption good:* Real estate can be purchased with the expectation of attaining a return (an investment good), or with the intention of using it (a consumption good), or both. This dual nature of the good means that it is not uncommon for people to over-invest in real estate which pretends investment on real property worth more than investment on financial market.

f)   *Immobility:* In real estate consumers come to the good rather than the good going to the consumer. Because of this, there can be no physical market place. This spatial fixity means that market adjustment must occur by people moving to dwelling units, rather than the movement of the goods. Spatial fixity combined with the close proximity of housing units in urban areas suggest the potential for externalities inherent in a given location.

The Royal Institution of Chartered Surveyors (RICS) (1981, p 230), defines real estate market price as the best price at which an interest in property might reasonably is expected to be sold by private treaty at the date of sale. Residential real estate price refers to a value that will buy a defined residential real property. It is the consideration given for the transfer of ownership of a real estate asset (Mwalili, 2014).

In ordinary usage, price is the amount of payment or compensation given by one party to another in return for goods or services (Wurtzebach, 1994). Price can also refer to the quantity of payment requested by a seller of goods or services, rather than the last payment amount. The requested price is known as the asking price, while the real payment is known as transaction price or the actual traded price (Wheaton, 2003).

2.2 Advantages of buying/owning a real estate

Why real estate buyers prefer to buy a house rather than renting? A quality home is more than just a roof and walls, it provides homeowners with feelings of stability and pride, as well as generating measurable results. Homeowners accumulate wealth as the investment in their homes grows, enjoy better living conditions, are often more involved in their communities, and have children who tend on average to do better in school and are less likely to become involved with

crime. Overall, owning a real estate has many advantages over renting including the following welfares (Yun, Ph and Evangelou, 2016; Millstein, 2016; Simons, 2015; Green and White, 1997)
.

A. *Home ownership leads to better health:* A safe, decent, affordable home is like a vaccine, it literally prevents disease. A safe home can prevent mental health and developmental problems, a decent home may prevent asthma or lead poisoning, and an affordable home can prevent stunted growth and unnecessary hospitalizations. Poor housing conditions contribute to asthma and other physical illnesses. Decent, affordable housing can help children with asthma address their health needs, according to a report by the Center for Housing Policy. A national survey of Habitat homeowners found that 74 percent said their families' overall health had improved since moving into their home.

B. *Home ownership leads to greater educational achievements:* As 2011 survey of United States Habitat homeowners by the University of Southern Indiana; children of homeowners are significantly more likely to stay in school until age 17 than children of renters, especially in low-income households. Children in home owning families outperform children in renting families in both mathematical and reading achievement tests, even when other factors are the same. These children will have fewer behavioral problems, higher educational attainment and greater future earnings. Most of adults in the households were furthering their education and the graduation rate for children of homeowners is 19 percent higher than for renters, and they are twice as likely to acquire some postsecondary education.

C. *Home ownership provides better security and safety:* Buying and getting home ownership status significantly reduced a household's incidence of crime. Homeowners have significantly less risk of being subject to a violent assault; a 2011 national survey of Habitat homeowners by the University of Southern Indiana found that 84 percent felt safe in their neighborhoods.

D. *Home ownership provides social benefits:* Buying and staying put for longer periods also creates social benefits that range from friendships with neighbors to community involvement and consistent educational opportunities for children. Home ownership provides social benefits beyond pure financial and economic benefits. Because most homeowners stay in their homes for longer periods, they are more likely to form relationships with their neighbors and are more invested in their community. Home ownership gives residents a platform to connect with neighbors and increases their social capital. The reason is simple as a homeowner, anyone have a

greater stake in his/her community and have the time and incentive to get to know his/her neighbors on a more intimate level. Keeping other things constant homeowners are more likely to be involved in community civic engagements, local elections, and volunteer work compared to renters (Yun, Ph and Evangelou, 2016).

E.   *Home ownership helps generate wealth building and a pathway out of poverty:* For most buyers, home ownership leads to wealth creation, as home equity encourages investment and serves as collateral for mortgage. The median net wealth of low-income homeowners is dramatically higher than the median net wealth of low-income renters. The Minnesota survey of Habitat homeowners found that 53 percent said they have more money since moving into their Habitat home; two-thirds are more confident about their ability to fund their children's college education; and almost 40 percent said they pay less in housing costs.   The benefits of home ownership are indisputable. Since 1976, Habitat for Humanity has helped more than 1 million families worldwide with housing solutions leading to decent, affordable shelter, which represents about 5 million people.

2.3 Theoretical review

The literature on the determinants of residential real estate prices starts from the idea that housing is a special type of asset because of its dual role as consumption and an investment good. In the long run, the equilibrium price a household is willing to pay for a house should equal the present discounted value of future services provided by the property, that is future rents and the resale value. In the short run, house prices can deviate from their fundamental values, depending, among other things, on idiosyncratic characteristics of the real estate market (Leung and Chen, 2006; Davis and Zhu, 2004; Wheaton, 1999).

According to Hosios (1991), there are a number of lessons that can be drawn from the analysis of consumer choice as it relates to the price. The first is that the value of something is whatever they are willing to give up for it. Two things have the same value if gaining one and losing the other neither leaves one better nor worse off, meaning they are indifferent between the situation of exchange and the situation after the exchange. The second lesson is that the value of something depends not only on the nature of the goods and preference but also on how much of those goods one has. The third lesson is that the price of something is determined by the amount

of something else given up to get it. Finally, one buys something if and only if he considers the cost of that thing to be less than its value.

Setting the real estate list price for a piece of property involves evaluating the property as well as the various market conditions and financial factors (Real estate pros, 2010). Marketing residential house as a multi-dimensional commodity, characterized by durability, structural inflexibility as well as spatial fixity is difficult to make a transaction. Each residential unit has a unique bundle of attributes: its accessibility to work, transport, amenities, the structural characteristics, neighborhood, and environmental quality (Yang, 2000; Watkins 1998). A house represents not only a collection of structural characteristics but also a set of location-specific characteristics.

Considering the market where housing is traded, (Raymond and Peter, 2000) mentioned that the housing market differs from that of many other differentiated goods in that it is fundamentally spatial in nature. Unlike other goods that are not constrained spatially, producers (i.e. property owners) cannot transport their real estate from one place to another. In the housing market is a 'Package Purchase" that is a household purchase three things at a time a house, location, and neighborhood.

Indeed, spatial constraints in property markets ensure that in the short run at least, the supply of properties to each market is extremely inelastic. Consequently, we would not expect market-clearing prices to equalize across house markets. Hence, housing consists of a diversity of factors that differs in a variety it possessed. Market forces determine the way in which different varieties of houses tend to determine different prices. For example, properties that have wide plot size will tend to command a higher price in the market than properties that have slight plot size. Higher-income households as well may be willing to pay more for housing to keep up neighborhood homogeneity (Goodman, 1998).

The components of housing units within a city cannot be assumed to be similar. On the demand side, assuming a given spatial distribution of preferences and income over households, a distribution over space of demands for these attributes may be imagined. The housing market is viewed as consisting of implicit markets for each of the attributes of housing (Rosen, 1974). House prices are determined by the demand for attributes, not only of the dwelling units themselves but also of the region in which the units are located. One attribute that might affect

the price of a dwelling unit may be the involvement of brokers and the sub-city that the house is located. In this study, the discussion of the choice of a bundle of housing attributes is adjusted to include plot size, the material by which components of a real estate constructs, tenure type, quality of the house and number of rooms of the dwelling unit (Structural characteristics of a house).

2.3.1 Real estate intermediaries (Agency theory)

The agency theory explains the relationship between the principal and the agent. An agency relationship occurs whenever one party (principal) engages another party (the agent) to do a task on their behalf. This task involves specialized skills and it is done in exchange for reward (Eisenhardt, 1989; Balkin & Gomez, 1992). The agency problem arises as a result of the agent not acting in the best interest of the principal thus the conflict of interest. It also may consist of the agent engaging in self-serving behavior which includes task evasion.

Real estate market is a classic example of conflict of interest between the principal who is the seller of a house and the agent who is the real estate broker. A study conducted by Arnold (1992) on the principal's-agent relationship between a homeowner and his/ her broker revealed two principal-agent problems between them. He first found the existence of agency problem since the broker plays the role as an agent who searches for buyers to purchase the house then advises the owner in setting a reservation price and provides information about the current market condition. The second problem was that homeowners are infrequent market participants as they are not fully informed of demand and supply conditions in the housing market while brokers are well-informed of market conditions. This information asymmetry can create an incentive for the broker to misinterpret market information (Arnold, 1992). In the real estate market, the principal is the seller or buyer of the house and the agent is the real estate broker (Rottke, 2001).

An agency problem occurs in such a relationship when asymmetric information is available to either party. There are different types of asymmetric information that come into play in these relationships including hidden characteristics. This asymmetry affects the pricing of real estate because either party may over or under price as they speculate the intentions of the other party. There are difficult economic issues arising from the possibility of multi-equilibrium when real estate brokers are introduced, and related econometric issues of how to infer causality given the

patterns of self-selection in the decision of whether or not to use real estate broker (Rottke, 2001).

There are a number of possible services that real estate brokers provide. The real estate broker has the ability to include a sellers property in a large database of property for sale, called the multiple listing services, which with other types of advertising, can help to increase the rate of arrival of potential buyers, and as a result, the new arrivals are better informed resulting in higher rates of offers (Quigley, 1991). The real estate agent is an expert on conditions in the local property market, and can therefore aggregate information and provide useful advice to the seller about what lists of prices are proper. Real estate agent also provide valuable services through access to the multiple listings services by helping to direct their search more efficiently to the property in their desired site, style and price range (Quigley, 1991).

2.3.2 Hedonic pricing theory

The most commonly applied methods of housing price evaluation can be broadly divided into two groups: traditional and advanced methods. There are five traditional mainstream standard recognized valuation methods in the field of property valuation: comparative method (comparison), contractor's method (cost method), residual method (development method), profits method (accounts method), and investment method (capitalization/income method). Advanced methods include techniques such as hedonic price modeling, artificial neural networks (ANN), case-based reasoning, and spatial analysis methods. Hedonic price modeling is the most commonly applied of these (Pagourtzi *et al.*, 2003).

Many scholars such as Goodman (1998) have referred to the work of Court (1939) as an early pioneer in applying hedonic technique. He used the term hedonic to analyze price and demand for each source of pleasure, which could be considered as attributes joined to form heterogeneous commodities.

Hedonic price theory assumes that a commodity such as a house can be viewed as an aggregation of individual components or attributes (Palmquist *et al.*, 2001). The hedonic approach is based on multiple regression models where the value of a property is given in a predefined form as a weighted sum of the various characteristics of the said property. Consumers are assumed to buy

goods embodying bundles of attributes that maximize their underlying utility functions (Yayar and Demir, 2014).

Rosen (1974) describes the process by which prices show quality variations as relying on producers who "tailor their goods to embody final characteristics described by customers and receive returns for serving economic functions as mediators".

Hedonic price theory originates from Lancester (1966) proposal that goods are inputs in the activity of consumption, with an end product of a set of characteristics. Bundles of characteristics than bundles of goods are ranked according to their utility bearing abilities. Attributes (such as, number of rooms, raw materials of construction, conditioning of houses, existence of subsidiary buildings, location of houses, ownership types, access to infrastructures, living area and lot size etc.) are implicitly embodied in goods and their observed market prices. The amount or presence of attributes associated with the commodities defines a set of implicit or "hedonic" prices (Rosen, 1974).

The marginal implicit values of the attributes are obtained by differentiating the hedonic price function with respect to each attribute (McMillan *et al*., 1980). The advantage of the hedonic methods is that they control for the characteristics of properties, thus allowing the analyst to distinguish the impact of changing sample composition from actual property appreciation.

The hedonic approach has substantial advantages over alternative methods of measuring quality and defining commodities in the housing markets (Rothenberg *et al*., 1991). First, the main advantage of this model is that one only needs to have certain information, such as the property price, the composition of housing attributes, and a proper specification of the functional relationships. The marginal attribute prices are obtained by estimating the parameters of the hedonic price function. It is a straightforward approach because only the coefficients of the estimated hedonic regression are needed to indicate the preference structure. No information whatsoever about individual characteristics or personal particulars of either the house buyers or the suppliers is required (Rosen, 1974).

 Second, compressing many characteristics of housing into one dimension allows the use of a homogeneous commodity assumption, and thus, the hedonic construction avoids the complications and in tractability of multi-commodity models.

Furthermore, the hedonic approach reflects the marginal trade-offs that both supplier and demanders make among characteristics in the markets, so that differences in amounts of particular components will be given the weights implicitly prevailing in the marketplace.

Likewise hedonistic real estate price model by Portnov *et al*. (2005), is oriented around the influence of micro economic factors on a particular housing price level fluctuation. The model includes the elements of physical properties and neighborhood environment of particular housing, determining its price increase or decrease and is consistent with the finding of (Malpezzi, 1999; Sirmans *et al*., 2005).

The application of the hedonic price model to the housing market rests on several key assumptions. First, homogeneity of the housing product is assumed. It relays on the supposition that the market operates under perfect competition, and there are plentiful buyers and sellers with free entry and exit. The model also assumes that buyers and sellers have perfect information concerning housing product and price. Finally, the hedonic price model only works under the assumption of market equilibrium, and that there are no interrelationships between the implicit prices of attributes (Rosen, 1974).

A major question frequently associated with the hedonic price model is the misspecification of variables where an irrelevant independent variable is included (over-specification), or where a relevant independent variable (attribute of a product) is omitted (under-specification). This can lead to biased and inconsistent coefficients (Rosen, 1974).

However, Hedonic model has its own disadvantages as well. One of the most important assumptions to come under attack is the one relating to perfect equilibrium. For this assumption to hold, it requires perfect information and zero transaction costs (Maddison 2001). If the equilibrium condition does not hold, the implicit prices derived from hedonic analysis are biased. This is because there is no a priori reason to suppose that the extent of disequilibrium in any area is correlated with the levels if particular amenities contributing to the hedonic house price.

The hedonic price model relies on regression technology, which is criticized by some authors for a series of econometric problems that can lead to the bias of estimation, such as function specification, spatial heterogeneity, spatial autocorrelation, housing quality change, multicollinearity, and heteroscedasticity.

Follain and Jimenez (1985) argued that the marginal price derived from the hedonic function does not actually measure a particular household who is willing to pay for a unit of a certain characteristic. Rather, it is a valuation that is the result of demand and supply interactions in the entire market.

2.4 Determinants of real estate price

Real estate constitutes a product class differentiated by characteristics. Xiao, (2017) argued that housing value can be considered as a function of its attributes, such as structure, neighborhood, and environmental characteristics. Therefore, the price function of house (Phi) can be demonstrated as; Phi= Ph (S_{i1}……... $Sij,,,,,,,,,,,,N_{i1}$............, $Nik,,,,,,,,,,,,Q_{i1}$............, Qim) where

Sj indicate the vectors of Structural or internal attributes describing the physical characteristics of housing (numbers of bedroom, swimming pool, and garage). Nk represents neighborhood characters (depicting the quality of the economic and social characteristics of the vicinity (income status and racial composition). It embodies locational attributes including the distance to major places of employment, to major amenities (shopping mall and public facilities), and to road infrastructure and transport access points (train station, subway station, major streets, highways, and airports). Qm signifies environmental characteristic attributes describing environmental quality and environmental amenities, such as air pollution, water pollution, noise, aesthetic views, and proximity to recreational sites or public service respectively (Xiao, 2017).

Empirical estimation of the equation involves applying one of a number of statistical modeling techniques to explain the variation in sales price as a function of property characteristics. Let X represents the full set of property characteristics (Sj, Nk and Qm) included in the empirical model. The empirical representation of the i_{th} housing price is: $P_i = P(Xi, \beta, \varepsilon)$ where

β is a vector of parameters to be estimated. ε is a stochastic residual term. P_i is the implicit price respected to those characteristics such as hedonic price models aim at estimating implicit price for each attributes of a good, and a property could be considered as a bunch of attribute or services, which are mainly divided into structural, neighborhood, accessibility attributes, etc. Individual buyers and renters, for instance, try to maximize their expected utility, which are subject to various constraints, such as their money and time.

Freeman (1979) explains that a household maximizes its utility by simultaneously moving along each marginal price schedule, where the marginal price of a household's willingness to pay for a unit of each character should be equal to the marginal implicit price of that housing attribute. This clearly depicts the technique within a neo-classical economics framework, a framework that analytically computes prices on the assumption that market equilibrated under an "invisible hand" with perfect information and no transaction costs. Even if hedonic theory has been developed with this limiting theoretical context discussed above, the technique is comparatively better and typically applied as an econometric empirical model than other pricing theories.

The measurement of location was statistically significant predictor of the sales price in the hedonic model (Ottensmann *et al*., 2008). Square footage, sprinkler system, garage, exterior siding, bedrooms, fireplaces, lot size, bathrooms, and floor types have a greater impact on selling price variations (Cebula, 2010); whereas garage, exterior siding, sprinkler system exert relatively constant effect on price of real estate (Zietz and Sirmans, 2008). Environmental amenities access to infrastructure like to school quality and neighborhood conditions highly determine the price of real estate in Rwanda (Kolowe, 2014; Livy, 2017).

From theoretical and empirical literature, determinants of residential real estate prices could be depicted with a conceptual framework as follow.

Price level	
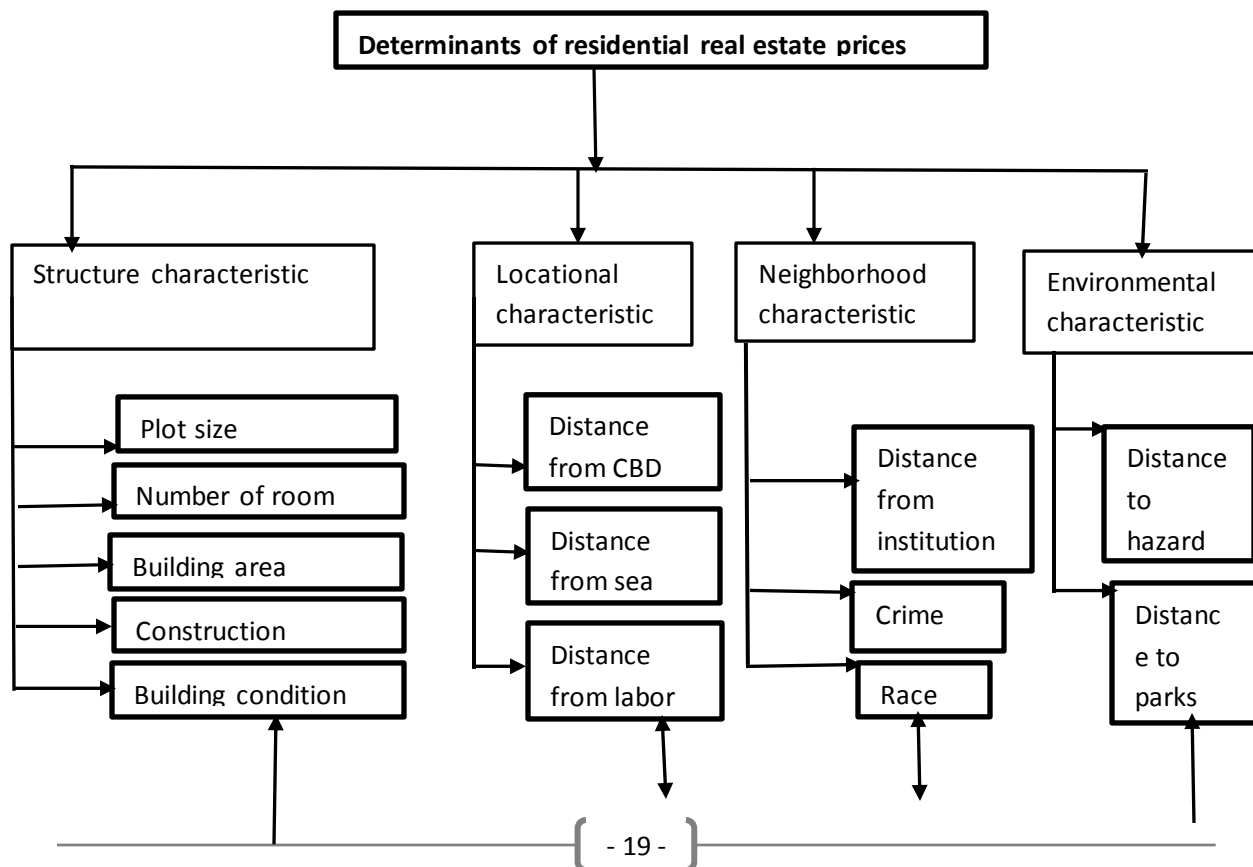
Figure 2.1: The conceptual framework of determinants of price of residential real estates

Source: Theoretical and empirical literature, (2018)

2.5 Real estate and its marketing practice in Ethiopia

The theoretical analysis developed earlier has discussed that market for the real estate is determined by the nature and characteristics of a property. The nature and characteristics of real estate make housing transaction is difficult than the market to other types of commodity. Other goods and services can be easily transported to other places to make transaction faster but it is impossible in the case of houses (Yun, Ph and Evangelou, 2016).

The market for house is a condition under which the interaction between sellers and buyers takes place. As the result of this interaction, the factors of demand and supply play critical role in settling the equilibrium price. The buyer of a house (based on his/her financial resources) would like to maximize the utilities that are attributes of the house. The seller of the house based on the legal right he/she has on the house tries to maximize profit by selling out his/her house to the possible buyer (Harvey, 1992).

2.5.1 The historical overview of real estate sector in Ethiopia

A.   Real estate sector pre 1975 situation

Real estate market in pre 1975 was predominantly handled by the private sector and it can be said that the government did not attempt to exert any effort in the provision of housing for low-income people. The housing market during this period can be characterized as operating somehow on a free market principle as land lords were leasing urban land and construct residential real estate to tenants, and there was no restriction as regards to the selling and buying of houses. No formal housing policy was adopted during that period and most of the poor people in the city were lived in extremely overcrowded areas. Nevertheless, there was a need in some form of intervention particularly in the low income housing sphere as it has been evident for several years that the then workings of private enterprises in housing have not tackle the problems which existed in main cities and in Ethiopia at large. Moreover, this laissez faire

condition was one of the factors blamed for the unplanned development of most of the urban centers in Ethiopia. Poor qualities of housing and unplanned sites are also attributes to the deterioration of physical condition of houses, which made the provision of infrastructure difficult.

B. *Real estate sector between 1975 and 1993*

The real estate industry was owned, managed, and controlled by the government under a socialist central-planning economic system (Durg's Regime) until 1993. The government nationalized all urban land and extra houses, high-rise apartments and office buildings without any compensation based on proclamation No. 47/1975. The main target of the proclamation was to get rid of the right of landlords. The government has a direct involvement in the sphere of housing provision.

As far as the production of new dwelling houses is concerned the government undertook different programs to improve the provision of housing. Initially, the government allocated budget to construct newly rental dwelling houses, which are administered by the Agency for the Administration of Rental Houses (AARH). In addition, self-help and assisted housing as well as housing cooperatives flourished to assist the low -income group. Low income people, whether they are worked in formal or informal sector, offered a house plan free of charge and technical assistance from the government. The applicants were also being able to get loan from governmental bank (Housing and Construction Bank HCB) with reduced interest rate of 6 and 4.5 percent for self-help housing and housing cooperatives respectively. Most importantly anybody could get land free of charge whatever the project might as far as the person; does not have another house, can afford to build the type of house, and must complete the house within 6 months' time. Although the government took over the responsibilities of building rental houses to those who cannot afford to build their own houses, it did a little in this regard because of its financial constraints.

C. *The real estate sector since 1993*

The current Ethiopian government, which came to power in 1991, introduced a new urban land lease system in 1993 with unban land leasehold Proclamation No. 80/1993. It replaced

Proclamation No. 47/1975 formulated during the Derge regime. The government introduced this system to administer the urban land tenure of the country and it enabled the government to reform the method of transferring urban land from permit to public land leasehold system. According to this proclamation, any Ethiopian citizen could buy land on a bid bases. The duration of urban land possession differs according to different land use type and purpose. The maximum lease period would be 99 years for residential plots. It was only after 1993 that the government gave signals about its possible tolerance of private sector participation in the provision of housing. Through buying land on a bid tender, individuals can build residential houses, services and facilities with the right to sell or rent. According to the newly adopted policy, the government starts to liberalize the housing sector by taking measures which include the selling of houses administered by the public sector, abortion of the assistance of subsidized building material delivery and ceasing the subsidy of interest rate loans from the financial sector.

The constitution of FDRE has provided the right of ownership of private property, however, the proclamations that followed the implementation of urban lease policy and expropriation proclamation in the name of public purpose can discourage private holding especially in the center of the city. The act of expropriation is applied at the center, middle and fringe areas of the city. The reason why those properties are expropriated (public purpose) is not clear and known. When the schemes are implemented they end up benefiting the higher income group of households. The leasehold system has been marginalizing the lower and even the middle income group of the population in the country in accessing land. It is possible to say that the system is becoming a reflection of wealth disparity in the country. The legal framework, the administration and enforcement of the rules and procedures that are instituted have significance importance in promoting or hindering housing market. However, real estate market is growing, given the existing policy frameworks and different factors affecting house transactions.

Over the past two decades, real estate has evolved from a government controlled sector into a relatively commercial product, and has become an important component of Ethiopia's urban economic sector.

2.5.2 Comparative analysis of Ethiopian real estate market

Real estate market in Ethiopia is generally highly disorganized and short in supply. The production of low cost houses in developing countries in general and Ethiopia in particular has

failed in the last two decades. The cost of construction of real estate (raise affordability issue) and the provision of finance does not have existed. A market-based housing finance system does not exist in Ethiopia, and is not likely to develop in the near future (Eshete and Teshome, 2015). In the absence of a market-based housing finance system, households have self-financing newest construction on an installment basis. Existing homes are typically purchased using a single cash payment.

The IMF's Global House Price Index states that unlike other African and Horn of African countries (like North Sudan, Kenya, Eritrea and Djibouti) the Ethiopian housing sector did not have any housing price index. Other African countries like Kenya, Tanzania, Nigeria and South Africa update their mortgage markets to initiate the housing sector. There is also active Phatisa's Pan African Housing Fund for housing developments in Zambia, Rwanda, and Kenya. The Global Housing Watch reports Ethiopia is one of the six African countries which is difficult to find cheapest newly built houses (IMF, 2017).

Unlike other countries like Kenya in which real estate sector is the fourth largest contributor to the national economy Ouma A, (2015) in Ethiopia the role of real estate sector does not have a greater effect on the socio-economic development of the economy. Poor quality and often overcrowded living conditions are the major housing challenges experienced by Ethiopian urban households. Housing quality in Ethiopia is lower and the market is weak than in neighboring countries.

The ownership of land in Ethiopia is exclusively the property of the state. The state administers regulate and enforce the property market through its monopoly position in the supply side and institutional regulations and the administration of the demand side of the market like other countries such as China, Vietnam, Tanzania, and Guinea (World Bank Group, 2016).

In many developing countries including Ethiopia dealing with building, registrations suffer from the deficient system of handling such records. The legal framework for defining property rights may be excessively complex and requires various supporting documents (MUDHCo, 2015).

2.5.3 Residential real estate market in Bahir Dar

The market for real estate properties in Bahir Dar alike other parts of the country is highly imperfect and fragile both the buyer and seller of a house involved higher transaction cost in the

searching process of a house. This prevalence is the result of inadequate knowledge and because of this information asymmetry, the involvement of a broker in the housing market becomes a necessity (Bahir Dar city municipality).

From the total property stock which was sold in Bahir Dar from 1905s E.C. to 1990s, E.C. only 5,059 properties (15 percent) were transacted, likewise, only 396 properties have transacted since 1973 E.C. The total number of properties sold, as the report reveals, over the period mentioned accounts for less than 1 percent of the total stock of properties (taking 48,500 as the total stock) which is negligible. This shows that the sales (transfer) undertaken during this period (that counts more than three decades) indicates that the property market in Bahir Dar is low and yet undeveloped. This figure, if compared with other comparable cities like that of Adama and Hawassa, showed that in Bahir Dar the real estate market is inactive and low. All major urban centers of Ethiopia have high housing demand due to their favorite locations along major transport and trade routes, their status as regional and zonal administrative centers, and the demolition of low- rent public housing during renewal. Bahir Dar being the capital city of ANRS has the third highest housing demand ratio of 272.4 next to Addis Ababa (361) and Samara (277) per 1,000 population (Krems, 2017).

The market system in Bahir Dar is composed of both formal and informal types. The informal market system functions for two basic reasons: When the property transacted is informal, the two parties are not able to make formal transfer since the property has no document in processing the formal way. The other is the two parties may agree on the informal transaction on the formal property believing the strong relationship would not make them to betray each other. Thus to escape from tax payment, they may agree in an informal way. In this regard, brokers play a significant role in facilitating the agreement between the two parties and also have the information power to convince both the buyer and seller.

In a case where independent professional assessors are not there, which is the common feature of real property market in Ethiopian urban centers, the buyer and the seller will refrain from being fully and reliably informed to reach into their selling and buying decisions. In fact, some of the brokers approached are enlightened and always keep themselves intact to the policies and regulatory frameworks related to the property. They are alert and close to the municipality 's movement in relation to properties market (Bahir Dar city municipality).

Banks and insurances disclosures and collaterals are not as such active in the property market since it is only on very few cases they handle in this regards. Common practices are reported by financial institutions in facing difficulties to sale the properties they disclosed. The reason is that other persons are not willing to buy the floated property of the person whom they know as co-citizen, particularly of their relationship and the implication it would bring on them from others. Generally, the operation of the property market in the city can be characterized by low level of development, informality, broker- influenced; and lacked transparency, objectivity and consistency (Bahir Dar city municipality).

The practice of transforming real estate ownership through auction is low as compared to other cities (6.2 percent in Addis Ababa, 3.6 percent in Mekelle, 3.3 percent in Kombolcha , 2.9 percent in Bahir Dar from 2012- 2013) (World Bank Group, 2016).

Currently, assuming that the rate of increase in real estate is proportional to the rate of urban population growth (5 percent/annum) and taking the estimation of ministry of urban development and construction report (MoUDC, 2014) which was 48,500 commercial and residential units as a base. It is plausible to expect the size of commercial and residential real estate to reach 58,200 units in 2018.

In the last four years, the city administration has constructed and sold less than 430 houses while more than 520 privately owned residential real properties were sold in 2016 alone implying the share of privately owned residential houses market in Bahir Dar is greater than government sponsored housing development and market.

In Bahir Dar sale of real estate (having 5,059 units) is the second principal form of land holding and getting property ownership next to free hold (22,929 properties). The rest forms (inheritance, leasehold and others) accounts for only 2,498 units of properties (MoUDC, 2014).

2.5.4 The process and procedure of housing transaction in Bahir Dar

As of the municipality of Bahir Dar city the procedure starts with the land administration offices (LAOs) in each sub-city which are responsible to undertake the transfer of ownership of houses. The decentralization of the city into the sub-cities was believed to deliver efficient services to the resident of the city at local level. One of the services devolved to sub-cities is land and housing administration. The ownership documents and files are distributed from the archive of the

municipality to sub-cities land administration offices. The sub-cities can then access the information they needed for preparation of urban service fee of transaction and other charges (Bahir Dar city municipality).

Therefore, any person who wants to transfer his/her right to another person has to go to sub-city land administration offices where the house is found. The transfer of house requires the fulfillment of relevant legal documents; such as, bringing legal documents issued by the acts and civil documents service about the sell or gift, original title deed and identification card in case where the transfer of the property is requested by legal representative legal document of representation of the owner from court or acts and civil documentation service has to be presented more else if the owner is married or if the property is under joint ownership their consensus on the transfer of ownership has to be presented (Bahir Dar city municipality).

After the documents received has checked as to the fulfillment of the requirements, and then documents together with the application form request will be crosschecked and the legality of the house will be verified. The person who checks the file of the house also verifies whether the owner of the house had bank loan or court order not for selling the house because of different cases. Later on, the property will be inspected and estimated, so that the customer will pay the transaction tax and will present the receipt. The contract registrar will verify whether payment conducted is according to the amount stated and prepared in bill of the transaction charges. The transfer section head will examine the whole process and procedures; and will approve by signing the letter. Lastly, letters signed in the above step and the title-deed will be delivered to the new owner of the house (Bahir Dar city municipality).

The above complex procedure indicates that the transfer process of ownership is not simple. In each steps there are convoluted problems that an individual might be confronted. These and other personal and bureaucratic challenges are addressed by household survey. As of the house hold survey result it is possible to conclude that a successful accomplishment of title transfer needs a minimum of four months and in certain extents even they elongate the time span even for more than a year. With negligible exceptional all most all residential real estate market participants complain on the process and time span of transaction. The problem arises from the data holding system as stated formerly there is no much computer utilization particularly under sub-city level and hence finding each files in hard paper and crosschecking it needs more time. Therefore, lack

of systematic recording and management of files is one of the major problems that impeded transaction of houses (Bahir Dar city municipality).

The urban service fee and other stamp duty taxes that will be paid by the buyer of the house bases on two conditions that are developed by the city. That is the transaction tax may depend on the declared price of the house agreements of the parties involved in the house transaction and/or on the municipality estimated value of the house by comparing their amount. If the declared price of the house is greater the municipality estimated value of the house transaction tax will be based on declared price of the house. Otherwise, it will depend on the estimated value of the house. This motivates real estate buyers and sellers to underestimate their reported price from what they actually transact (Bahir Dar city municipality).

Hence, in order to reduce the transaction cost that involved in the transfer process of the house, buyers and sellers will prepare two documents. One legally accepted agreement which both parties transacted. The second document is not legally binding and did not represent the real transaction situation but will be presented to the transfer section of the sub-city with much lower contracted price level than that of the actual price. Access to the estimated value of houses that could be made by the municipality is not that much difficult to obtain Average levels could be obtained from their former estimations for other comparative properties and even the estimation could be accessed by friendship with municipality officers. Absence of cadaster registration and/or lack of up to date information about the price of a real estate dramatically reduces the revenue of the city (Bahir Dar city municipality).

Some of real estate buyers and sellers, brokers and municipality officers forward as the real estate sector in general and real estate transaction values estimation and transaction section in particular are one of the principal sectors exposed to corruption. Those real estate buyers state as they get in to collusion with the municipality officers mainly with the property inspectors and valuers so as those officers to minimize their estimation for that property and to share the advantage personally (Bahir Dar city municipality).

Generally, lack of housing registration, inefficiency in administration of the transfer process, highly constrained development of the real estate activities. Lack of proficient valuers and the resulting proper valuation system have contributed significantly for the low level of development of the house market. The absence of well-developed cadaster register and land information

system (LIS) about the real market value of residential houses has also negatively affected the housing market of Bahir Dar (Bahir Dar city municipality).

2.5.5 Real estate agents and real estate transaction in Bahir Dar

In particular, recently, the majority of properties have been sold via real estate brokers and the properties that are sold by the owner may not be typical of the overall population of properties for sale. Most transactions held without the involvement of brokers are when the transactions are between family members and friends. It might be the case that beliefs about the power of real estate agents are self-confirming. That is, if sellers believe that they are unlikely to be successful unlike they hire a real estate broker, then they will do so and most of the good homes and land will be listed with real estate brokers. If buyers also believe they will not be able to find out about good properties unless they search the multiple listing services, then the sellers' belief will be confirmed and the majority of transactions will be mediated by real estate brokers (Wurtzebach, 1994).

Most participants of the house market in Bahir Dar have recognized the importance and convenience of broker in housing search and transactions. The major objective of using brokers are "avoiding trouble" and "more quickly" facilitation of transaction. There are many functions that brokers could facilitate during transactions including the following advantages. Brokers serve through providing information about the housing market to buyers and sellers who have no other source of expert knowledge about conditions in the housing market to influence their client's purchases of other conveyance services, such as title transfer, clearance and escrow services. Brokers are conscious in providing clients with preprinted standard purchase agreement forms and helps in the transfer of the house quality of service competition through which each member gains access to information available to other members (Bahir Dar city municipality).

In Ethiopia, transaction costs for both buyer and seller can range between 4 percent and 30 percent. The first and relatively lower rate (4percent) is for residential real estates under free hold and lease with allotment tenure system and at the same time these properties should have to serve for more than two years. For those properties that have bellow two years of service age the transaction cost exceeds 25 percent (21% for transaction tax and fee; and 4 percent brokerage service fee).

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research design

Research design is a plan and procedure for research that span the decision from broad assumptions to detailed methods of data collection and analysis (Creswell, 2003). As such the design includes an outline of what the researcher will do from writing the hypothesis and its operational implications to the final analysis of data. More specifically, it includes the brief description of the study area, the type and source of data, sampling design and procedure, method of data collection, methods of data analysis and the econometrics model specification part.

There are three approaches available for researchers to design their research methodology namely quantitative, qualitative and mixed methods (Creswell, 2003). The primary criterion to be considered for selecting an approach is the research problem (C.R. Kothari, 1990). In view of this, using quantitative approach is best if the problem is to identify factors that determine an outcome, understand the best predictors of an outcome and to test a theory or explanation. However, a qualitative approach is advisable if a concept or phenomenon needs to be understood because little research has been done on it. Lastly, there is a mixed approach to inquiry that combines both qualitative and quantitative forms. It is more than simply collecting and analyzing both kinds of data rather it involves the use of both approaches in tandem so that the overall strength of a study is greater than either of the two (Creswell & Plano Clark, 2007). In this study identifying the principal determinants is the major objective and up to the knowledge of the researcher little/no research is done on it in the study area. Therefore, to study determinants of price of residential real estate mixed approach is more appropriate.

3.2 Description of the study area

Bahir Dar, the capital city of the ANRS, is one of the fastest growing and highly populated cities in the country with a population of over 323,000 (MoUDC, 2014). It is located in the North-western part of the country at about 570 km from Addis Ababa, having a latitude 11^0 36'-11.6 ^{0} N and longitude of 37^0 23' -37.383^0 E/11.6;37.383 with an elevation of 1840 meters above sea level. The city with fast urbanization rate, it is highly crowded with people migrated from different parts of the country in general, and from different parts of the region in particular. This

situation contributes to corresponding rate of increase in the size and category of real properties though the property market is still underdeveloped, distorted and poorly managed that makes the property market more complex (MoUDC, 2014). The city has been awarded for its natural and cultural heritages, and for it is one of Ethiopia's top tourist destinations. In 2002 it was awarded the UNESCO Cities for Peace Prize for addressing the challenges of rapid urbanization (BoFED, 2013). Situated on the shore of lake Tana, Bahir Dar is the gateway to the Blue Nile falls and the Zeghe peninsula. The population of the city has been alarmingly growing in the past ten years due to migration of people from rural areas.
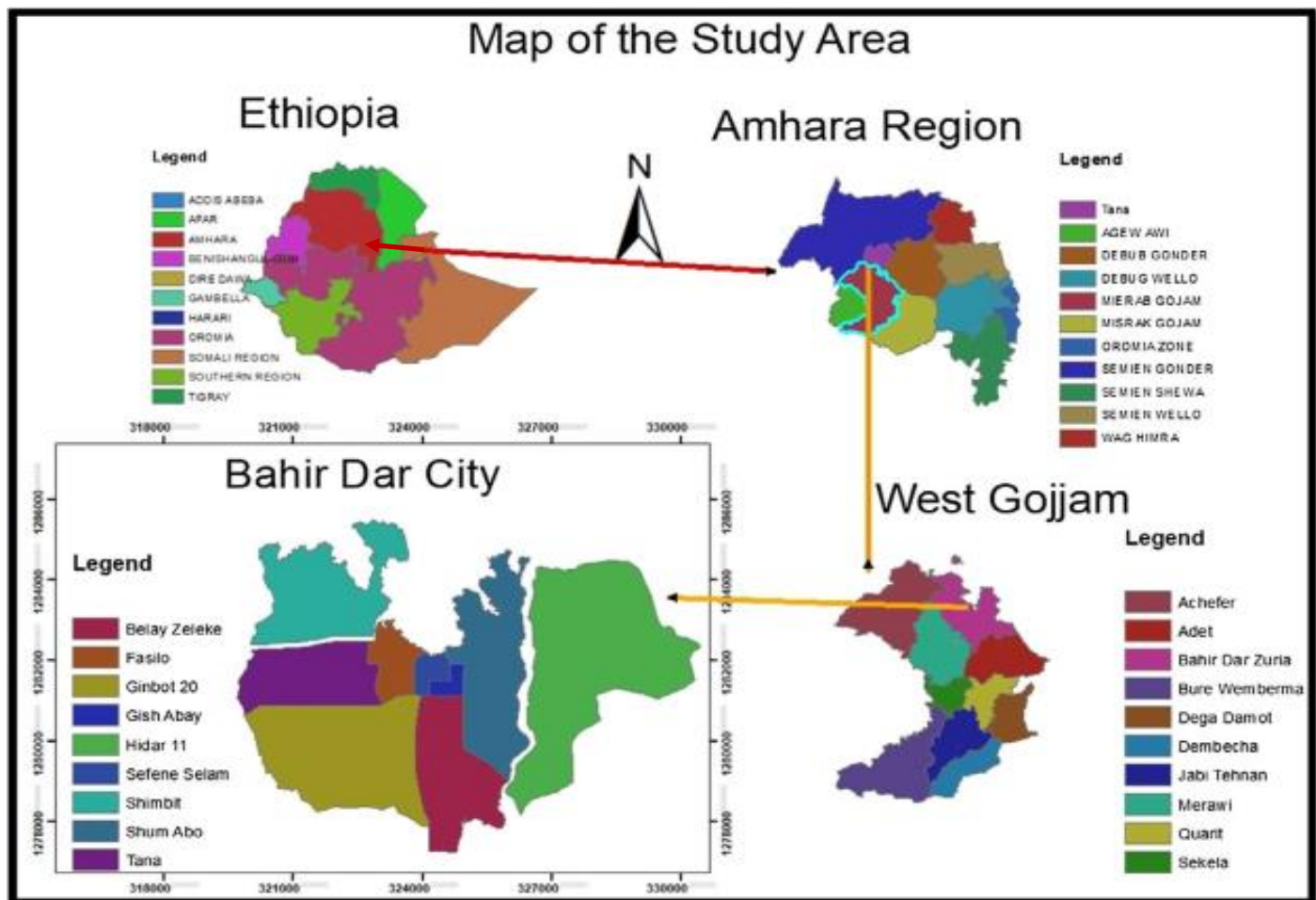

Figure 3.1: Location Map of Bahir Dar City
Source: Google map

3.3 Sample size determination

The larger the sample, the better it represents the population. However, an increasing sample size translates directly into increasing costs: not only of money but time as well. The dilemma of

realistically balancing "accuracy" (increase sample size) with "cost" (decrease sample size) confronts every researcher. The target populations from which the study is undertaken are the real estate buyers of Bahir Dar city since 2009 E.C.

If it is logical to assume a degree of variability (i.e. proportion) of 0.5 and a confidence level of 95 percent, the simplified technique form of Yamane Taro's (1967) sample size determination is efficient (Robert and Kloet, 2010; Ajay and Micah, 2014). The minimum sample size, that was considered to investigate the problem, is determined by Yamane formula. The simplified form of this formula is the one which is applicable mostly with a confidence level of 95.

$$n = \frac{N}{(1+N(e)^2)}$$ Where n= sample size, N= population size and e= the level of precision

To get this formula, it is advisable to start with the original Yamane formula that the above simplified formula derives from $n = \frac{\{P(1-P)\}N}{\{(Z)^2\,P(1-P)N(e)^2)\}}$ Where n= sample size, N=population size, e= the level of precision, z=the value of the standard normal variable given the chosen confidence level (CL), (Z=1.645 with a CL=90 percent, Z=1.96 with a CL=95 percent and Z= 2.57 with a CL=99 percent) and P= the proportion or degree of variability then if we want a confidence level of 0.95, then the statistical table tells us z is 1.96. substituting this in the above formula, gives the simplified determination which is applicable at 95 percent confidence level.

$n = 0.96N/(0.96 + N(e)^2)$, which turns into the simplified yemane formula by rounding 0.96

to 1. $n = \frac{N}{(1+N(e)^2)}$ $\twoheadrightarrow$ $n = \frac{993}{(1+993(0.05)^2)} = 286$

3.4 Sampling techniques

In order to represent the population with enough accuracy and to estimate the population based on the corresponding sampled properties, the target sampled real estate should be selected by appropriate sampling method. Multistage random sampling technique was used in order to realize this objective particularly three stage sampling has been applied to pursue the survey.

First, real estate transactions in the city were categorized to nine sub-cities as of their local administration. Three sub-cities, Ginbot_20, Hidar_11 and Tana, that have highest residential real estate have been selected from the nine sub-cities. These three sub-cities have been selected

because during the study period the highest residential real estate transaction was recorded in Ginbot_20, Hidar_11 and Tana. The sum of the rest six sub-cities transaction is below one of the selected sub-cities. Moreover, sub-cities other than the 3 sampled locations are not extensively in residential use rather are under mixed or other type of use (such as commercial, industrial, hotel/motel, institutional and recreational buildings). The selection criterion also includes the presence of a large number of residential houses with varying types, the number of transacted houses, and by examining the locational preference of buyers.

Second, the choice and identification of the kebeles have developed with the assistance of workers in land transfer section of each sub-city. The identification of kebeles was again based on number of transaction of residential properties.

Finally, 286 residential real estate buyers were selected randomly from the whole kebeles (4 kebeles) of the three sub-cities proportionally.

Table 3.1 Sample size determination

Sub-city	Number of transaction	Sampled	Sub total		Sample Size
Ginbot_20	386	Yes	Sampled sab-cities=3		Ginbot_20 = 111
Hidar_11	326	Yes	Total Real Estate transactions in selected sub-cities =**993**		
Tana	281	Yes			
Shimbit	70	No	Number of sub-cities not sampled=6		Hidar_11 = 94
Fasilo	52	No			
Belay Zeleke	36	No	Total number of residential real estate transactions registered in non-sampled sub-cities =**236**		
Shumabo	32	No			Tana = 81
Gish Abay	27	No			
Sefene Selam	19	No			
Total	1229	Yes(3)+No(6) = 9	993+236=1229		**286**

Sources: survey result, 2018

3.5 Data type, sources, and methods of collection

This study has mainly relied on primary data. However, secondary data have also been used for undertaking a cross reference. Primary data on physical, locational and neighborhood characteristics of the house were collected using a pre testes structured questionnaires, FGD, and key informant interviews. Structured questionnaires prepared both in Amharic and translated to English to ease the communication and solve the language barrier with sampled households in the time of interview.

For the purpose of collecting information from the sampled households, 3 enumerates have been selected and trained. After the training, questionnaires were administered by enumerators with a close supervision by the researcher. To get reliable and accurate data for the study, selected house buyers were fully informed about the purpose and goals of this study.

Secondary data has been collected from previous surveys, literature, and reports from various research institutions (mainly MUDHCo), government offices and agencies has also been used.

3.6 Model specification

In this study, hedonic pricing model has been applied to estimate the factors which determine the price of residential properties. Ordinary least square (OLS) multiple linear regression is appropriate when the sampling technique is random and when the research data are more of quantitative. OLS regression has typically been used in housing research to determine the relationship of a particular housing characteristic with selling price (Sirmans *et al*., 2008).

Rosen (1974), demonstrated that the hedonic price functional form is a reduced form equation which reflects mechanisms of both price and value and their respective determinants. A further important task researcher facing is how to function the relationships of the dependent variable and the explanatory variables naturally, which imposes an incorrect functional form on the regression equation, and that will lead to misspecification bias. Considering all the above the simplest and appropriate approach is the ordinary least square (OLS) model.

$$P = \beta_0 + \sum_{k=1}^{k} \beta_k X_k + \varepsilon$$

Where; P denotes the residential real estate prices; β_0 indicates the constant term; bk (k = 1, …, K) indicates the marginal change of the unit price of the kth characteristic Xk of the real estate; X_k represents factors that determine the price of residential property; and ε is a vector of random error term.

In this research, there are two different types of residential real estate selling price levels from two different perspectives. The first and the major target of this research is real/actual selling price of residential real estate. The second is an estimated selling price of residential homes, which is estimated by municipalities for collection of tax, and other service fees from transaction of real properties mainly to solve the understatement of agreed or reported prices. To look at the effect and significance of different determinants in these two different price forms two different econometric models have been used in the study as presented below.

   A. Model specification for real selling price of residential real estate

To represent the exchange or real selling price of residential real estate (RRE_Salesprice), a semi log model has been employed with the following explanatory determinant variables.

$$lnRRE\_Salesprice = \beta_0 + \beta_1 Plot - Size + \beta_2 Building - Area + \beta_3 lnBuilding - Cprice +$$
$$\beta_4 Location + \beta_6 Roof + \beta_7\ Broker + \beta_8\ Sbsidiary - Building + \beta_9 Access + \beta_{10} Grade +$$
$$\beta_{11} Tenure + \beta_{12}\ Build - condn + \beta_{13}\ Wall - Finishing + \beta_{14}\ Number - room + Ui$$

   B. Model specification for estimated selling price of residential real estate

This model represents the relationship between the selling prices estimated by municipalities called residential real estate estimated price (RRE_Eastimprice) and the respective real estate attributes. Semi log model is employed to look at the relationship among the dependent and explanatory variables.

$$LnRRE\_Eastimprice \qquad = \beta_0 + \beta_1 lnPlot - Size + \beta_2 Building - Area + \beta_3 lnBuilding -$$
$$Cprice + \beta_4 Location + \beta_6 Roof + +\beta_7\ Sbsidiary - Building + \beta_8 Access + \beta_9 Grade +$$
$$\beta_{10} Tenure + \beta_{11}\ Build - condn + \beta_{12}\ Wall - Finishing + \beta_{13}\ Road - width +$$
$$\beta_{14}\ Number - room + Ui$$

3.7 Variable choice, definition and hypothesis

Since prices of residential real properties are the value of implicit characters of a given real estate, identifying potentially relevant covariates or determinants is a necessary task in designing hedonic regression experiments (Dem, 2014). The specification, identification and definition of both dependent and independent variables is adopted from MoUDC (2014) final report on the study and identification of property valuation in Bahir Dar city particularly on its analysis of determinants of rental market value.

3.7.1 Dependent variables

Residential Real Estate sales price (RRE_Sales price) and Residential real estate expected price (RRE_Eastimprice)}; the dependent variable in this study is the sales price of residential real estate which is measured with monetary unit of Birr regressed up on the explanatory variables.

In this study, the first and foremost important dependent variable is actual transaction/sales price of residential real estate but for comparison purpose price of residential real estate estimated by municipalities have also been analyzed both in descriptive and inferential statistics. The information asymmetry which hinders markets from running perfectly forces to have these different types of sales price of residential real estate. As stated before, the real sales price is an exchange price of properties, whereas, the estimated price level is the one that municipalities inspect for property transfer purpose.

There is also a reported price level that real estate buyers report for transfer fee purpose and this price level is also discussed under descriptive statistics. Most of the time this reported price levels are understated, the gap in valuation and taxation process opens room for buyers and sellers to report an understated level mainly from two interrelated rationalities. First, municipalities estimate by considering the lease price level (initial holding value) and taking the total plot size. Estimations of both components are not based on today's market condition and hence are highly lower than their real value. Second, municipalities take two alternatives to charge property transfer fee and tax. The first alternative is if the contract or agreed price is greater than their estimation they charge by considering the reported price level. However, if the reported level is lower than what they estimate municipalities use their estimation for charging

purpose. Sellers and buyers know the above two basis of charges and hence they usually report a highly understated level to not to be taxed more if by default their agreed price is above what the municipalities estimate.

To solve the problem of the understatement of the reported prices, municipalities by themselves estimate the selling price of properties by considering the value of land and the current building price. The summation of the price of land and the current building price is termed as estimated price. Therefore, the rationality of municipalities to estimate price of residential real estate is that every seller and buyer gets in to collusion and understates the reported price level of a real estate for minimization (evasion) of title transfer fees and taxes. As clearly depicted under the descriptive and inferential analysis parts the rationality of municipalities and their estimation action seems logical. This is because the reported values also called agreed prices are completely below the expected prices and the real selling price of properties.

Dependent variables are in logarithmic format to look at the percentage response of price levels to change in explanatory variables. The distribution residential real estates with their implicit attributes and their respective residuals are not normal if not in logarithmic form. Moreover, by nature real estates are heterogeneous and hence there is a very great variation of price of residential real estate. The actual selling price of sampled residential real estate varies from Birr 350,000 to 3,700,000. To smoothen this price variation logarithmic transformation is compulsory.

3.7.2 Explanatory (Independent) variables

Based on economic theory, empirical findings and personal observation, the covariate variables that determine actual and expected price levels of residential real estate are listed below.

Plot size (Plot_size): The gross area of the plot in square meter including the building area and free spaces with in the compound is expected to have a significant effect on actual and expected price levels and hence a real estate with vast plot area are expected to have greater prices. Consistently, most literature indicates plot area have a positive contribution to the price of a given real estate (Zietz and Sirmans, 2008).

Building current price (Building_Cprice): It is a proxy variable used to measure replacement and/or reproduction cost of a given building. This is the price by which a given building could be

sold with the existing market situation measured in monetary value (Birr). Building current price is captured from the bill of quantity and construction plan of a given building. Those buildings with modern raw materials and designs have more demand and the resulting sales price. On the other hand, even if the building is new if its design, direction and material of construction are old, cheap its building price will be low, and hence its aggregate sales value will be minimal. Residential real estate values are summation of building and land values. If the current price/value of a building is high, its sales price is expected to be more and the opposite holds true.

Broker (Broker): it is a dummy variable used to measure the effect of real estate agents and/or brokers in selling price of residential real estate. It takes a value of 0 if the transaction of a given real estate is held without the involvement of brokers and 1 if the transaction is facilitated by brokers. Brokers involve in real estate market through interacting sellers and buyers and they have a commission for their service. Since the commission of a broker is a certain percentage of the sales price they mostly bias towards sellers and they try to convince buyers to buy a given house with an artificial and higher price. Brokers by inferring time series price trends and by speculating house price bubble pessimistically mostly enforce the selling price to be superior than what will be without their involvement.

Building area (Building_area): The sizes of land on which the building erects in square meter tend to determine the price of a given property. The wider the building area the more have been the available home space for use and the less will be the idle space, literature also suggest that the size of land that the building is erected have a positive contribution to the price of a property (Cebula, 2010).

Location of property (Location): It is a categorical variable used to measure location of existence of a residential real estate. Location could be categorized at sub-city level or it could be categorized at individual property character perspective. But in the study area it is difficult to subgroup each residential property based on their attributes. Therefore, the researcher represents the location of residential from their sub-city point of view. It takes a value 1 if the property is found in Hidar_11 sub-city, 2 if the real estate is found in Tana sub-city and 3 if the home is found in Ginbot_20 sub-city. Location of real properties that is where the property is located whether it is near the CBD, adjacent to the main road, near to a shopping center or which part of

the city influences its price. The sales price of properties varies with different sub-cities depending up on their nearness to central business districts (Zeng, 2013; Kagendo, 2011). Sub-cities near to CBD devour an opportunity to access utilities and minimizes transport cost and hence those properties found in Tana and Ginbot_20 sub-cities are expected to have more price than those, which found beyond Nile river (Hidar_11 sub-city).

Number of rooms (Number_room): It is the number of rooms in a given residential real estate. Most residential real estate buyers have many family members and these family members need their own bed rooms. Most literatures show the benefit of number of rooms and its positive effect on the selling price of residential real estate (Babawale, 2012) . Therefore, it is expected that the more the number of rooms the higher will be the selling price of this properties.

Access to road (Access): It is a categorical variable used to measure accessible road nature of residential houses. Access to road could be represented with either from road type perspective or from distance from road standpoint. In the study the difficulty of measuring the distance from each residential properties inspires to follow the first option of type of road. It takes a value 1 for residential houses that have no access to any developed road or that have access to dirt type road, 2 for those that have access to gravel type road, 3 for homes that have a coble stone type accessible road and 4 for those residential real properties that have access to asphalt road. Those homes adjacent and around asphalt roads tended to have superior price over homes that have access to other types of road. Literatures state transport access type and road size have a direct effect on sales price of houses most importantly houses adjacent to major and modern roads have more sales value (Babawale, 2012).

Type of tenure (Tenure): This refers to categorical variable for the type of tenure (ownership) by which the property is owned. It takes 1 for properties under lease from government (lease with allotment) this type accounts properties in housing cooperatives. It takes 2 for residential real estates under lease from private individuals (lease with tender/auction) this type represents transactions of residential real estates which are hold with tender or auction. It is represented by 3 for those residential real estates with a free hold system. The way how the parcel is get/owned (the level and length of freedom of owners on their plot) affects its sales value properties under free hold and under lease with allotment (lease from government have similar ownership level without their difference on the duration of ownership. However, those properties under lease

from individuals (lease with tender/ auction) have different procedures and even the urban service fee and stamp duty tax is higher by 1 percent from the former two type.

Land grade (Grade): It is a categorical dummy variable used to measure the effect of zoning or grading on sales price of residential houses. It is represented by value 1 if that zone is highly developed and hence have access to too many advantages, 2 if that surrounding have good access to utilities fairly or moderately, and 3 if the home is in districts with minimum access to infrastructures. Depending upon the development made on that specific parcel and its site advantages the grade of plots varies in different locations (Zhang and Geltner, 2018) and hence those properties which are found in first and second grade localities have better selling price than properties which exist in third grade zone.

Condition of building (Build_condn): this is represented with a categorical variable used to measure the quality and current status of the building under investigation. It takes a value of 1 if the property is in excellent or very good condition, 2 if the home is in a good condition, 3 if the property is in a medium or fair condition, and 4 if the property is in bad or deteriorated condition. The condition of a real estate in which it currently exist seems to affect the sales value of a given property. Residential real estate in a very good condition have better price over other levels. (Konut *et al.*, 2008; Hilmi and Hadi, 2016).

Wall finishing material (Wall_finishing): It is a dummy variable used to measure the material by which the wall of the building is finished. It takes value of 1 if the buildings wall has been finished without any material utilization, 2 if the real estate wall has been finished with malleable and 3 if the wall of the building has been finished by malleable with painting. Literatures state that those properties constructed with expensive materials have a high price (Zeng, 2013). The material by which the wall of the building finalizes determines the selling price of those real properties and in this research it is expected that those dwellings with walls finished by malleable with or without paintings have superior selling price over those finished with nothing/without finishing/.

Subsidiary building (Sbsidiary_building): It is a dummy variable used to measure the effect of subsidiary buildings to the selling price of residential real estate. It is represented with 0 for those residential properties which are constructed without any subsidiary building and 1 for those residential houses with subsidiary constructions. Subsidiary buildings are one of the principal

sources of income over the utilities. Mostly residential properties are bought thought mortgage and these home owners have to pay the debt burden through collecting the rental income from subsidiaries. Therefore, those properties that have detached subsidiary buildings are expected to have superior price over those that have no subsidiary building.

Road Width (Road_width): A continuous variable measured in square meter. The size of accessible road may affect the selling price of houses as the width of accessible roads increase, it minimizes traffic James and provides extra advantages to their kids to play football as what is now happening in most major routes. Therefore, it is expected that those residential buildings with widest roads have more selling price than those that are without road or with congested roads.

Roof material (Roof): A dummy variable used to measure the effect of raw materials used for roof construction. It is represented with 1 for residential homes that have a roof constructed from steel and with 2 for a residential real estate that their roof is from mortar. Most dwellings roof are from steel but sometimes when those property owners could not afford steel they use mortar in place of steel. Steel have more strength and could serve for a long duration than mortar. Therefore, it is expected that those residential real properties that have steel contained roof more selling than those homes that have a mortar constructed roof.

3.7.3 Diagnostic tests

Inferences based on OLS results can be valid depending on whether the Classical Leaner Regression Model (CLRM) assumptions hold. In this section, different diagnostic tests that have to be tested to give inferential analysis about the determinants have been also addressed. From those diagnostic tests more attention is given to heteroscedasticity, multicollinearity and normality tests, particularly the dominant cross-sectional data problem, Hetrodasticity, would be discussed and tested. The following are the most frequent utilized tests for cross-sectional data used regression model.

A. Multicollinearity

Multicollinearity problem results in the complete drop out of the variables from the model which have important implications on the sales price of residential real estate. Therefore, conducting a

multicollinearity test is also a necessary task. Even if there is no a formal test for multicollinearity, its degree can be shown or detected. VIF and 1/VIF (tolerance) are the most familiar methods of detecting the problem of multicollinearity among the explanatory variables. As a rule of thumb, if VIF of a variable exceeds 10 or the tolerance margin (=1/VIF) is less than 0.1 or 10 percent, then we would say that there is a serious problem of multicollinearity. Therefore, whether or not all the VIFs are below 10 and thus all the tolerance margins (=1/VIF) are more than 0.1 or 10 percent, will be discussed in the next chapter and the result is presented under appendix -6.

B. Heteroscedasticity

In this research Breusch-Pagan / Cook-Weisberg test for heteroscedasticity has been employed to check whether or not the model is constrained by the problem of heteroscedasticity. The Breusch-Pagan / Cook-Weisberg test for heteroscedasticity states if the chi^2 result is higher mostly if it is greater than 10 percent proves our failure to reject the null hypothesis that states there is constant variance. Therefore, the Breusch-Pagan / Cook-Weisberg test result have been discussed in the next chapter and is presented under appendix -4.

C. Normality test

The normality assumption assures that the p-values for the t-test and f-tests to be valid. The normality of the disturbance term is also required; otherwise, all the tests that have been used so far will be invalid. The parameters to be estimated must be the functions of a normally distributed variable, which is most of the time the disturbance term. The OLS normality assumption requires the normal OLS residual distribution with mean zero and constant variance.

D. Overall level of significance test

The overall significance of the model had verified by the rule of thumb of calculated F-value. Since the rule of thumb should prove that calculated F-value is greater than 4, if that is so the F-test verified that the model overall is significant. The other important way for the overall significance test is p-value. The smaller the p-value (0.00) in the model is, the higher the probability to reject (drop) the null hypothesis, which states that all variables are insignificant to

the model. That is, $B_0 = B_1 = ...Bn = 0$. Thus, rejecting this null statement implies that the model as overall is significant.

The goodness of fit of the model has measured by the coefficient of determination (R-squared and its adjusted level) and its adjusted form which implies the percentage of the variation in the dependent variables (Price of residential real estate) which is explained by the explanatory variables (residential real estate attributes) included in the model.

3.8 Method of data analysis

In this study, both descriptive statistics and econometric analysis have been used. Descriptive statistics such as figures, frequencies, cross-tabulations and other appropriate statistical analyses have been conducted to gain insights into the relationships between locational, physical, environmental, neighborhood and other variables related to sales price of residential properties. After data sets were collected, the researcher has encoded it in to SPSS and Stata statistical analysis software tools. The result has been presented in table format; and SPSS and Stata software have been excessively used in the analysis.

CHAPTER FOUR: RESULT AND DISSCUSSION

This chapter presents the analysis and interpretation of the data collected from the field. It presents analysis and findings of the study as set out in the research methodology on the determinants of residential real estate prices in Bahir Dar. The data was gathered from buyers of residential real estate in Bahir Dar city, published and unpublished reports obtained from the municipality and from real estate brokers. The data obtained was fed into SPSS and Stata and used to compute the relations used as proxies to measure determinants of residential real estate prices in Bahir Dar city.

In this chapter the descriptive statistics of both categorical and continues variables have been presented and discussed. In addition to the descriptive analysis, regression analysis has also been conducted. Land/plot specific characteristics have been analyzed and then building characteristics of target residential properties would have been addressed. The role of agents with in the real estate market and their effect on selling price of residential properties have been discussed. The econometric model result has been also presented and discussed.

4.1 Descriptive statistics for categorical variables

4.1.1 Characteristics of the plot

As depicted on the first three consecutive figures (figure 4.1 up to 4.3) and in appendix-3 plot related attributes of the surveyed residential real estate takes different values for different residential properties. Land related attributes are the tenure system, the grade of the plot and the type and/or quality of road, which is accessible to that specific plot.

The field survey result has revealed that most of the residential real estates (73.1 percent of land holding system) are under free hold tenure type. Lease from the government (lease with allotment) system accounts 23.78 percent of residential real estates in the study area and the remaining 3.15 percent are under lease with auction/tender (lease from private individuals). The result infers that most of residential real properties are hold through free hold system the result is consistent with the finding of (Kagendo, 2011) in Nairobi that concludes most parcels in particular and real properties in general are acquired through free hold and/or inheritance.
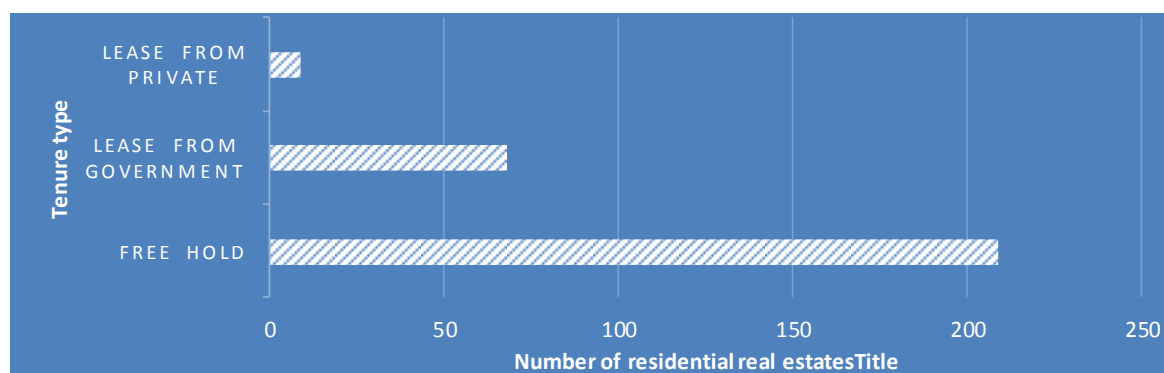
Figure 4.1: Tenure type of the sampled real estate
Sources: survey result, 2018

The information obtained from the survey has revealed that residential real properties found on localities/sites that have second grade (grade 2) accounts 41.96 percent of the total population. But the number of residential properties which are built on plots that have first grade and third grade are also not much less from second grades and hence the distribution of selling activity within each land grade is almost comparable. There are 87 residential real properties (30.4 percent) constructed on zones that have first grade. Building constructed on plots with third grade accounts 27.6 percent as it is indicated in figure 4.2 below.

Location that represents the sub-city where the real estate is found have its effect on the price of residential homes. The data gathered from sample respondents show that, in 2017/18, 37.9 percent, 32.1 percent and 27.6 percent of the residential real estate transactions were taking place in Ginbot 20, Hidar 11 and Tana sub-cities respectively as it is indicated in figure 4.2 below. This indicates the number of transactions on the sampled sub-cities is relatively proportional.
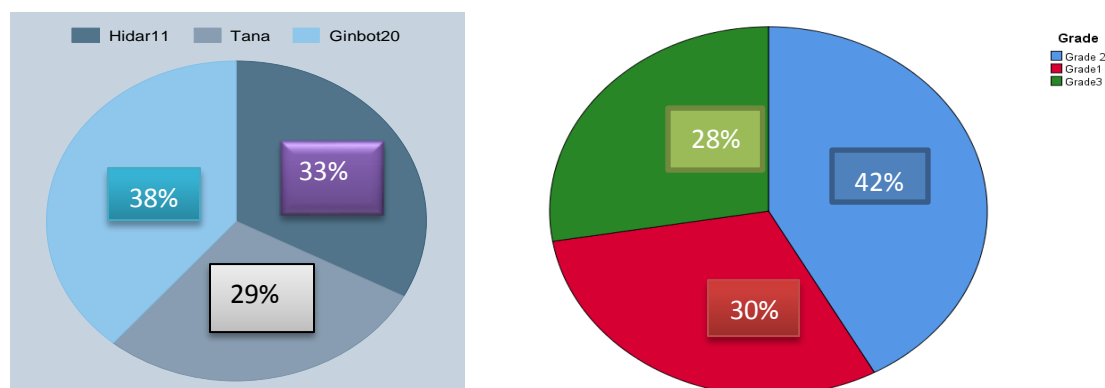
Figure 4.2: Land Grade and locational distribution of the sampled residential real estate

As depicted on the below figure (figure 4.3), 24.5 percent of residential houses of the sampled residential real estate have access to asphalt road, 22.4 percent of residential real estates have access to coble stone type of road. The remaining 28.3 and 24 percent of residential real estates have access to either gravel road or dirt/soil type road respectively. It indicates that the residential properties which do not have access to asphalt and cobblestone road are not small in number.   reset
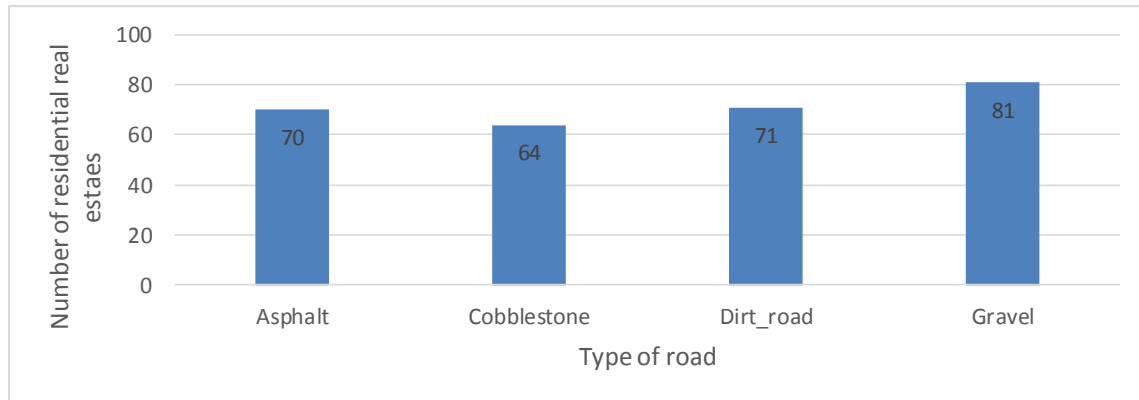
Figure 4.3: Accessible road types for sampled real estate

4.1.2 Building specific characteristics

Under this subsection, the attributes of buildings have been analyzed independently. Those building specific attributes that drive variation in sales price of residential real estate includes raw materials in which the wall, the roof and the ceiling of the main building is constructed and finalized; the current existing condition or quality of the main building; and having and lacking of subsidiary buildings. Therefore, the frequency distribution of the surveyed residential real estate building specific attributes are depicted under the following seven consecutive.

The wall of majority of residential properties are built by cement (73.4 percent) and the remaining 26.6 percent are built from local and backward materials (constructed from wood and mud). This result indicates a radical change of construction material and quality from traditional houses with a wood and mud wall to a modern one that have a cement wall. As stated by Gebeyehu Abelti, Marco Brazzoduro (2001), almost all (94.6 percent) residential real estate in Amhara region and 89.3 percent in Ethiopia have a wall constructed from wood and mud. The transformation of preference and raw material of construction from wood and mud to cement is

from two rationalities. First the municipality sits a minimum quality and construction level which hampers a wood and mood level. Second with the improvement in living condition of dwellers and technological advancement people prefer to construct with better raw materials.
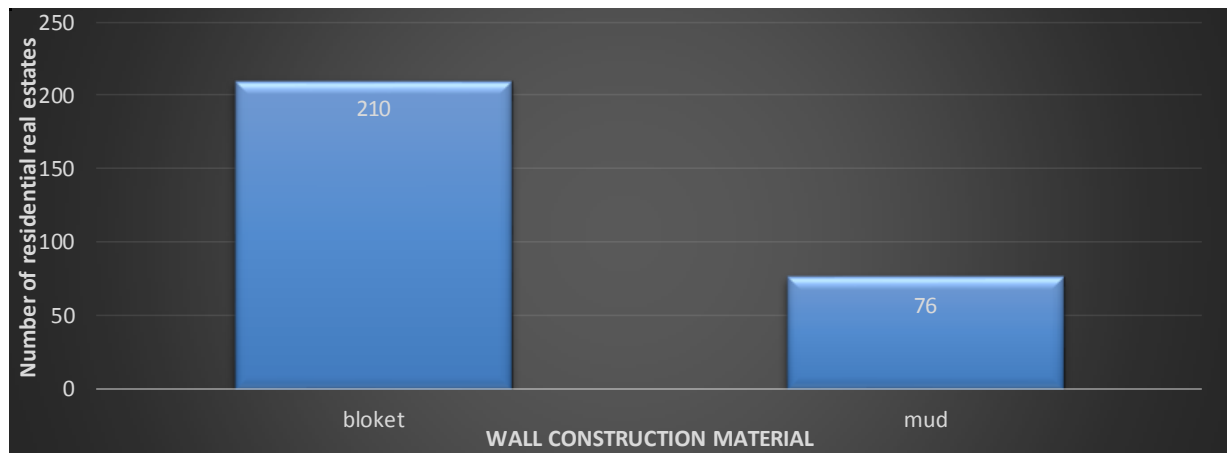
Figure 4.4: Wall of the main building
Sources: survey result, 2018

The roof of the main building constructed from steel accounts for 86.7 percent of residential real estate under investigation and the remaining 13.3 percent are constructed from mortar. This finding is consistent with the outcome of (Gebeyehu Abelti and Marco Brazzoduro, 2001) that states 83 percent of houses constructed in Ethiopia and 82.2 percent of houses constructed in Amhara region specifically have a roof constructed from corrugated iron.
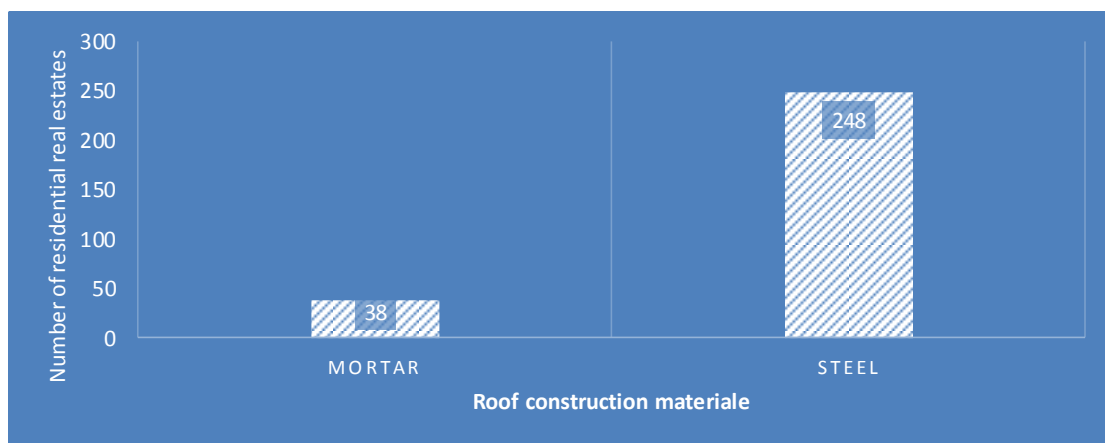
Figure 4.5: Roof of the main building
Sources: survey result, 2018

Most residential real properties (47 percent) have a floor constructed from masonry. Certain number of houses are constructed from local materials without utilizing modern materials of

construction and hence 23 percent of the sampled properties have a soil floor without any material. The rest sampled residential real estate 30 percent have a paved wall (be paved with).
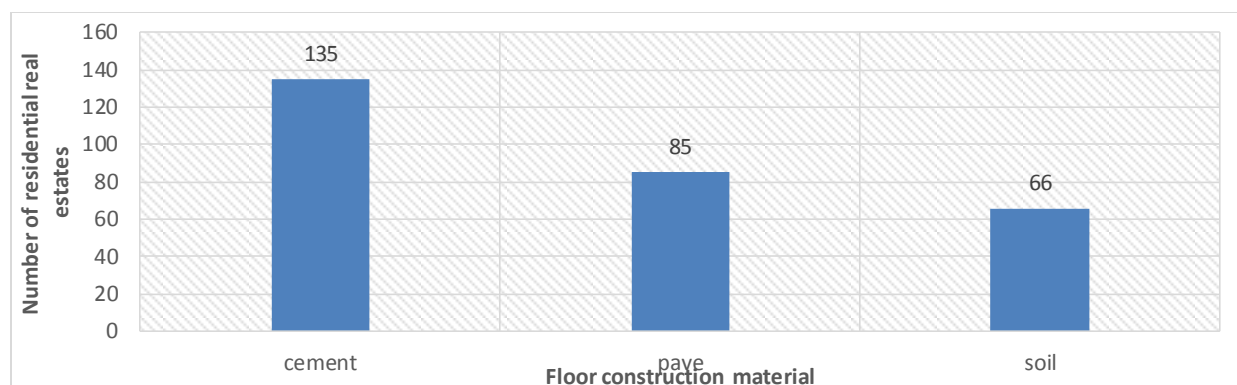
Figure 4.6: Floor of the main building
Sources: survey result, 2018

After the wall of the building at its base is constructed, its outer part needs some sort of finishing material and as of this survey in Bahir Dar city three type of wall finishing materials are utilized. Very few number of homes almost 9.5 percent did not have any wall finishing material as the result reveals most of this dwellings have deteriorated condition mud constructed wall and the like inferior characters. About 26.5 percent of our sample properties have wall finishing's with malleable and the rest majority which accounts 64 percent of the total sample a malleable with painting wall finishing level.
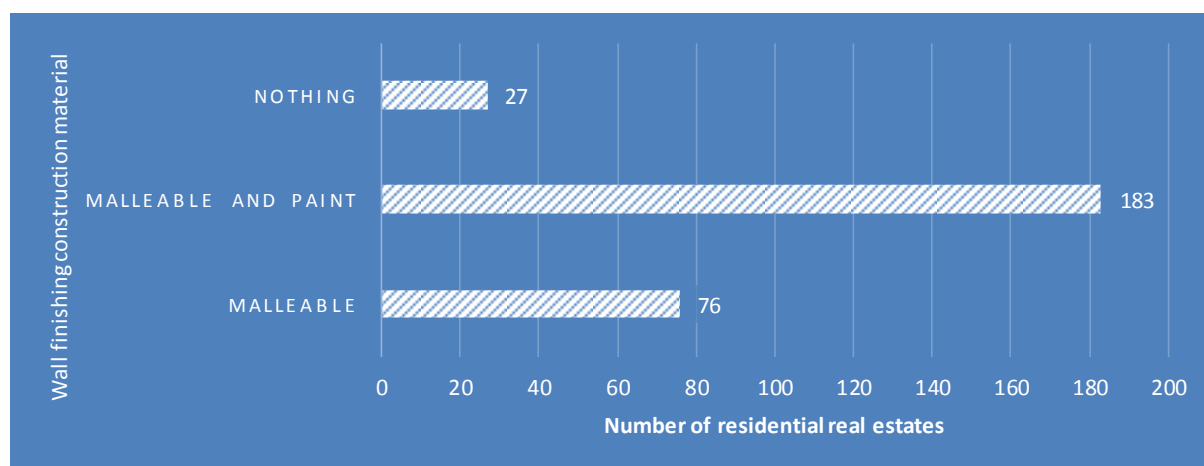
Figure 4.7: Wall finishing material of the main building
Sources: survey result, 2018

Utmost number (35.7 percent) of surveyed residential real estate did not have any ceiling whereas 22 percent of the sampled unites are constructed from a combination of mortar and gypsum where as 12.6 percent of the surveyed unites are constructed only from mortar. 17.5 percent of the sampled units are constructed from chipboard. 6.3 percent of the target sampled unit have a ceiling constructed from cloth likewise 5.2 percent of the surveyed units have a plastic ceiling. Negligible units' (0.7 percent) residential real estate under investigation have a faizit ceiling.
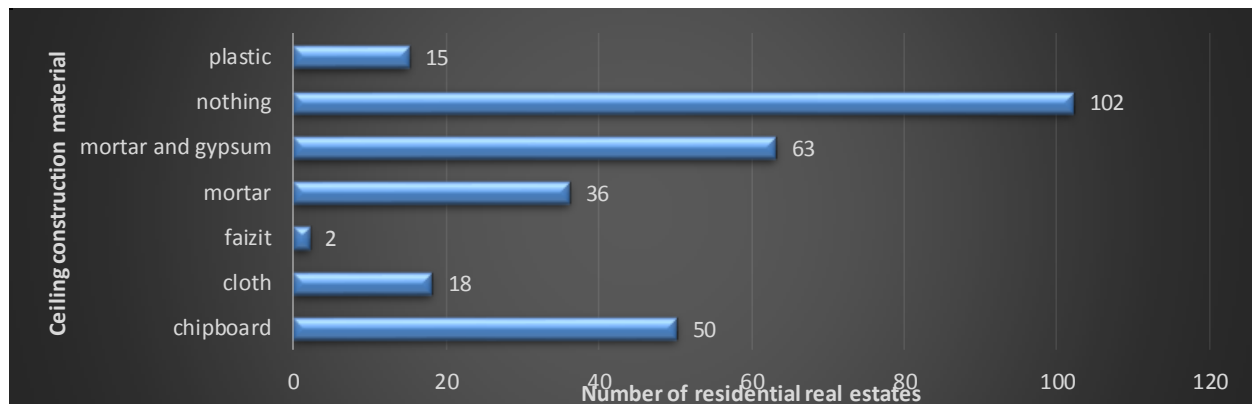
Figure 4.8: Ceiling construction material of the main building
Sources: survey result, 2018

As presented under bellow figure most of residential properties are currently found under good (44 percent) and moderate (33 percent) conditions. Very few number of residential real properties (7percent) under investigation are in a very fair and interesting condition. The remaining certain number of residential real properties found under bad or deteriorated (16 percent) condition.
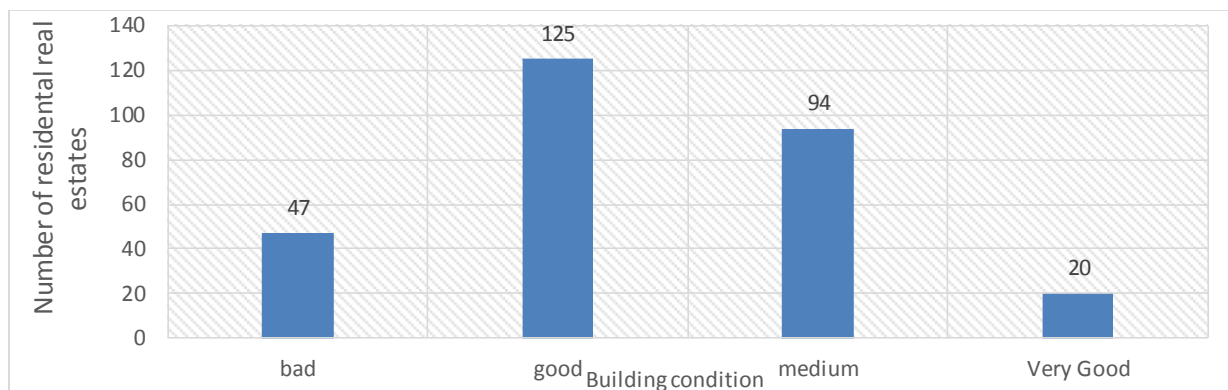
Figure 4.9: Building condition

Most of the sampled residential real estates under investigation are without subsidiary buildings. (74 percent) of residential properties are constructed without any subsidiary building and the remaining (26 percent) residential real estates have additional subsidiary buildings in addition to the main building. As the figure presents those residential properties with deteriorated building condition have low tendency to have subsidiary buildings.
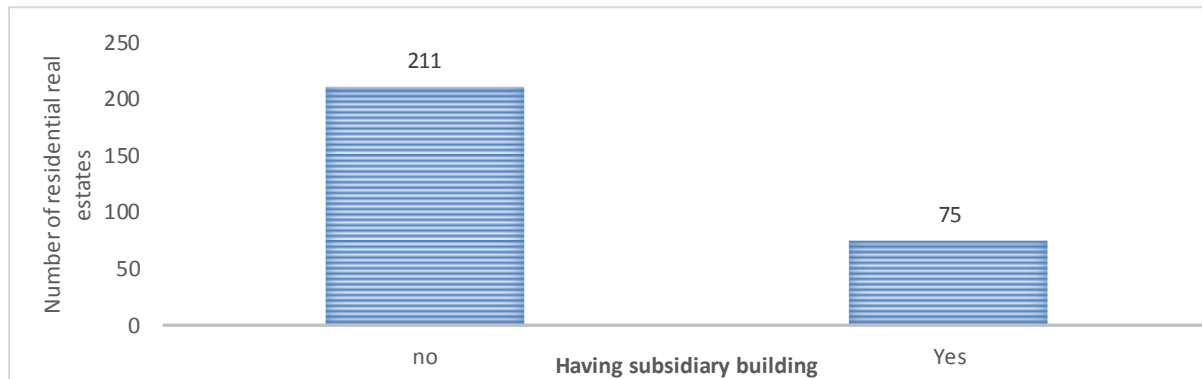
Figure 4.10: Subsidiary building
Sources: survey result, 2018

4.1.3 Agent characteristics

Brokers have a great role in bringing sellers and buyers together and in facilitating residential real estate markets in Bahir Dra city. As figure 4.11 depicts brokers contact around 78.7 percent (225 sellers and buyers) out of the total transactions under investigation and only 21.3 percent of transactions are concluded without the involvement of any third party /broker.
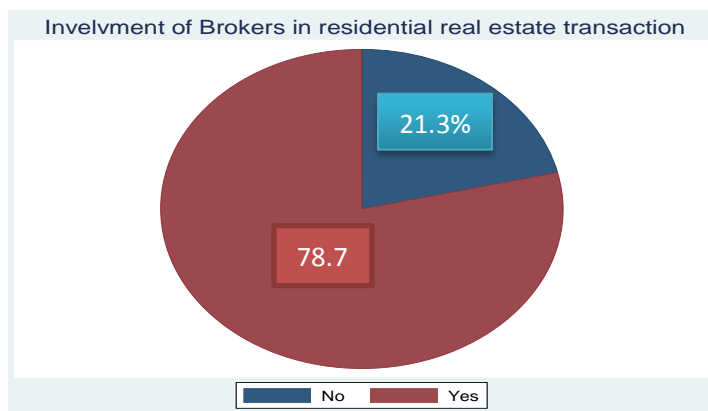
Figure 4.11: Transactions with and without the involvement of brokers
Sources: survey result, 2018

According to the FGD with brokers, the entry into brokerage services is an easy task. What is mostly expected from them is active sociable and having more interaction with the sector in any means. An individual who has acquaintance with brokers has a good chance of knowing the activities of the house broker services. As the brokers reported during the discussion having more education is not as such necessary and mandatory to be a broker. Almost all with very few exceptional did not have any advanced education beyond secondary education level. They argue as learning by doing is sufficient to entry to the brokerage and they report as no one gives to them any training during their entrance in to the system and afterwards. Most of brokers agree with their weakness in inspecting implicit home attributes and as this   require training over the normal interpersonal communication skill. There is no any guiding principle and document in how to brokerage, the only tool is their personal skill and the custom in the market.

The real estate commission to the broker is typically 4 percent in Bahir Dar, when a sale occurs between a buyer and seller who are both represented by their own real estate agents. This commission is split 50/50 between the buying and selling agents.

4.2 Descriptive statistics of continuous variables

There are eight prominent continuous variables in this research. Those variables are residential real estate real/actual sales price, residential real estate estimated price, residential real estate agreed price, building current price, plot size, building area, number of rooms and accessible road width. The descriptive statistics of these variables with their attributes are presented under below table (Table 4.1).

Real/actual price level, estimated price level, reported price level and building current price have been measured with monetary term of Birr. The remaining continues variables (plot size, building area and accessible road width) have been measured with square meter. These continues variables have different average, minimum and maximum values. Therefore, table 4.1 shows the average maximum and minimum values of these continues variables.

Table 4.1. Descriptive statistics of continuous variables

Continuous Variable		Obs	Mean	Std. Dev.	Min	Max
Dependent	Residential real estate sales price	286	1744825	2656466	350000	3700000
	Residential real estate estimated price	286	573695.8	323494.7	84844	1823372
	Residential real estate agreed price	286	481667.3	1157169	36655	1950000
Independent Variables	Building current price	286	216598.7	159487.5	3343	1196908
	Plot size	286	189.1666	94.26	16.86	600
	Building area	286	77.42564	40.88864	10.89	282
	Number of room	286	1.937063	.6065928	1	3
	Accessible road width	286	5	10.2	13.055	44

Sources: survey result, 2018

As depicted in the above table, the real sales price of residential properties is greater than both from the estimated as well as from the agreed price levels. Averagely the actual sales price of sampled residential real estates is 3.62 and 3.04 times superior from prices reported by the two agents (sellers and buyers) and from prices estimated by municipalities. The deviation among actual, reported and estimated price levels highly reduces the revenue of municipalities.

If we merely look at the residential real estate title transfer tax and related service fee, the municipalities collect Birr 6,563,080 from the sampled properties based on its sales price estimation with 4 percent lump sum tax (2 percent for stamp duty and 2 percent service fee) for residential real estate. But if there were a good estimate of sales prices without any understatement, the revenue would have been Birr 19,960,796 which have an additional Birr13,397,715.92. The difference is beyond twofold of what they are actually collecting this result is consistent with the finding of (Tom, 2016) which states in Ethiopia most property transaction tax payers are currently paying around a quarter of what they should they have to pay mainly due to lack of actual price data. Even more, this volume is by considering as all properties have greater than two years of service, by taking the minimum rate (4%). The rate of payment that MUDHCo ratifies for title transmission for a residential real estate having more

than two years of service and acquired through free hold or lease with allotment is 6%. But in Bahir Dar case the municipality lowers this rate of payment to 4%. If the ownership of the residential property was acquired through lease with auction/tender the property transfer fee is 5%. In case where a given residential real estate has bellow two years of service there is 15% additional tax over the property transfer fee.

As depicted above the average price of buildings, which is, also called engineering cost of building is Birr 216,598.7 and the minimum and the maximum estimated building prices are Birr 3, 343 and Birr 1,196,908.

This study covers 54,101.65 square meter plot sized space as a sample. The average plot size of transacted residential real estate is 189 square meter. The minimum and maximum plot sizes are 16.86 and 600 square meters

The size of the plot under which the building is erected that is called building area also determines the value of selling prices. The minimum, maximum and average building areas of the target representative residential real properties are 10.89, 282 and 77.4 square meters.

Most of the sampled residential homes have two rooms that means having only one additional room from the main living room but the number of houses that have no any additional room other than the main room are also very large in number. Few numbers of residential properties also have three rooms (two additional rooms over the main room). Therefore, the minimum, maximum and average number of rooms in my study area are 1, 3 and 1.937063 (approximately 2) respectively.

In addition to the type of accessible roads the size of the accessible road also affects the selling price of residential properties. Even if two properties have similar attributes including accessible road type if the size is different, it causes to have variation in their selling price. In the survey area the maximum registered road size is 44-meter square and the minimum size which is mostly dirt road is 5-meter square. The average road size in the sampled localities is 13-meter square.

4.3 Inferential analysis and diagnostic tests

4.3.1 Diagnostic tests

To identify the most important determinants of selling price of residential real estate and to analyze the significance of each determinant multiple linear regression have been employed. The selling prices of residential properties, which is defined as residential real estate selling price, and residential real estate estimated prices are the dependent variables and also proxy as measurement value of residential real estate. To analyze the selling price of residential real estate the two different levels of prices (the actual and estimated price levels) and the respective real property attributes are incorporated in the model.

Before econometrics regression analysis took places, this study considered various econometrics assumptions and diagnostic tests, which can affect consistency of the model, applied (i.e. OLS). In multiple linear regression model of OLS normality, multicollinearity, heteroscedasticity and model specification tests have to be tested and analyzed. As stated in the prior chapter the problem of heteroscedasticity is the principal constraint in real estate market because real properties have a very dramatic difference in their intrinsic attributes and selling price. For instance, in this research, the selling price of homes varies from Birr 350,000 to Birr 3.7 million. Moreover, hence the research uses a cross-sectional data testing heteroscedasticity is compulsory.

To test the heteroscedasticity problem, in this research Breusch-Pagan / Cook-Weisberg test for heteroscedasticity is employed and the result shows that there is no problem of heteroscedasticity for both models see appendix -4. Regarding to model specification Ramsey's test of omitted variable bias is employed and the result shows there is no more problem of model specification in both models case see appendix -5. Multicollinearity test with variance inflation factor (VIF) and its ratio (1/ VIF showed that there is no serious multicollinearity problem for both dependent variable determinants see appendix -6. The test of normality of residuals proves that distribution of error terms have normal distribution curve in histogram for both model residuals see in appendix -7. Finally, the overall goodness of fit of the model is also tested with F test and R^2. The result reveals that the model is good at less than 1 percent significance level through F test. The explanatory power of the model (R^2) also supports the F test result as depicted in the regression outcome R^2 for the real exchange and estimated prices are 61 and 71 percent

respectively. The adjusted R^2 for the real exchange and estimated prices are 58 and 69 percent respectively

4.3.2 Econometric model results and discussion

The aim of the study is to empirically examine factors that determine the price of residential real estate. To this, the result of multiple regression models shows that, from the total 21 different explanatory variables regressed in both models only 6 and 8 variables are found to be significant in determining the actual and estimated prices of residential real estate respectively. Determinants including plot size, building current price, location, roof, broker and wall finishing materials are among the significant determinates of real/actual exchange prices of residential real estate. Variables other than these including building area, subsidiary building, accessible road type, land grade, tenure type, building condition and number of room are all insignificant in determining the exchange price of residential real estate.

Most of explanatory variables employed in both models are similar but there is a significant difference in the effect of these variables on the two dependent variables. In the second model (model of estimated price) plot size, building current price, location, subsidiary building, tenure type/system and well finishing material are significant in determining the estimated price level. The remaining variables included within this model such as building area, roof material, type of accessible road, land grade, building condition, number of room and road width have insignificant effect in determining the estimated price of residential real estate.

From the above two models, we can infer that plot size, building current price, location, broker and wall finishing materials are the common significant determinants of actual exchange and estimated prices.

The twin consecutive models precisely presented under table 4.2 and 4.3 respectively shows that the power of the model to express variations (R^2) in selling prices of residential real estate are 61 and 71 percent for actual/real and estimated prices. The adjusted R^2 level for the real exchange and estimated prices are 58 and 69 percent respectively.

4.3.2.1 Econometric model result for sales price

Table 4.2 Econometric model result of actual/real sales price

VARIABLES	lnRRE_Salesprice
Plot_size	0.00328***
	(0.000372)
Building_area	0.000196
	(0.000713)
lnBuilding_Cprice	0.104***
	(0.0348)
Tana	0.0369
	(0.0713)
Ginbot_20	0.112*
	(0.0649)
Mortar	-0.342***
	(0.0961)
With_Broker	0.158**
	(0.0765)
WithSbsidiary_Building	0.0416
	(0.0611)
Gravel	0.0463
	(0.0752)
Cobblestone	0.0424
	(0.0785)
Asphalt	0.0449
	(0.122)
Grade_2	-0.0365
	(0.104)
Grade_3	-0.0271
	(0.120)
Lease_prvt	0.0979
	(0.149)
Freehold	0.0303
	(0.0708)
Good	-0.0452
	(0.0997)
Fair	-0.102
	(0.102)
Bad	-0.0576
	(0.112)
Painted	0.197**
	(0.0990)
Malleabl	0.00381
	(0.0611)
Number_room	0.0186
	(0.0534)
Constant	12.07***
	(0.452)
Observations	286
R-squared	0.613

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Sources: Estimation result, 2018

The OLS regression reveals that keeping other explanatory variables constant, an addition of plot size by 1 square meter leads to 0.0033 percent change in real selling price of residential real estate. This result is consistent with the finding of (Karl *et al.,* 2015; Sisay, 2006; Yiyang Gu, 2017) that states residential properties with more plot size have superior selling prices.

The percentage change of the current building price also called an engineering cost determines the selling price of residential real estate. As table 4.2 depicts, a 1 percent change in buildings current price leads to a 0.1 percent change in selling price of residential real estate price. Those houses with modern and expensive construction materials results higher building value which leads to higher level of selling price of a given real estate (Borowiecki, 2009).

The location where the property exists also determine the selling price of residential real estate. The regression result shows that those properties which are located in Ginbot 20 sub-city have higher price over those located in Hidar 11 sub-city. The expected percent change in actual selling price of residential real estates from residential real estate in Hidar 11 to residential real estate in Ginbot 20 is 11 percent. This finding is consistent with the work of (Ferlan *et al.*, 2017; Kagendo, 2011; Ottensmann *et al.,* 2008) which states locations between the CBD and fringes are demanded and have mostly better selling price.

As depicted on table 4.2 residential real estates in Bahir Dar city have a roof constructed either from steel or from mortar. The material by which the roof of the main building is constructed from have a significant effect on the selling price of residential real estate. Researches by (Gebeyehu *et al.*, 2001and by (Sisay, 2006) supports that those real properties constructed from steel and other precious materials have better selling price over those that have cheap and low quality constructed roof. Consistently, the expected percent change in actual selling price of residential real estates from residential real estate constructed from mortar to steel is 34 percent.

The role of real estate agents in real estate market is widely accredited by many researchers. However, their finding show that, even if, those real estate agents have a great role in the market through contacting sellers and buyers they may monopolize the market and exploit clients mainly when there is market imperfection. Similar outcome is generated in this research in Bahir Dar city most of residential transactions are held with the involvement of brokers and hence have a good contribution in contacting the two parties. However, brokers cost beyond what they did. This arises when there is information asymmetry they fabricate an artificial price and take more

value from both parties for their personal advantage and this is consistent with the work of (Kagendo, 2011). Kagendo concludes, those home buyers who bought a property through an agent/ broker are asked beyond the price of a home and the commission of the agent by forming collusion with either of participants. In this research, the expected percent change in actual selling price of residential real estates from residential real estate transacted without broker involvement to transactions with the aid of broker is 15.7 percent. Agent involvement has an asymmetric impact on earnings the two parties depending up on the broker personal advantage (Anderson, no date).

The material by which the wall of the main building is finalized also determines the price of a given real estate. Literature supports those real properties with better quality and long enduring wall-finishing material have better value. As depicted on table 4.2, those properties with a wall finished through malleable and painting have better selling price than those without any wall finishing material. The expected percent change in actual selling price of residential real estates from residential real estate with wall finished by wall and painting to those without any wall finishing material is 19.7 percent. This result is consistent with the finding of (Borowiecki, 2009) which states the construction material which directly affects the cost of construction have insignificant effect on price of real estate.

4.3.2.2 Econometric model result for estimated price

Table 4.3 Econometric model result for estimated sales price

VARIABLES	lnRRE_Eastimprice
lnPlot_size	0.542***
	(0.0581)
Building_area	0.000974
	(0.000639)
lnBuilding_Cprice	0.210***
	(0.0306)
Tana	0.164**
	(0.0655)
Ginbot_20	0.0900
	(0.0596)
Mortar	-0.0963
	(0.0977)
WithSbsidiary_Building	0.123**
	(0.0561)
Gravel	0.00814
	(0.0682)
Cobblestone	-0.0218

	(0.0714)
Asphalt	0.0357
	(0.111)
Grade_2	-0.00570
	(0.0943)
Grade_3	-0.0626
	(0.109)
Lease_prvt	0.338**
	(0.136)
Freehold	0.0223
	(0.0638)
Good	0.0255
	(0.0918)
Fair	0.0225
	(0.0923)
Bad	0.0959
	(0.102)
Number_room	0.0689
	(0.0571)
Road_width	0.00276
	(0.00418)
Painted	0.101*
	(0.0550)
Malleabl	0.00950
	(0.0896)
Constant	7.410***
	(0.471)
Observations	286
R-squared	0.702

Sources: Estimation result, 2018

Government mostly use simple rules for appraising and estimating the price of properties, whereas the market employs more complex rules and hence mostly this value is understated from the market value (M. Clauretie, 2004). A study by M. Clauretie (2004), tests the hypothesis that government estimated prices of residential properties are no different from those that would be obtained in market transactions. However, his finding rejects the null hypothesis and recognizes the understatement of estimated value of properties.

Consistent to the former model the size of the plot significantly determines the estimated price of residential homes. As presented on table 4.3 a 1 percent increase in plot size leads to an average 0.54 percent increase in estimated price of residential houses. Rationalities and literatures for this are not different from the first model.

The percentage change of the current building price/cost significantly determines the estimated price of residential real estate. As table 4.3 depicts a 1 percent change in buildings current price leads to a 0.21 percent change in estimated price of residential real estate price.

Location of a given residential real estate significantly determines the estimated price level. Table 4.3 shows the expected percent change in estimated selling price of residential real estates from residential real estate in Hidar 11 to residential real estate in Tana is 16 percent. The rationality is that municipalities mainly consider the developments and infrastructures established in that locality and other positive advantages. These positive advantages include nearness to CBD, to lake Tana, and to other recreational areas.

If we look at the second model (model of estimated price), the effect of location is different not only with its category (sub-city) but also in coefficient. In the first model (model of actual/real price), it is depicted as residents prefer to pay more for residential real estates which in Ginbot 20 sub-city. But the second model recognize the price advantage residential real estates located in Tana sub-city over those located in Hidar 11. The deviation signifies the difference in preference and evaluation of location between dwellers and municipality. The result is consistent with the work of (Zeng, 2013; Kagendo, 2011; Guntermann and Thomas, 2005) .

Unlike the first model, subsidiary buildings have positive contribution to the overall value of real properties. As presented on Table 4.3 the expected percent change in estimated selling price of residential real estates from residential real estate without subsidiary buildings to residential real estates that have additional subsidiary buildings is 12%. The rationality for this is municipalities/valuers inspection. Municipalities inspect subsidiary buildings as pillar improvements on the plot and hence they give more credit to subsidiary buildings. As a result, municipalities estimate better price for those residential real estate with subsidiary buildings over those that did not have any subsidiary building.

As that of the first model, even if the relationship between estimated price and land grade is positive which is to mean those properties found in grade 1 have better price and the like it is not statistically significant. This result is against what the researcher expects and what it has to be if municipalities follow the international valuation standards. This may be mainly because there are many land grades, which extends to five or six land grading level which could be given to a plot based on the development that the municipality devotes on that locality.

Those properties with grade four, five and the rest did not actively participate in the real estate market by hoping their property will have better access to utilities rather mostly localities with these grades have more speculation interest and hence will its grade improve. In contrast, those first grade owners are with better access to infrastructures and hence they have less motivation to sell their property due to this the majority of sampled plots have second grade with certain number of first and third grade plots but without any plot lower than third grade. The value difference between these three consecutive grades is not as such significant but if more plots with first and last grade (fourth fifth and the rest) are included their difference will be significant. Due to the grade concentration on second, third and first grades and due to the value difference between these consecutive grades is lower land grade becomes insignificant in determining the estimated price.

The other rationality may be as municipalities' state during the interview they merely ask the location and size of a given real estate and without any inspection by attending physically on the property they estimate the value of the home this information gap discredits the value of grades through valuing with distorted land grade levels. Municipalities use and follow the grade given for the land during land preparation for lease and hence most properties, which have automatically different access to infrastructures during developments with different outlooks, may have similar grade. When there are developments, in localities, the grade for land will be automatically changed but municipalities did not upgrade their information.

Like the first model, the way in which the wall of the main building is finalized also determines the estimated price of residential real estate. As depicted on Table 4.3 the expected percent change in estimated selling price of residential real estates from residential real estate without wall finishing materials to residential real estates that have wall finishing materials of malleable and painting is 10%.

Unlike the previous model, in this model the tenure type by which the plot is owned significantly affects the selling price. As depicted on table 4.3, those properties leased from private individuals (lease with auction/tender) have significantly different and better estimated price level than those with lease from government system. The expected percent change in estimated selling price of residential real estates from residential real estate under lease with allotment to residential real estates under lease with auction/tender is 34 percent. This is because under lease

with tender system the lease held by auction through competing and winning. This competition necessitates to pay higher price over the value of the property to win than free hold and lease from government (allotment) systems. Therefore, because the price of a plot during tender is too much and due to valuers use this value to estimate the price of a plot and a building the price of properties under lease from private (tender) is significant and superior.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The main objective of this study is to investigate the determinants of price of residential real estate in Bahir Dar city. The study recognizes residential real estate as a multi-dimensional product comprising of locational, structural and neighborhood attributes. A one year and three months' cross-sectional data has been collected from sample of 286 residential real estate transactions. Residential real estate market participants such as buyers, sellers, municipalities and brokers are surveyed to get and crosscheck the primary data.

Processes and procedures in residential real estate transaction and title transfer practice are complex and regressive. A minimum of four months are required to successfully accomplish these complex procedures and to transfer the title.

Research on real estate pricing in Ethiopia is not known and neglected area of investigation and continues far behind. While real estate continues to significantly influence buyers, sellers and investors in Ethiopia, they do not have sufficient information on the pricing to enable them involve wisely. A rapid rise in real estate prices based on future rather than current benefits (induced by public goods not offset by the public collection of taxes) is bound to affect business profitability. The price level is unaffordable for majority of the city dwellers and this problem becomes serious as the only way of accessing land in Ethiopian cities becomes merely through lease system.

This research identified plot size, current estimated price of building, location, involvement of broker, roof construction material, wall finishing material, availability of subsidiary building and type of tenure in that order, as the principal significant descriptors of residential real estate prices at least in one of the two models in the study area. But only plot size, building current price, location and wall finishing material are common significant determinants of the binary models.

The total sum of selling prices reported by sellers and buyers to municipalities; and estimated by municipalities are respectively 3.62 and 3.04 times lower from what the real estate actually transacts. From this the municipality annually losses at minimum Birr 13,397,716 due to this discrepancy.

Most of residential real properties in Bahir Dar city have a floor, roof, wall and ceiling constructed from cement, steel, Masonry and nothing respectively. Currently most of residential buildings are under good and fair conditions, have subsidiary buildings and transactions are held with the involvement of brokers. Most of residential properties are hold with free tenure system which is against the plan of the city and the country. It is envisioned to transform all tenure types to lease but the result disproves the intended change.

There is no any comprehensive record of housing transaction over time and there is no price index particularly residential real estate price index (RREPI) which is very essential to predict annual growth of price of residential real estate and hence price of properties. There is no advanced computer utilization in the real estate transaction and data management process. There is no multipurpose or fiscal cadaster application in the city.

The regulations and principles under which the municipalities follow are out dated. For instance, the rate by which municipalities use to estimate the value of a plot and a building was determined in 2006 E.C. Given a dynamic featured real estate market using four years' lag pre-determined rate leads to an understated estimated price levels and great deviation between the estimated and real sales price of residential real estate; and results very low municipality revenue.

5.2 Recommendation

Based on the findings and conclusions, the following specific recommendations are forwarded.

☞ It is recommended that the government should work hard to establish independent valuation institutions that can value residential real estate prices in particular and the real estate sector in general.

☞ As both the descriptive and inferential statistics reveals, plot related determinants like plot size and building area are highly significant and are the principal determinants of residential house price changes. This proposes that policy should focus on raising land supply to restrain property price increases over the long run.

☞ The Federal government in general and the Amhara region in particular should design a system that enable all participants of the real estate market have symmetric information.

Particularly there should a mechanism that provide information to real estate buyers regarding price determinants and/or house attributes when making decisions.

☞ The government should have to amend rules, regulations, proclamations and principles with the market condition and hence guiding principles should not be rigid. The rate of payments and property grades should have to be updated with the market system; and with the developments and changes made on/to real properties.

☞ The application of fiscal cadaster which is in progress but not functional until now have to be facilitated and for the long run, there should a multipurpose cadaster.

☞ A surprising situation given that shelter is a basic human need. Inability to afford a home is to mean an inability to fulfill basic necessities therefore, consideration has to be given to affordability of residential real estate prices. There should be a price index for residential real estate sector so as it could be possible to take remedial measure for price fluctuations.

☞ To use brokers for market enhancement, to minimize market distortion and to orient them towards facilitating residential real estate market.

   ✓ There should be franchising.
   ✓ Codes of ethics, principles and standards to their activities has to be developed.
   ✓ Brokers should have an updated list of real estate property prices so that they can help buyers to make informed choices in the real estate property investment by giving them a variety of alternatives.

☞ Municipalities and sub-cities have to be strengthen their capacity of manpower and the system of service delivery through providing short term and long term training.

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Appendix -1- English version survey questioner

This questionnaire is designed by a post graduate student of Land and Real Property Valuation in Institute of Land Administration, Bahir Dar University to prepare a first-degree completion research paper. It is prepared to capture data and information that will enable researcher to study the determinants of price of residential real estate at Bahir Dar city. Information and data will be kept in strict confidentiality and will only be used for paper objective. Therefore, filling this questionnaire would have no any harm against any respondent. since yours genuine and honest response is highly regarded for the successful accomplishment of the study, the researcher would like to ask you respectfully to fill the questionnaire properly. Your maximum support and cooperation is highly needed in responding to questions below and providing correct information.

First thank you for your willingness!

General Guideline:

- Please circle yours choose (where appropriate) for those questions that you think right.
- Give your short and precise answers for those followed by blank spaces.
- You can give more than one answer for choice questions when necessary.

I. *Questioner for Property Sellers and Buyers*

1. *General information*

1.1 Questioner identification number (ID)……………. Date of data collection……….

1.2 Sub-city where the property locates……… Kebelle……………….

1.3 Sex of property owner   0   female   1   male

1.4 Age of the property owner…….

1.5 Marital status…...

     1 married   2 single   3 widowed

1.6 Education level

     1 illiterate   2   1-6   3   7-8   4   9-12

Please specify your level of education if it is beyond grade 12

1.7 Monthly income……

2. *Land related information*

2.1 Type of tenure

　　1 Lease from government　　　　2 lease from private　3 free hold　　　　4no evidence

2.2 Plot size in square meter……

2.3 Land grade

　　1first grade　　　2 second grade　　　3 third grade　　　4 fourth grade 5 fifth grade

2.4 Accessible road type

　　1 soil road　　　2 lead road　　　3 coble stone　　　4 Aspalt

3. *House/property/ specific questions*

3.1 Date of transaction　　　/day/month/year/-------------

3.2 Building condition

1 Very good　　　2 good　　　　3 medium　　4 deteriorated (bad)

3.3 Expected age of the real estate……

3.4 Building area in square meter……

3.5 Number of rooms…….

3.6 Wall finishing material

　　1 wood and mud　2 stone　　　3 cement　　4 steel

3.7 Floor finishing material

　　1soil　　2 cement　　3plastic　　4 other……….

3.8 Time span to get public transport in minutes

　　1. ≤10　　　　　　　　2. 10-20　　　　　　　　3. ≥20

3.9 Time span to get local market in minutes

　　1. ≤10　　　　　　　　2. 10-20　　　　　　　　3. ≥20

3.10　Time span to get nearest primary school in minutes

　　1. ≤10　　　　　　　　2. 10-20　　　　　　　　3. ≥20

3.11　How long do you span in search of the real estate (if possible in month)?

　　1. ≤1　　　　2. 2-3　　　　3. 3-6　　　　4. 7-12　　　　5. ≥12

3.12　How was your transaction made?

　1. With broker　　　　　2. With relatives　　　　　3. With advertisement

3.13　If your answer to 3.12 is 1 do brokers provide sufficient information?　　　1 yes　2 no

3.14   Do you think brokers facilitate the real estate market transaction?

1 yes   2 no

3.15   How long it takes to transfer the property ownership write (title deed)?

1. ≤1   2. 2-3   3. 3-6   4. 7-12   5. ≥12

3.16   Was the transaction process easy?

1 yes   2 no

3.17   If your answer is no what is the problem

1. Difficulty of getting sellers and buyers together

2. Low quality and quantity house

3. Financial constraint

4. Bureaucratic complexity

5. State if other than this

3.18   *What do you think could be solution for this problem?*

1. *Giving recognition and support to brokers*

2. *Providing updated and efficient information*

3. *Improving our cadaster utilization*

4. *Building efficient institutions*

5. *State if other than this*

3.19   *Whom much you incur a cost other than the price of the real estate in the transaction process……...*

3.20   *Was the title deed transfer process transparent and easy?*

1 yes   2 no

3.21   If your answer to 3.20 is no what was the problem

1. Buyers and sellers Lacking awareness about the process

2. Unnecessary bureaucracy of respective officers

3. Ambiguous rules and principles

4. Lack of service delivery

5. There is no complain handling system

II.   Questioner for interview participants

1. How and where do you perform your brokering?

2. How do you find buyers and sellers?

3. What motivates buyers and sellers to buy or sell properties?

4. What factors determine the price of residential real estate?

5. Do you think the real estate market is under the influence of sellers?

6. How and from whom you receive your commission?

III.   Questioner for group discussion participants

1. What do you think about the real estate transaction process and its system?

2. How do you estimate the price a real estate?

3. What factors determine price of residential real estate?

4. What is your reference to estimate price of residential houses?

5. What are the hindering factors in the property transaction process?

6. In your view what should have been taken to improve the real estate market?

Appendix -2- Amharic version survey questioner

መጠይቅ

ይህ መጠይቅ የተዘጋጀው በባ/ዳር ዩኒቨርሲቲ ሜትና ቁሚንብረት ግምታ ትምህርት ክፍል ተማሪቂ ተማሪ ስለሆንኩ የሁለተኛ ድግሪየን ማጠናቀቂያ ጽሁፍ ለማዘጋጀት ነው፡፡

የመጠይቁም አላማ በባህርዳር ከተማ በማኑ የመኖሪያ ቤቶች ግብይትና የመ�%ዋጋ አተማመን ዙሪያ ጠቃሚ መረጃዎችን ለማስባሰብ ነው፡፡

ስለሆነ ምጥናቱን ለማክሄድ ሚጃዎችን ማስባሰብ አስፈላጊ በማሆ የእርስዎ ቁሚንብረት አንዱየ ጥናቱ ናሙ ሁኖ ተመርጧል፡፡ ለጥናቱ በስኬት መጣፈቀ የእርስዎ ታማኝነት እና ትዕግስት የተማኣበት ምኣሽ እጅግ ወሳኝ በማሆ መጠይቁን በአግባቡ እንድትማሉኝ በአክብሮት እጠይቃለሁ፡፡ በ%ረ%ሻም የማስጠት ሚጃ ማስጥራዊነት የተጠበቀና ለዚህ ጥናት አላማብቻ እንደማዎል አረጋግጣለሁ፡፡

"ጊዜዎን ሰውተውስለማያደርጉልኝ ትብበር በቅድማ አመስግናለሁ"!!!

አጠቃላይ መማያዎች:

✓ የምር%ጥያቄዎችን ትክክለኛ ሚስዎን የያዘወን ምር%ያክብቡ፡፡

✓ ለባዶ ቦታ ጥያቄዎች አጭር እናግልፅ ምላሽዎን በተሰጠውቦታ ይሞሉ፡ ፡

✓ አስፈላጊ ከሆነ ለምሮጫጥያቄዎች ከአንድ በላይ ሜስ ማስጠት ይቻላል፡ ፡

ማጣይቅፅ፡ - ለገኘወችና ሻራች

ክፍል አንድ፡ - ባለቤቱን/ባለንብረቱን የተማከቱ ጥያቄዎች፡

1.1 የ ማጣይቁ ሚላ ያ ቁጥር -------------------- ማጣይቁ የ ተማ በት ቀን --------------------

1.2 ክፍለ ከተማ-----------------------------------

1.3 ቀበሌ -----------------------------------

1.4   ያታ   0 ሴት   1 ወንድ

1.5 ዕድሜ-------------

1.6 የ ጋብቻ ሁኔታ --------

1 ያገባ   2 ያላገባ   3 አግብቶ የፈታ

1.7 የ ትምህርት ደረጃ ---   1 ያልተማሪ   2 1-6   3 7-8   4 9-12

የ ትምህርት ደረጃዎ ከ12 ክፍል በላይ ከሆነ ያለዎትን የ ትምህርት ደረጃ ይፃ ፉ -------------

1.8 ወርሀዊ ገ ቢ---------------(ብር)

ክፍል ሁለት፡ -ሜት ነ ከ ሜጃ

1. የ ይዞ ታ አይነ ት…….

1 ሊዝ-ከመንግስት   2 ሊዝ-ከግል   3 ምሪት 4 ሜጃ አልባ

2. በታዉስንት ካሬ ሜትር ነ ዉ……

3. ቤቱ/ቋሚንብረቱ ማ ኼበት የ ቦታ ደረጃ

1ኛ ደረጃ   2ኛ ደረጃ   3ኛ ደረጃ   4ኛ ደረጃ   5ኛ ደረጃ

4. የ መባሪያ መንገ ድ አይነ ትና ስፋት (ሜ)፡ -

1. የ ለለ ወ/አ ፈር/   2. ጥር ጊ ያ   3.ኮብል ስቶነ   4. አስፋልት

ክፍል ሦስት፡ - የ ቤቱ/የ ቋሚንብረቱ/ አጠቃላይ ሜጃ

1. ግብይቱ/ግኝዉየ ተፈፀ መዉ መቻ ነ ዉ ቀን ...... ወር ....ዓም.........

2. ቤቱ የ ማ ኻበት ሁኔታ

1 በጣም ጥሩ   2 በ ጥሩ ሁኔታ   3 መካከለኛ   4 ያረጀ

3. የ ቤቱ ዕድሜ በግምት ስንት ይሆናል-------

4. ህንፃ ዉስንት ካሬ ሜትር ላይ ነ ዉ ያረ ፈዉ ....

5. ቤቱ ስንት ክፍሎች አሉት ....

6. የ ቤቱ ግድግዳ የ ተሰራበት ቁስ

1 ከጭቃ   2 ከድን ጋይ   3 ከስ ሚ ቶ   4 ከቆርቆሮ

7. የ ቤቱ ወለል የ ተሰራበት ቁስ

1 አፈር   2 ሲሚኔቶ   3 ፕላስቲክ   4 ሌላ ከሆነ ይገለፅ ....

8. የ ህዝብ ትራንስ ፖርት አ ገ ልግሎት ለ ማግኘት ስንት ደቂቃ ይጠይቃል

  I. ≤ 10 II.   10-20   III. ≥ 20

10. በ አ ካባቢ ዉ ያለ ዉን ገ ቢ ያ ለ ማ ግ ኘት ስንት ደቂቃ ይጠይቃል

  I. ≤ 10 II.   10-20   III. ≥ 20

11. በ አ ቅራቢ ያ ዉ የ ማ ኻ ዉ የ መ ጀ መ ሪ ያ ደረጃ ት/ት ቤት ስንት ደቂቃ ይሰዳ ል

  i. ≤ 10 ii.   10-20   iii. ≥ 20

12. ቤቱን /ቋሚ ን ብረቱን /ፈልጎ ለ ማግኘትና ለ መ ዛት ምን ያ ህ ል ወር ፈ ጀ

  i. ≤ 1 ii.   2-3   iii.   3-6   iv.   7-12   v. ≥ 12

13. የ ቤቱ ግብይት እን ዴት ነ ዉ የ ተካሄደዉ

    i.   በደላላ   ii.   በቤተ ዘ መ ድ   iii.   በማስ ታወቂ ያ

14. ሜ ሳ ዉ i ከሆነ ደላላ ዎች ስል ቋሚ ን ብረቱ/ቤቱ በ ቂ ሚ ጃ ስጠዋችኋል

1 አ ዉ 2 የ ለ ም

15. የ ደላላ ዎች መኛ ር የ ቋሚ ን ብረቱ/ቤቱ ግብይት ያ ቀላ ጥፉ ታል ብለህ ታስ ባ ለ ህ

i.   አ ዉ   ii.   የ ለ ም

16. ቤቱን ና ስመን ብረቱን ለ ማ ዝ ዋወር ምን ያ ህ ል ወር ፈ ጀ

i. ≤ 1 ii.   2-3   iii.   3-6   iv.   7-12   v. ≥ 12

17. የ ቋሚ ን ብረት/ቤት ገ ብ ያ ዉ እና ግብ ይቱ ቀላ ል ነ ዉ

i. አወ   ii. አይደለም

18. ማስወ አይደለምከሆነ ችግሩ ምንድን ነዉ.

i. የገጀኝና ሻጭአለማ ናኝት   iv. ጥሩ የሆኑ ተቋማት አለማር

ii. ጥራትና ስፋት ያለዉቤት አለማግኘት   v. የተንዛዛ ቢሮክራሲማC

iii. የፋይናንስ አቅምአለማር   vi. ሌላ ካለ ይግለዉ

19. በእረሰዉ እይታማፍትሄዉምን ይጣልወታል

I. ለደላላዎች ህጋዊ እወቅና ማስጠት   III. የካዳስተር አገልግሎት ማጠቆም

II. ወቅታዊና በቂ ሚጃ ማድረስ   IV. ብቁ ተቋማትን ማፍጠር

20. ከቋሚንብረቱ/ቤቱ ዋጋ ወጪገብይት ሂደቱ ስንት ወጪአወጡ-----------

21. የቋሚንብረት/ቤት ግብይት ሂደቱ ግልፅና ቀላል ነዉ.   1 አወ   2 አይደለም

22. ማስወ አይደለምከሆነ ችግሩ ምንድን ነዉ.

i. ገኝና ሻጨስል ሂደቱ አወቅና አለማC   iv. በቂ የሆነ አገልግሎት አለማC

ii. ግብይት ባለሞያዎች አላስፈላጊ ቢሮክራሲ   v. ኮራፕሽን

iii. ግልፅ የሆኑ ደንብና መሟየያዎች አለማC   vi. ቅሬታ ስሚኣካላት አለማC

ማጠይቅ፪ ፡ - ለቃለ ማጠየቅ ተሳታፈወች

1. የደላላ ስራየትና እንዴት ይከናወናል?

2. ገኝና ሻጩችን እንዴት ታገኟቸዉአላችሁ?

3. ሰወችን ቤት ለመዛት/ለመሻጥ የሟነ ሳሳቸዉምንድን ነዉ?

4. የቋሚንብረት/ቤት ግብይቱንና ዋጋወን የሟሰኑት ጉዳዮች ምንድን ናቸዉ?

5. የቋሚንብረት/ቤት ግብይቱ በገኝኩነ ዉወይስ በሻጩተፅኖ ስር ነ ዉ?

6. ኮሚሽን እንዴትና ከማን ትቀበላላችሁ?

ማጠይቅ፫ ፡ -ለቡድን ወይይት ተሳታፈዎች

1. የቋሚንብረት/ቤት ግብይት ስራአቱ ምን ይጣላል?

2. የቋሚንብረት/ቤት ዋጋን እንዴት ነ ዉምካገ ምጡ?

3. የቋሚንብረት/ቤትን ዋጋ የሟስኑት ጉዳዮች ምንድን ናቸዉ?

4. በቁሚኒንብረት/ቤት ግብይቱ ሂደት ወስጥ ያሉት ተግዳሮቶች ምንድን ናቸወ?

5. የቁሚኒንብረት/ቤትግብይቱን ለማስለጥ ምን መፍረግ አለበት ይላሉ?

Appendix -3- Descriptive statistics for categorical variables

Characters		Frequency	Percent	Valid Percent	Cumulative Percent
Tenure	Lease from government	68	23.78	23.78	23.78
	Lease from private	9	3.15	3.15	26.93
	Free hold	209	73.08	73.08	100.0
Land Grade	Grade_1	87	30.42	30.42	30.42
	Grade_2	120	41.96	41.96	72.38
	Grade_3	79	27.62	27.62	100.0
Road type	Asphalt	70	24.5	24.5	24.5
	Coble stone	64	22.4	22.4	46.9
	Gravel road	81	28.3	28.3	75.2
	Dirt road	71	24.8	24.8	100.0
Location	Ginbot20	111	37.9		
	Hidar11	94	32.1	40.3	72.4
	Tana	81	27.6	27.6	100.0
Floor	Cement	135	47.2	47.2	47.2
	Pave	85	29.7	29.7	76.9
	Soil	66	23.1	23.1	100.0
Wall	Masonry	210	73.4	73.4	73.4
	Mud	76	26.6	26.6	100.0
Roof	Mortar	38	13.3	13.3	13.3
	Steel	248	86.7	86.7	100.0
Ceiling	Chipboard	50	17.5	17.5	17.5
	Cloth	18	6.3	6.3	23.8
	Faizit	2	.7	.7	24.5
	Mortar	36	12.6	12.6	37.1
	mortar and gypsum	63	22.0	22.0	59.1
	Nothing	102	35.7	35.7	94.8
	Plastic	15	5.2	5.2	100.0
Condition	Bad	47	16.4	16.4	16.4
	Good	125	43.7	43.7	60.1
	Fair	94	32.9	32.9	93
	Very Good	20	7	7	100.0
Subsidiary	No	211	73.8	73.8	73.8
	Yes	75	26.2	26.2	100.0
Wall finish	Malleable & paint	183	64.0	64.0	64.0
	Malleable	76	26.6	26.6	90.6
	Nothing	27	9.4	9.4	100.0
Broker	No	61	21.3	21.3	21.3
	Yes	225	78.7	78.7	100.0

Appendix -4- Heteroscedasticity test

A. Heteroscedasticity test of transaction price

```
. hettest

 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnRRE_Salesprice

         chi2(1)      =      0.95
         Prob > chi2  =    0.3304
```

B. Heteroscedasticity test of estimated price

```
. hettest

 Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnRRE_Eastimprice

         chi2(1)      =      1.06
         Prob > chi2  =    0.3025
```

Appendix -5- Model specification test

A. Model specification test of transaction price

```
. ovtest

 Ramsey RESET test using powers of the fitted values of lnRRE_Salesprice
        Ho:  model has no omitted variables
                F(3, 261) =      0.81
                 Prob > F =      0.4919
```

B. Model specification test of estimated price

. ovtest

Ramsey RESET test using powers of the fitted values of lnRRE_Eastimprice
        Ho: model has no omitted variables
                F(3, 261) =   0.86
                Prob > F =   0.4649

Appendix -6- Multicollinearity test of explanatory variables

A. *Multicollinearity test of transaction price*

. vif

| Variable	VIF	1/VIF
Grade__3	5.25	0.190330
Asphalt	5.02	0.199060
Grade__2	4.76	0.209915
Good	4.44	0.225219
Fair	4.17	0.239912
Bad	3.14	0.318296
Plot__size	2.23	0.449242
Gravel	2.09	0.479231
lnBuilding~e	1.95	0.512492
Cobblestone	1.95	0.513632
mortar	1.93	0.517785
Number__room	1.90	0.525877
Tana	1.87	0.533466
Ginbot__20	1.82	0.550117
Freehold	1.79	0.558521
With__Broker	1.78	0.561092
Malleabl	1.56	0.640625
Building__a~a	1.54	0.650495
Painted	1.52	0.656657
WithSbsidi~g	1.31	0.763057
Lease_prvt	1.24	0.809327
Mean VIF	2.54	

B. *Multicollinearity test of estimated price*

```
. vif
```

| Variable | VIF | 1/VIF |
|---|---|---|
| Grade__3 | 5.25 | 0.190365 |
| Asphalt | 5.04 | 0.198535 |
| Grade__2 | 4.79 | 0.208726 |
| Good | 4.59 | 0.218094 |
| Fair | 4.15 | 0.240793 |
| Road__width | 3.99 | 0.250592 |
| lnPlot__size | 3.25 | 0.307851 |
| Bad | 3.16 | 0.316096 |
| Number__room | 2.65 | 0.377707 |
| mortar | 2.43 | 0.411107 |
| Gravel | 2.09 | 0.479024 |
| Cobblestone | 1.96 | 0.510937 |
| Tana | 1.92 | 0.519979 |
| Ginbot__20 | 1.87 | 0.535274 |
| lnBuilding~e | 1.84 | 0.543099 |
| Freehold | 1.77 | 0.564619 |
| malleabl | 1.52 | 0.659240 |
| Building_a~a | 1.50 | 0.665714 |
| WithSbsidi~g | 1.35 | 0.742580 |
| painted | 1.30 | 0.767273 |
| Lease_prvt | 1.25 | 0.801285 |
| Mean  VIF | 2.75 | |

## Appendix -7- Normality test

*A. Normality test of transaction price*
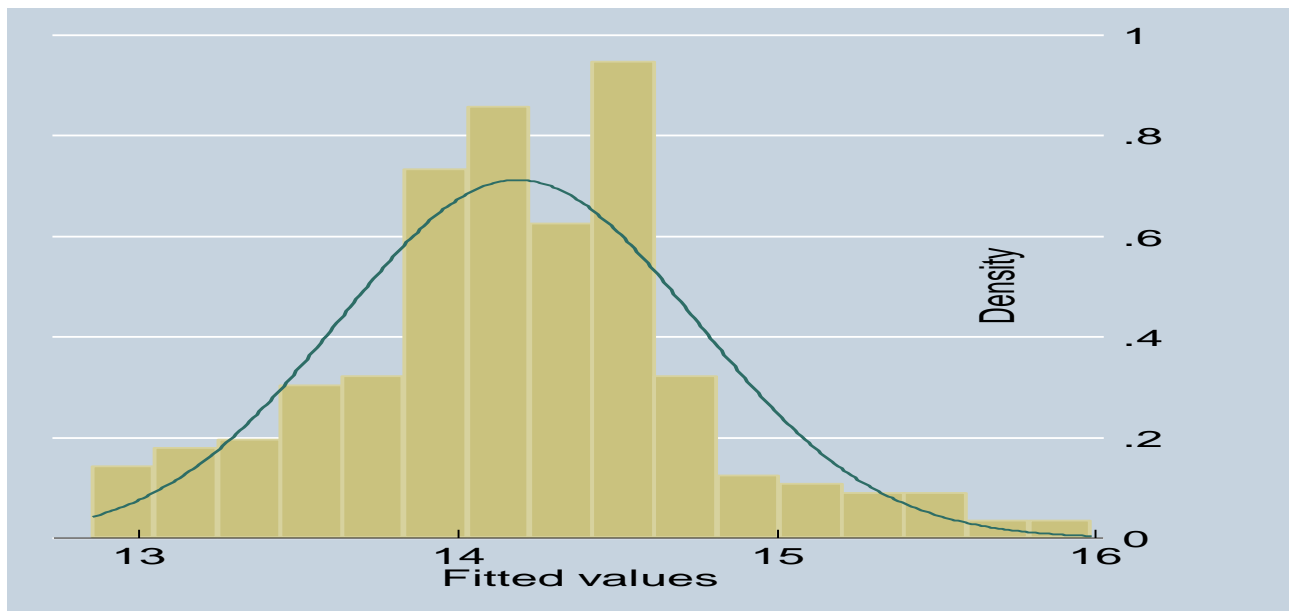


*B. Normality test of estimated price*
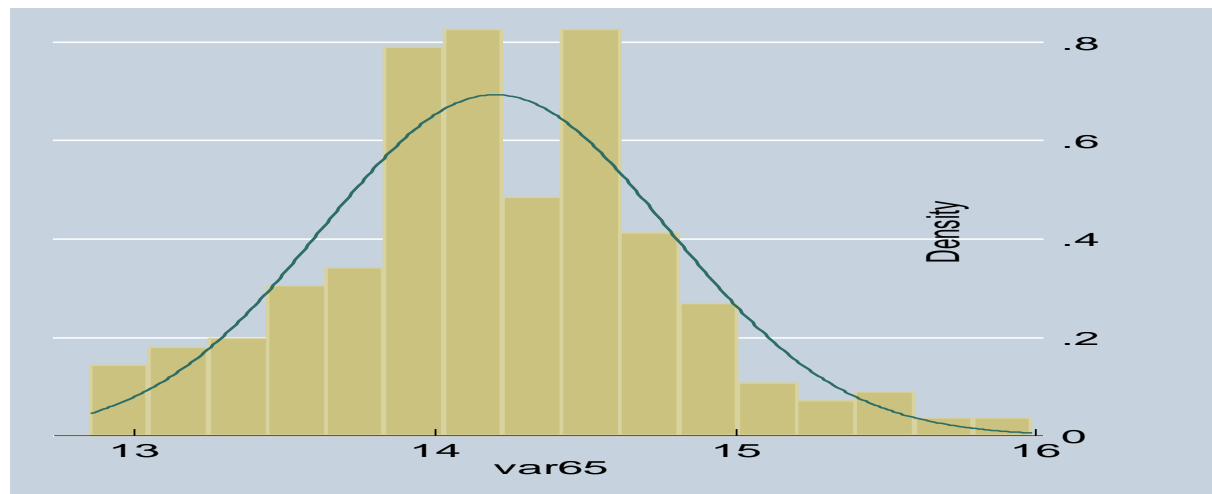
## Appendix -8- Correlation matrix of variables

| | l~sprice | l~mprice | l~dprice | lnPlot~e | Buildi~a | lnBuil~e | Tana | Ginbo~20 | mortar | Broker | WithSb~g | Gravel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| lnRRE_Sale~e | 1.0000 | | | | | | | | | | | |
| lnRRE_East~e | 0.7004 | 1.0000 | | | | | | | | | | |
| lnRRE_Agri~e | 0.6051 | 0.6547 | 1.0000 | | | | | | | | | |
| lnPlot_size | 0.7249 | 0.7583 | 0.5896 | 1.0000 | | | | | | | | |
| Building_a~a | 0.3760 | 0.4129 | 0.3823 | 0.4141 | 1.0000 | | | | | | | |
| lnBuilding~e | 0.4201 | 0.5430 | 0.5413 | 0.3681 | 0.4213 | 1.0000 | | | | | | |
| Tana | -0.0637 | 0.0266 | -0.0462 | -0.0646 | -0.1738 | -0.1646 | 1.0000 | | | | | |
| Ginbot_20 | 0.0299 | -0.0507 | 0.0282 | -0.0978 | 0.0737 | 0.0034 | -0.5006 | 1.0000 | | | | |
| mortar | -0.5073 | -0.4609 | -0.3816 | -0.6381 | -0.2461 | -0.1885 | 0.2112 | -0.0792 | 1.0000 | | | |
| Broker | 0.5017 | 0.6015 | 0.7080 | 0.5917 | 0.3050 | 0.4749 | -0.1084 | -0.1108 | -0.3997 | 1.0000 | | |
| WithSbsidi~g | 0.2533 | 0.3213 | 0.2555 | 0.3035 | -0.0116 | 0.1389 | 0.1016 | 0.0472 | -0.2334 | 0.1940 | 1.0000 | |
| Gravel | -0.0836 | -0.0862 | -0.1470 | -0.0766 | 0.0690 | -0.0506 | -0.0851 | 0.1364 | -0.0403 | -0.1084 | -0.0572 | 1.0000 |
| Cobblestone | 0.0937 | 0.0765 | 0.0543 | 0.1654 | 0.0670 | -0.0353 | -0.0210 | -0.1177 | -0.1113 | 0.1157 | 0.0423 | -0.3375 |
| Asphalt | 0.2691 | 0.2821 | 0.4109 | 0.2421 | 0.1350 | 0.2602 | -0.0329 | 0.1140 | -0.0791 | 0.1971 | 0.1228 | -0.3578 |
| Grade_2 | 0.0009 | 0.0677 | -0.1242 | 0.1011 | -0.0166 | -0.0602 | 0.0159 | 0.0353 | -0.0406 | 0.0622 | 0.0408 | 0.1889 |
| Grade_3 | -0.3530 | -0.4405 | -0.4076 | -0.4302 | -0.1692 | -0.2882 | -0.0412 | -0.1069 | 0.1729 | -0.3465 | -0.2439 | 0.2018 |
| Lease_prvt | -0.0166 | 0.0580 | -0.0388 | 0.0095 | -0.0112 | -0.0828 | 0.0645 | -0.1025 | -0.0116 | -0.0039 | -0.1075 | 0.0200 |
| Freehold | 0.2196 | 0.1919 | 0.2417 | 0.2797 | 0.1221 | 0.0868 | 0.1191 | -0.1960 | -0.1804 | 0.2228 | 0.0034 | 0.0491 |
| Good | 0.0780 | 0.0889 | 0.1018 | -0.0216 | 0.1573 | 0.3240 | -0.0063 | 0.0649 | 0.0704 | 0.0802 | -0.0125 | 0.0094 |
| Fair | -0.1137 | -0.0918 | -0.0857 | -0.0028 | -0.1741 | -0.2678 | 0.0558 | -0.0990 | -0.0546 | -0.0718 | 0.1075 | 0.1549 |
| Bad | 0.0572 | 0.0438 | 0.0117 | 0.0582 | -0.0051 | -0.0488 | -0.0903 | 0.1115 | -0.1180 | 0.0466 | -0.0928 | -0.1740 |
| Painted | -0.0080 | -0.1515 | -0.1146 | -0.0038 | -0.1348 | -0.3337 | -0.0172 | 0.0373 | -0.0559 | -0.1530 | -0.1381 | -0.0172 |
| Malleabl | -0.1088 | -0.0696 | 0.0275 | -0.2222 | 0.0359 | 0.2370 | 0.0513 | 0.0893 | 0.2293 | -0.0528 | 0.0499 | -0.0296 |
| Number_room | -0.0953 | -0.0200 | -0.0417 | -0.1912 | -0.1689 | -0.0166 | 0.3857 | -0.0713 | 0.4490 | -0.1246 | 0.0357 | -0.2294 |
| Road_width | -0.4286 | -0.3941 | -0.3346 | -0.5774 | -0.3235 | -0.2885 | 0.4241 | -0.2264 | 0.6651 | -0.3936 | -0.1945 | -0.0903 |

| | Cobble~e | Asphalt | Grade_2 | Grade_3 | Leas~rvt | Freehold | Good | Fair | Bad | Painted | Malleabl | Number~m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cobblestone | 1.0000 | | | | | | | | | | | |
| Asphalt | -0.3057 | 1.0000 | | | | | | | | | | |
| Grade_2 | 0.1895 | -0.4511 | 1.0000 | | | | | | | | | |
| Grade_3 | -0.1441 | -0.3517 | -0.5252 | 1.0000 | | | | | | | | |
| Lease_prvt | 0.0954 | -0.1026 | 0.0903 | -0.0218 | 1.0000 | | | | | | | |
| Freehold | -0.0524 | 0.3455 | -0.2187 | -0.1010 | -0.2970 | 1.0000 | | | | | | |
| Good | -0.0841 | 0.0722 | -0.0207 | -0.1187 | -0.0377 | 0.0422 | 1.0000 | | | | | |
| Fair | -0.0006 | -0.0867 | 0.0084 | 0.1171 | 0.0444 | -0.0284 | -0.6165 | 1.0000 | | | | |
| Bad | 0.1241 | -0.0110 | 0.0627 | -0.0418 | 0.0282 | -0.0924 | -0.3907 | -0.3103 | 1.0000 | | | |
| Painted | 0.0849 | -0.1004 | -0.0322 | 0.1482 | -0.0582 | 0.1151 | -0.2604 | 0.0287 | 0.2763 | 1.0000 | | |
| Malleabl | -0.1390 | 0.1221 | -0.0558 | -0.0415 | 0.0518 | -0.1598 | 0.2646 | -0.2194 | -0.0801 | -0.4304 | 1.0000 | |
| Number_room | -0.0827 | 0.0860 | 0.1118 | -0.1682 | -0.0143 | -0.1412 | 0.1498 | -0.1608 | -0.0162 | -0.1837 | 0.2829 | 1.0000 |
| Road_width | -0.1264 | -0.0578 | -0.1562 | 0.2791 | 0.0679 | -0.1536 | -0.0623 | 0.0739 | -0.1137 | -0.0928 | 0.1963 | 0.6090 |

## Appendix -9- OLS regression result

### A. OLS regression result for real transaction Price

| Source | SS | df | MS |
|---|---|---|---|
| Model | 65.7967621 | 21 | 3.13317915 |
| Residual | 41.5565718 | 264 | .157411257 |
| Total | 107.353334 | 285 | .376678364 |

Number of obs = 286
F( 21, 264) = 19.90
Prob > F = 0.0000
R-squared = 0.6129
Adj R-squared = 0.5821
Root MSE = .39675

| lnRRE_Salesprice | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Plot_size | .0032814 | .000372 | 8.82 | 0.000 | .0025489 | .0040138 |
| Building_area | .0001959 | .0007126 | 0.27 | 0.784 | -.0012073 | .0015991 |
| lnBuilding_Cprice | .1040295 | .0347721 | 2.99 | 0.003 | .0355635 | .1724955 |
| Tana | .0368802 | .0712899 | 0.52 | 0.605 | -.1034889 | .1772493 |
| Ginbot_20 | .1118289 | .0649072 | 1.72 | 0.086 | -.0159727 | .2396306 |
| mortar | -.3423264 | .0960524 | -3.56 | 0.000 | -.5314527 | -.1532 |
| With_Broker | .1575303 | .0764588 | 2.06 | 0.040 | .0069836 | .3080771 |
| WithSbsidiary_Building | .0416006 | .0610591 | 0.68 | 0.496 | -.0786242 | .1618254 |
| Gravel | .0462529 | .0752158 | 0.61 | 0.539 | -.1018464 | .1943521 |
| Cobblestone | .0424304 | .0785431 | 0.54 | 0.590 | -.1122203 | .197081 |
| Asphalt | .0448542 | .1223018 | 0.37 | 0.714 | -.195957 | .2856653 |
| Grade_2 | -.0364834 | .103761 | -0.35 | 0.725 | -.2407879 | .167821 |
| Grade_3 | -.027086 | .1202677 | -0.23 | 0.822 | -.2638921 | .20972 |
| Lease_prvt | .0978695 | .149375 | 0.66 | 0.513 | -.1962484 | .3919874 |
| Freehold | .0302867 | .0707722 | 0.43 | 0.669 | -.109063 | .1696364 |
| Good | -.0451982 | .0996622 | -0.45 | 0.651 | -.2414321 | .1510358 |
| Fair | -.1015811 | .1019672 | -1.00 | 0.320 | -.3023535 | .0991913 |
| Bad | -.0575775 | .1122115 | -0.51 | 0.608 | -.2785208 | .1633658 |
| Painted | .1965668 | .0990148 | 1.99 | 0.048 | .0016076 | .3915259 |
| Malleabl | .003808 | .0610597 | 0.06 | 0.950 | -.116418 | .124034 |
| Number_room | .0186444 | .0534264 | 0.35 | 0.727 | -.0865517 | .1238406 |
| _cons | 12.07496 | .4520479 | 26.71 | 0.000 | 11.18488 | 12.96504 |

### B. OLS regression result for estimated price

| Source | SS | df | MS | | | |
|---|---|---|---|---|---|---|
| Model | 80.613952 | 21 | 3.83875962 | | | |
| Residual | 34.1420469 | 264 | .129325935 | | | |
| Total | 114.755999 | 285 | .402652628 | | | |

Number of obs = 286
F( 21, 264) = 29.68
Prob > F = 0.0000
R-squared = 0.7025
Adj R-squared = 0.6788
Root MSE = .35962

| lnRRE_Eastimprice | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| lnPlot_size | .5415686 | .0580681 | 9.33 | 0.000 | .4272331 | .655904 |
| Building_area | .0009744 | .0006385 | 1.53 | 0.128 | -.0002828 | .0022317 |
| lnBuilding_Cprice | .2095015 | .0306168 | 6.84 | 0.000 | .1492172 | .2697857 |
| Tana | .1642632 | .0654506 | 2.51 | 0.013 | .0353917 | .2931347 |
| Ginbot_20 | .0900447 | .0596427 | 1.51 | 0.132 | -.0273911 | .2074806 |
| mortar | -.0962916 | .0977082 | -0.99 | 0.325 | -.288678 | .0960948 |
| WithSbsidiary_Building | .1230906 | .0561025 | 2.19 | 0.029 | .0126253 | .2335559 |
| Gravel | .0081424 | .0681911 | 0.12 | 0.905 | -.1261252 | .1424101 |
| Cobblestone | -.0217972 | .0713798 | -0.31 | 0.760 | -.1623434 | .1187491 |
| Asphalt | .0356876 | .111002 | 0.32 | 0.748 | -.1828744 | .2542495 |
| Grade_2 | -.0057035 | .0943176 | -0.06 | 0.952 | -.191414 | .1800069 |
| Grade_3 | -.0626077 | .1090018 | -0.57 | 0.566 | -.2772312 | .1520158 |
| Lease_prvt | .3376116 | .1360727 | 2.48 | 0.014 | .0696857 | .6055375 |
| Freehold | .0223308 | .0638013 | 0.35 | 0.727 | -.1032934 | .1479549 |
| Good | .0255495 | .0917986 | 0.28 | 0.781 | -.1552011 | .2063001 |
| Fair | .022461 | .092255 | 0.24 | 0.808 | -.1591882 | .2041101 |
| Bad | .0959374 | .1020631 | 0.94 | 0.348 | -.1050239 | .2968986 |
| Number_room | .0689285 | .0571407 | 1.21 | 0.229 | -.0435811 | .181438 |
| Road_width | .002755 | .0041753 | 0.66 | 0.510 | -.0054661 | .0109762 |
| painted | .1014422 | .0549584 | 1.85 | 0.066 | -.0067705 | .2096549 |
| malleabl | .0095019 | .089572 | 0.11 | 0.916 | -.1668646 | .1858683 |
| _cons | 7.409917 | .4708584 | 15.74 | 0.000 | 6.482801 | 8.337033 |