SOCIOECONOMIC AND ENVIRONMENTAL FACTORS AFFECTING HOUSE RENTS IN ISLAMABAD

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A Thesis submitted to the Department of Environmental Economics, Pakistan Institute of Development Economics Islamabad, in Partial Fulfillment of the Requirement for the Degree of Masters of Philosophy in Environmental Economics

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In the name of Allah, Most Gracious, Most Merciful

DEDICATION

This thesis is dedicated to my husband Shakeel Abbas, for his lovely wishes, continuous support, patience, understanding and guidance, to all my family members especially my parents and finally to my Sweet Heart Babies Romaisa Maryam & M. Baazil.

CERTIFICATE

This is to certify that, we have read this thesis and that in our opinion; it is fully adequate in scope and quality as a thesis for the Masters of Science (MS) in Environmental Economics, the thesis by Miss. **Saghira Kiran** is accepted in its present form by the Department of Environmental Economics Pakistan Institute of Development Economics Islamabad.

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DECLARATION

It is declared that this submission is my own work toward the Masters of Philosophy in Environmental Economics and that the best of my knowledge. It contain no material previously published by another person or nor material which has been accepted for the award of the any other degree of the university.

Saghira Kiran

10th February, 2016

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ABSTRACT

Socioeconomic and environmental factors play an important role in determining the housing prices. This study investigates both socioeconomic and environmental factors that influence the rental price of housing in Islamabad. The primary data were collected by using the questionnaires through survey conducted in urban areas of Islamabad. Random sampling technique was used to collect data from 380 respondents. The Hedonic Price Model was applied to estimate the impact socioeconomic and environmental factors on house rental prices. The empirical results shows that Building characteristics like total covered area, total number of bathrooms, proper sewerage system, security system, total number of TV lounge, availability of lawn and availability of school, college public transportation, park, play ground in the vicinity, gas, water and electricity facility in house, Presence of trees in the house, balcony, garage, number of bedrooms, distance to the nearest hospital are all significant variables and have positive impact on house rents. All the above variables have positive impact on house rents. On the other hand age of the building, distance to the industry, distance to work place and number of floors has negative impact on house rents in Islamabad. Furthermore, the locational characteristics of the houses attract the lessee and it has significant impact on the rental price of the houses. Therefore the government should build small parks, lakes, streets and make a best sewerage system as well as extend the environmental services.

CHAPTER 1

INTRODUCTION

1.1 Background and Statement of the Problem

Socioeconomic and environmental factors play an important role in determining the housing prices. Generally, factors that influence rental prices of houses are divided into two categories, internal and external. The external factors including economy, quality of services, transport, utilities, population, employment, location of houses, finance, immigration, air and water pollution, dust open drain, distance to work area and market (Can, 1990). The internal factors are area of house in square yards, bedrooms and size of house, age of houses, layout and design, magnitude of noise pollution, amenity or dis-amenity and crime rates in the neighborhood. In addition waste disposal arrangements, water and power supply, condition of environmental sanitation, school, shopping facilities, and access to good health facilities shape the price value of living in certain areas over the time.

Currently, Pakistan faces socioeconomic, economic and environmental problems, including acute the shortage of housing, ill managed land market, pollution control and inefficient land used system. However, the government institution and other non-governmental organizations are engaged into the analyzing these issues and prepare the policy framework for the handling these issues (Summer Husain 2011). Furthermore, housing sector is one of the important sectors which can not only contribute to national economy in term of GDP but it also provides shelter to households. However, Islamabad is a city where economically strong people live; also some middle class families and poor are also residing on rents.

The variation in house prices also affect the welfare of the households as it is the

major item of expenditures out of the total budget. Ultimately, this will impact the expenditures on health, education and other utilities. A Housing Survey conducted by the census department in collaboration with Federal Directorate of Education and local administration in April 2011, reported an increase of two million population of Islamabad. This increase of population spontaneously resulted in severe demands of housing. This demand for houses is met by 25% through *Katchi Abadis*, 60% through informal sub-divisions of land and 15% through densification of inner cities. Due to low incomes and growing prices of land and building supplies, most of the people are unable to afford standard housing in urban areas (Bajwa, nd).

This background provides justification to investigate the socio economic and environmental factors which have strong impact on the property value of the housing which is the focus of this study.

1.2 Description of the Study Site

Islamabad is the capital city of Pakistan; it is situated in the northwest of Pakistan, and has a population of more than 2 million. Islamabad is located to 14 km north east away from Rawalpindi on the Potohar Plateau. Its map reference is Northern latitudes 33o 49' and longitudes 72o 24' east of Greenwich. Its altitude is ranging from 457 to 610 meters. It comprises an area of 906.50 square kilometers, of which 220.15 sq. km is urban area while 466.20sq. Km is rural area while 220.15 is the area of parks (Government of Pakistan and USAID, 1993).

The city is also a base camp for tourists who wish to go to the north of the country for different adventures like trekking, hiking, and mountaineering. As the city is growing into major business and commerce center, so it is attracting a large number of highly skilled workers from different cities like Lahore, Karachi, and Quetta. Due to influx of expatriate from different places, the demand for houses is changing in Islamabad.

Many of the job holders live either in flats or small portions in suburban areas. It is now no more separated with industrial and other commercial deeds. Population of Islamabad has increased from 0.340 million to 1.124 million within 25 years depicting a total rise of 230 percent with an average annual growth of 6 percent. The increasing financial activities have provided opportunities to high rise buildings, residential apartments, housing projects, educational institutions, industries and markets. These developments forced CDA to change the master plan of Islamabad and upgrade the physical infrastructure (Government of Pakistan, 2008).

However, entire Islamabad capital territory is divided into five zones as specified, zone one, zone two, zone three, zone four and zone five. The zone one consist of eight sectors, including H-14, H-15, H-16, H-17, I-14, I15, I-16 and I-17. Its intersection with Shahrah-e-Kashmir to Nicholson Monument. the second zone consist of an area bounded by the GT road to the north and north of Shahrah-e-Kashmir and comprising the residential sectors G-15, G-16, G17, F-15, F-16, F-17, E-15, E-16, E-17, D-16, D-17, C-17 and B-17. The zone two consisted on thirteen sectors. The zone three included the Margalla Hills National Park and other protected ranges of forest area between the Margalla Hills and North of the Murree Road. The zone four included the Islamabad Park and the rural periphery between the Murree Road towards the North and the south. The zone five occupies the area of southern Islamabad and the south east of the city. (CDA,nd).

Table 1.1: Residential Sectors in Islamabad

Residential Sectors		No of Sectors	Name
I.	Developed	15	G-6, G-7, G-8, G-9, G-10, G-11, F-7, F-8, F-9, F-10, F-11, E-7, E-8 and I-8
II.	Planned	5	I-14, I-15, I-16 and G-13
III.	Being Planned	3	F-12, G-12, D-12 AND E-12
IV.	Developed Institutional Sector use	3	H-8, H-9 AND H-11
V.	Residential or industrial sector use	2	I-9 and I-10
VI.	Developed Sector for Wholesale Market	1	I-11
VII.	Developed sectors for Diplomatic Enclave	2	G-3 and G-4
VIII.	Developed sector for Administrative Building	1	F-4
IX.	Developed Public Building Sector	2	G-5 and F-5
X.	Cricket ongoing	1	F-9
XI.	Developed Sector of Blue Area	2	F-6, G-6, F-7 and G-7

Source: CDA Islamabad

Table 1.2 provides the information of the housing unit and population of sectors in Islamabad. Some sectors are specific to residential areas, some for educational institutes and business point of view. The table also shows G-7 and model village is the most congested sector in term of housing unit in different sectors of Islamabad. The average number of housing units are 42071 with the population 25752.8 (CDA, nd).

Table 1.2: Housing Unit and Population of Sectors

No	Sector	Land Use	Total Housing Units	Population Census 1998	Persons Per Housing Units
1	I-8	Residential	4614	18667	4
2	I-9	Industrial and Residential	2609	20810	7.9
3	I-10	Industrial and Residential	5916	42173	7.1
4	I-11	Wholesale Market and Residential	2340	9041	3.8
5	G-6	Residential	4877	36798	7.5
6	G-7	Residential	7113	55030	7.7
7	G-8	Residential	5506	31379	5.7
8	G-9	Residential	7088	50986	7.2
9	G-10	Residential	5180	33654	6.5
10	G-11	Residential	6637	10044	1.5
11	F-6	Residential	2035	16791	8.2
12	F-7	Residential	1228	11817	9.6
13	F-8	Residential	1397	10548	7.5
14	F-10	Residential	1565	12796	8.1
15	F-11	Residential	3373	17289	5.1
16	E-7	Residential	329	16696	5.1
17	Model.V	Residential	9713	58278	6
Total			**71520**	**437797**	
Average			**4207.1**	**25752.8**	**6.3**

Source: CDA Islamabad

1.3 Research Questions

This research answers the questions: How much the socioeconomic and environmental factors impact the house rents?

1.4 Objective of the Study

The present study aims to analyze and estimate the impact of socio economic and environmental factors on house rents in Islamabad.

1.5 Hypothesis of the Study

The hypothesis of the study is as follow

- Number of bedrooms, Gas, water, and electricity connection, sewerage system, public transportation, park, has positive impact on house rents
- Distance to industries, age of the building, Number of floor acquired, have negative impact on house rents

1.6 Plan of the study

In chapter one, introduction of the study covering background and statement of the problem, research questions, objectives and hypotheses are given.

In chapter 2, relevant literature is reviewed. Chapter 3 discusses the nature of data used and methodology applied for this study. Chapter 4 consists of data results and discussion while in chapter 5, the conclusion and recommendations based on findings of the study are given.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

A review of literature gives detail information about the problem and provides a better understanding to make the research objective and purposeful. Literature review is also important to identify the relevant research methodology and to identify correct analytical frame work for the study. The aim of this chapter is to present literature relevant to the issue under consideration.

2.2 Brief Overview of Most Relevant Literature

Kockelman (1997) studied the effects of location elements on home purchase prices and rents in San Francisco Bay Area using the hedonic price analysis. He found that travel costs and accessibility affect land values.

Bello (1998) used hedonic price model to demonstrate the significance of housing attributes in urban housing Helsinki Finland. He focused on the main housing elements like physical, location, and neighborhood characteristics.

Benson, Hansen, Schwartz Jr., and Smersh (1998) estimated the value of the view in a single-family dwelling property value market using hedonic price model. He focused on the Bellingham in Washington city with variety of amenities like oceans, lakes, mountains etc., The results suggested that houses constructed near the ocean view have comparatively higher prices as compared to similar one located far away from the area.

Romkaew (2000) showed the impact of established infrastructure and social and cultural services on property values in camber well. The results indicated that the presence of physical attributes of property and transportation are important attributes

in determining the prices of property. According to him locational factors are important for the determination of house prices.

Boyle and Kiel (2001) reviewed existing studies about house price hedonic technique that measures consumer's willingness to pay for environmental amenities or dis- amenities like water quality, air quality, and distance from toxic sites. They focused on constant results of different studies when prices change with time.

Hite, Chern, Hitzhusen, and Randall (2001) estimated the impact of landfill on the vicinity dwelling real estate prices using hedonic price model. For this he combined together the components of urban location choice and hedonic pricing model to measure the impact of the presence of numerous environmental bad on inhabited real estate values and found that closing landfills may not lessen impact of property values.

Batalhone, Nogueira, and Mueller (2002) estimated the social cost of air pollution by applying the hedonic price method (HPM). They measured the economic impact of a strong smell coming out from a sewage treatment plant, which was located in the north of Brasília, Brazil. This was found that a considerable decrease in property values was seen due to the presence of that environmental dis amenity.

Hwang (2003) investigated the impact of Scientifically Estimated Environmental Risks (SEERs) and other calamities along with locational and neighborhood amenities on the housing prices. The different variables were examined through analysis of variance and Hedonic price model.

Bourassa, Hoesli, and Sun (2005) estimated the values of three aesthetic externalities i.e. water view, nearby improvements, and the quality of landscaping in the surrounding by using hedonic models as well as a database of sales transactions for the three largest urban areas in New Zealand Auckland, Christchurch, and Wellington

from 1986 to 1996 and the results shows that prices of these externalities change with the real estate cycle.

Boris, Yakov, and Larissa (2005) estimated the factors that affect housing alterations and housing valuing in four residential vicinities in Haifa, Israel by using hedonic model. They found a strong relationship between environmental variables and property values in the vicinities.

(Reiff & Barbosa, 2005) studied the housing stocks in Brazil from the year 1970 to 1999. The estimated the relationship between rate of the payments of rented houses and the value of owned properties using hedonic price model. The data was obtained for the years 1970, 1980, and 1991 from the department of Demographic Census, and for the rest of the years from the National Household Survey (PNADs).

(Asante, Zwi, & Ho, 2006) used hedonic pricing model to examine the influence of housing attributes on housing values in the Kumasi Ghana, All the attributes like the number of rooms, floors, and property age; location of the property; availability of garage, fence wall and swimming pool; and land registration affect the property values in urban Ghana.

In another study Kaufman and Cloutier (2006) applied a hedonic pricing model to examine the effects of brown fields as well as green spaces on inhabited property values. The data for this study was obtained from sales and assessments for housing property in vicinity to the brown fields and the green spaces. They found that by turning brownfields into green spaces can raise property values from $2.40 to $7.01 million. The consequence of this specific examination is that nearby households may have a positive marginal willingness to pay for remediation and restoration of brown fields.

Sheppard, Oehler, and Benjamin (2006) estimated the impact of cultural amenities on property values using data from 11 Massachusetts cities and showed that the presence of cultural amenities can increase the demand for housing, and the value of cultural amenities would be reflected in house prices.

Gupta, Mythili, Hegde, and Patil (nd) estimated the effect of the environmental, structural and locational variables on housing prices in Northern Suburbs, Central Suburbs and Navi Mumbai. To this end they took information from 578 new house owners from July-November 2006. They applied hedonic price model and revealed preference approach.

Kiel (2006) used hedonic price model to find the individual's willing to pay for environmental goods by using the evidences from the houses and its sales prices.

Campbell Jr and Munroe (2007) showed the impact of greenways on land values and found that, the impact to land values will be captured within the planned greenway.

Irfan and Pant (2007) examined the effect of smell of open sewerage on house values in the city of Rawalpindi, Pakistan, using hedonic pricing model. They found that open drainage system decrease the willingness to pay for more rent even the interior of the house is good, but if the local authority closed or semi closed the open drainage system the willingness of the household to pay more rent will increase.

Selim (2008) analyzed the real estate property prices and housing market in Turkey by hedonic price model. He used 2004 family budget survey data. The most vital variables that affect house rents were sort of building, number of rooms, size, type of house and other somatic features like pool, natural gas connection and water system.

Marco (2008) focused on the vicinity of the New York City to get a better understanding of rented houses. He used cross sectional data of 59 districts obtained

from Furman center for Real estate. Result showed that rents were correlated with household incomes.

Bello and Bello (2008) used a double staged hedonic model in order to get peoples' willingness to pay for improved environmental facilities in two neighborhoods in Akure, Nigeria. The main variables included were household income, distance to the trash dumping sites, and regular electricity supply. These variables were found influencing factors for the willingness to pay for improved environmental facilities. Asabere and Huffman (2009) estimated the relative effects of trails and greenbelts on house values using hedonic framework. They used a database consisting of 10,000 transactions of houses from April 2001 to March 2002 from Texas. They found that trails, greenbelts were related with house values.

Komarova (2009) estimated the value of environmental impact of air pollution in Moscow with Hedonic Prices using housing property prices data of around 20 thousand apartments delivered by a top real estate agency working in Moscow. They took physical features of the environmental, houses, neighborhood socio demographic and geographic data.

Aroul (2009) estimated the connection between the property values and greenness. She found significant positive relationship between property values and greenness in Frisco adding premium.

Donovan and Butry (2011) estimated the impact of environmental amenities on rents in Portland, USA using hedonic model and found that an extra tree in the house increased WTP for monthly rent by $5.62, and a tree in the public place increased WTP for rent by $21.00.

Iqbal (2012) investigated people's willingness to pay extra for parks in Stockholm, Sweden using hedonic modeling followed by Geographic Information System (GIS).

Results show that parks with cultural features, features of national interest etc. increase apartment prices. However, if park had regular social events this tend to decrease property values.

Babawale, Koleoso, and Otegbulu (2012) applied hedonic model for Apartment Rentals in Ikeja Area of Lagos Metropolis in Nigeria. They found number of bedrooms, bathrooms, pipe-borne water availability, and overall condition of the property as the major influencing factors apartment rents.

Babalola, Umar, and Sulaiman (2013) examined the determinants of house prices in the university environment and applied hedonic price model. They found that tenement rate, age, number of houses built in the university and proximity to the university were the main factors determining the house rents.

Usrey (2013) showed the impact of single-family rental proximity on home sales price using GIS software using data collected from 2,766 homes sold from January 1, 2011 to July 1, 2012 in Fort Collins, Colorado. He applied hedonic price model and found that rental proximity affect home values.

Amenyah and Fletcher (2013) estimated the impact of location as well as different housing characteristics on the rents in Ghana. They found that location, number of bedrooms, availability of services and sharing of facilities affect housing rental prices.

2.3 Conclusion

The above literature clearly shows the impact of various socioeconomic and environmental factors which affect land/property values. House rents are sensitive to household income, locational variables, accessibility to work place to educational institutes, or center of the city or markets, rates of crime in the vicinity. Along with these factors physical factors also play vital role on rents that are age of the building, type of the building, size of the house, covered area, no. of rooms and bath rooms,

presence of balcony, garage and water storage tanks or government (piped)water supply and natural gas connections. Furthermore, infrastructural, social and cultural services of an area are also very important to determine the rents. According to the above literature most of the articles are on environmental amenities and dis amenities. They also impact rents as evident from the high willingness to pay for environmental goods. Amenities include value of view, water view, nearby improvements of quality of landscaping, green fields, greenways, trails and green belts, trees, parks, larger continuous view while dis amenities include distance from toxic sites, landfills, dumping sites, power plants, brown fields, open drainages, smell from sewerage systems, air contaminations, noise pollution near airports. Hedonic price model is used in most of these studies.

In Pakistan, one study which estimated the impact of open sewerage smell on house rents in Rawalpindi. However, aim of this thesis is to investigate the impact of various socio economic and environmental factors on house rents in some selected regions of Islamabad.

CHAPTER 3

DATA AND METHODOLOGY

3.1 Overview of Chapter

This chapter focuses on the theoretical background of the study, nature of data used, data collection, sampling design and econometric modeling. These are discussed in subsequent section.

3.2Theory of Hedonic Price Model

Since 1960 several studies used different approaches to determine the property value. The Hedonic price model is one of the well-established model which is for estimating the impact of various socioeconomic and environmental factors on property values. First, the term used by Andrew Court (1939) for the prediction of automobile prices**,** and popularized by Griliches in the early 60s. (Rosen, 1974) applied this term to the housing market for the first time. In his conceptual framework, housing market is divided into further sub-markets for different characteristics of housing. Initially the Hedonic price model was estimated by using multivariate statistical techniques, such a multiple regression analysis. Location characteristics of the buildings on property values were identified and measured by the help of the Hedonic Price Model (Portnov 2005. The monetary values of a house depends upon different characteristics such as age of the building, number of rooms, location etc. Many authors have utilized this method to construct house rent indices and to determine the variables responsible for property prices (Butter, 1982; Margo, 1996; Meese & Wallace, 1997; Kiel & Zabel, 2007). However, this approach makes it possible to differentiate changes in house prices from changes in property quality by providing quality-adjusted prices indexes, and to investigate the main factors that determines the value of properties within the

areas covered. The general form of the Hedonic price function can be written as following.

$$P(Z) = f(Z_1, Z_2, Z_3 \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots Z_n) \dots \dots \dots (3.1)$$

Where $P(Z)$ shows the price value of property and $Z = f(Z_1, Z_2, Z_3 \dots \dots \dots \dots Z_n)$ is the vectors of n characteristics which influence the prices of property, such as physical characteristics and location characteristics of the property. More generally the Hedonic price model is written in econometric form is as following

$$P(Z) = \alpha_0 + \sum_{t=1}^{n} a_i Z_i + \omega \dots \dots \dots \dots \dots \dots \dots \dots (3.2)$$

Where a_i shows regression coefficients and ω shows the error terms.

The present study is applies this model because this model serve the purpose of this study which is to analyze and estimate impact of socio economic and environmental factors on house rent in Islamabad.

3.3 Principle Determinants of Rental value of Houses

In the real property market, determining market value is one of the complex problem because each property has different attributes and characteristics including both physical and location characteristics.

3.3.1 Physical Characteristics

Physical characteristics of the houses are relates to the basic structure of houses. It is a man-mad structure including the size of houses, design of houses and construction components. All these characteristics determine the rental value of houses. The houses are constructed on the certain areas, where size of building may be small or big. However, the rent of the building depends on the size of building. It may contains more characteristics such as rooms, washrooms, kitchen T.V lounge (Karvel and Unger 1991). Another physical characteristic of the houses is the design of building. It

includes ideal design, layout of building and amenities. Existence of natural lighting and desirable view attract the houses.

On the other hand construction components are also main determinant of the rent of houses. It includes the quality of construction and existence of internal services such as the air condition, generator, security system, parking area and interior construction system (Fisher and Robert 1994). Physical structure in term of the age of building is also directly related to the physical characteristics of the building which increase both rental price and price of houses. If the building is depreciated due to aging as well as wear and tear, then it decreases the rental price of houses.

3.3.2 Location Characteristics

Location related to access to the working place, access to the other facilities such as play grounds, distance to the health care centers, distance to the schools, colleges and universities, access to transportation facilities, access to water, gas and electricity facilities etc. However, the physical access to all these facilities is an important factor which determines the rental price of houses. On the other hand locational characteristics include environmental factors including waste management, air pollution and environmental amenities. The rental price of property is heterogeneous in nature; so in this sense the Hedonic theory deal this issue in which variation of heterogeneous goods will be the focus of interest.

3.4 Nature of data used and sampling design

The data for this research was primary obtained through a survey conducted by the researcher herself through questionnaire (see appendix A). Questionnaire includes different questions on the house, the neighboring and environmental characteristics. The survey was carried out during the month of April and July 2014.

The study area comprised of urban areas of Islamabad namely Sector E, F, G & I and one rural area namely Bara Kahu. The reason for selecting these sectors from urban areas is that these are more populous areas and mostly the houses are on rents here. The selected study area is the center of the city. The reason to select Bara Kahu is that many of the job holders working in different places of Islamabad prefer to live here to have an affordable living.

Sample size was calculated through sample size calculator keeping the margin of error (confidence interval) and confidence level as 5% and 95% respectively. According to the Population Census (1998), the total number of houses in sector E, F, G and sector I and Bara Kahu were 3300, 11852, 34527, 15065 and 4137 respectively. The sample size from Sector E, F, G, I and Bara Kahu was 10, 70, 203, 90 and 8 respectively. Furthermore, from a cluster of rented houses, only one rented house was selected. Respondents were selected randomly and these were any knowledgeable person of the household. Data was obtained through questionnaires from 380 households.

Table3. 1: Sample Size and its allocation

Sector	Total number of Houses (Census 1998)	Number of Houses on Rent	Sample size
E (U*)	3300	1683	9
F(U)	11852	6045	70
G(U)	34527	17609	203
I(U)	15065	7683	90
Bara Kahu (R)	4137	662	8
Total			**380**

*U & R represents urban and rural area respectively.

3.5 Description of the variables

The choice of variables was based on both empirical and theoretical literature. The details of the variables used and constructed are given as under:

3.5.1 House Rent

In this study monthly gross rent of the house in local currency was consider as a dependent variable. It represents the amount of money people actually pay for a house having different attributes.

3.5.2 Structural/ Physical variables and personal information

i. Area/ Size of building

This variable represents the total covered area or living space in the provided building. This variable is taken in square meters. The sign of the coefficient of the area is expected to be positive.

ii. Number of Rooms / Bathrooms

The variable represents the number of living rooms, bedrooms, bath rooms and no. of T.V lounges in house. The number of rooms is also an important variable which influence the rental price of houses and its sign is expected to be positive.

iii. Age of Building

This variable represent the age of building (life of the building) taken in years. If the building is newly constructed and have many facilities then it cost high rent price. The sign of the coefficient of this variable is expected to be negative.

iv. Income level

The income represents the personal income of the household living in the rented house. If the income of a person living in rented house increase he would be able to afford to pay the high rent. So, its sign is expected to be positive.

v. Family members

The family members represent total number of individuals living in the house.

vi. Education level

Education level represents the household heads education. This variable represents the socioeconomic condition of household head and rental price of houses.

3.5.3 Facilities in the House

Variables like balcony, garage, government water, gas connection, electricity installed and average gas and E bills are all included in this category.

3.5.4 Neighborhood/ Accessibility Variables

It includes distance to school, college, market, nearest health facility the nearest transportation facility working place, distance to utility stores, it also includes the security system in the area.

3.5.5 Environmental variables

These variables are the environmental factors that impact the rents such as the view of area, waste management, Margalla view, proper sewerage system, distance to parks, distance to the playgrounds, distance to industry, distance dumping sites, presence of tree and lawn in the house and greenery in the house

Hedonic price model facilitate us to incorporate these variable while estimating the determinants of rents. Table 3.2 shows the construction of different variables that are used in the regression model.

3.6 Model Specification

The study estimates the impact of socio economic and environmental factors on house rents in Islamabad. To this end, the Hedonic price model is used. The Hedonic price model is used by many researcher in empirical studies to investigate relationship between property value and environmental factors (Kockelman (1997), Benson, Hansen, Schwartz Jr, and Smersh 1998, Romkaew 2000, Boris, Yakov, and Larissa

2005, Irfan and Pant (2007), Selim (2008), Asabere and Huffman 2009, Donovan and Butry (2011) and Fuhrer (2012). The present study is also using this approach.

The ordinary least square method is used. The econometric model is estimated in log-linear form as also proposed by Kockelman (1997), Ramkaew (2000), Hite (2001), Portnov (2005), Irfan (2005), Selim (2008). The specification of the econometric model is given as:

$$
\begin{aligned}
lnH\,.Rent_i = {} & \alpha_0 + \beta_1 H.INC_i + \beta_2 BLD.AGE_i + \beta_3 NO.BTH + \beta_4 NO.BRM_i \\
& + \beta_5 AVL.BL_i + \beta_6 NO.FLR_i + \beta_7 COV.ARE_i + \beta_8 DIS.WRK.PLC_{\,i} \\
& + \beta_9 AV.LOUN_i + \beta_{10} AVL.GAR_i + \beta_{11} AVL.GOVT.WTR \\
& + \beta_{12} AV.NGAS + \beta_{13} AV.ELE. + \beta_{14} AVL.LWN_i + \beta_{15} AVL.TREE_i \\
& + \beta_{16} AVL.SEW_i + \beta_{17} AV.SEC.SYS + \beta_{18} DIS.IND + \beta_{19} DIS.SCH_i \\
& + \beta_{20} DIS.COL_i + \beta_{21} DIS.Ply.G_i + \beta_{22} Park_i + \beta_{23} DIS.TRANS_i \\
& + \beta_{24} DIS.HOSP_i + \mu_i
\end{aligned}
$$

Table3. 2: Description of variable

Variable	**Units**	House Rent per month in PKR (Dependent Variable)
HH_INC	Thousand	Household monthly income in PKR
AGE_BLD	Years	Age of the building in years
BRM_HS	Count	bedrooms in the house
BTH_HS	Count	bathrooms in the house
BAL_HS	Dummy	Balcony =1if balcony is present , 0= otherwise
FLR_HS	Count	floors in house
COV_ ARE	Marlas.	Total covered area of house
DIS_WRK_PLC	Kms	Distance to work place in kms
LOU_ HS	Dummy	TV Lounge =1if lounge is present , 0= otherwise
GAR_HS	Dummy	garage =1if garage is present , 0= otherwise
WAT_HS	Dummy	water =1if govt water is available, 0= otherwise
NG_CON_HS	Dummy	gas connection =1if natural gas connection is present,0= otherwise
ELE_CON_HS	Dummy	Electricity =1if electricity connection is present,0= otherwise
DIS_ IND	Kms	Distance to industry
DIS_SCH	Kms	Distance to school
DIS_COL	Kms	Distance to college
DIS_HOS	Kms	Distance to the nearest health facility
DIS_TRNS_FAC	Kms	Distance to the nearest transportation facility
DIS_ PRK	Kms	Distance to park in Kms
LWN_HS	Dummy	lawn =1if lawn is present , 0= otherwise
SEC_ HS	Dummy	security system =1if security system is present , 0= otherwise
SEW_SYS_HS	Dummy	sewerage system =1if proper sewerage system is present , 0= otherwise
TRE_HS	Dummy	tree =1if tree is present in house , 0= otherwise
PLY_GRD_AVL	Dummy	playground =1if play ground is present, 0= otherwise

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1 Overview of Chapter

This chapter contains descriptive statistics and empirical estimation. The regression results of the Hedonic price model to estimate the empirical relationship between housing rent and socioeconomic and environmental variables are also reported in subsequent sections.

4.2 Descriptive Statistics of the sampled data

Table 4.1 shows the frequencies of sampled observations. Majority of the respondents (203) have been taken from sector G while only 8 respondents have been taken from Bara kaho.

Table 4.1: Frequency Distribution of households taken from different sectors

Sectors	Frequency	Percent
E	9	2.4
F	70	18.4
G	203	53.4
I	90	23.7
Bara kahu	8	2.1
Total	**380**	**100.0**

Source: Author's Calculation

Table 4.2 shows the descriptive statistics of quantitative variables, this table gives information on minimum maximum mean and standard deviation of all the quantitative variables in the model.

Table 4.2: Descriptive Statistics of Quantitative Variables

	Variables	Minimum	Maximum	Mean
1.	Education of Respondent	8.00	18.00	14.56
2.	Age of Household head	14.00	70.00	44.21
3.	Total No. of People in household			5.40
4.	Total NO. of Children going to school		9.00	2.38
5.	Total number of earning people	1.00	4.00	1.29
6.	Per month income of Household	10000.00	1700000	65000.16
7.	Per month expenditures of Household	15000.00	150000	121481.58
8.	Per month rent of Household	9000.00	200000.00	43508.42
9.	Age of building	1.00	36.00	16.67
10.	Total covered area in Marla	3.00	22.00	6.98
11.	Floors in the house	1.00	3.00	2.03
12.	Total room in the house	1.00	8.00	3.19
13.	Total number of bed rooms	1.00	6.00	2.47
14.	Total number of Bathrooms	1.00	6.00	2.41
15.	Total no. of TV lounge	.00	3.00	1.03
16.	Type of wash room wall material	1.00	4.00	1.36
17.	Type of floor material	2.00	5.00	3.96
18.	Type of roof material	4.00	5.00	4.99
19.	Distance to nearest school	.05	4.00	1.33
20.	distance to nearest college	.10	11.00	2.21
21.	Distance to the nearest market	.10	4.00	1.47
22.	Distance nearest public transport	.05	4.00	1.55
23.	Distance to the nearest highway	.2	5.0	1.88
24.	Distance to the nearest superstore	.05	4.00	1.42
25.	Distance to the nearest playground	.10	5.00	1.47
26.	Distance to the nearest hospital	.10	11.00	2.59
27.	Distance to the workplace	.30	35.00	6.65

Source: Author's Calculation

Table 4.3 shows the total number of households who reported the reason to live in their particular area in Islamabad. According to the table, 75 households used to live in their area due to clean environment of the area, 73 reported neighborhood. Eighty eight reported that they are living in their area due to good law and order conditions.

Table 4.3 Reasons of living in their area

Reasons of living in particular area	Total number of HH
Clean environment	75
Neighborhood	73
Law and order condition	88
Economical as compared to other areas	48
Near to work place	33
Facilities available in area	43
Other	20
Total	380

Source: Author's Calculation

Table 4.4 gives information of the occupation of the house hold head. According to the table private job holders are on top with 37.6% after that business men and job holders come with 34.2% and 25.3% respectively.

Table 4.4 Occupation of the HH heads

Occupations	Frequency	Percent
Government job	96	25.3
Private job	143	37.6
Business	130	34.2
Other	11	2.9
Total	380	100.0

Source: Author's Calculation

Table 4.5 gives a complete picture of the dummy variables and the facilities in the house and the no. of HH possess them or not by using option Yes or No. The table also gives information of percentage of variables that are possessed by the household.

Table 4.5 Descriptive statistics of the availability of services

Facilities available	Total	Yes	No	%age yes
Availability of Electricity	380	380	0	100%
Availability of separate electricity meter	380	295	83	78%
Availability of telephone connection	380	214	166	56%
Availability of cable connection	380	341	39	48%
Availability of internet connection	380	185	195	46%
Availability of govt. water	380	226	154	59%
Availability of gas connection	380	368	12	96%
Availability of separate gas meter	380	240	140	63%
Availability of proper sewerage system	380	272	108	72%
Availability of security system	380	300	80	78%
Availability of street lights outside the house	380	254	126	66%
Availability of night watchman	380	216	164	56%
Availability of lawn	380	165	215	43%
Availability of garage	380	332	47	87%
Availability of balcony	380	145	235	38.2%

The table shows the percentage of households who possess these facilities in the house, according to it availability of electricity is in 100% HH, separate Electric meter in 78% HH, cable internet and govt water are 48%, 46% and 59% respectively. Gas connection, separate gas meter and proper sewerage system are in 96%, 63% and 72% respectively. Likewise security system streetlights and night watchman are in 78%, 66% and 56%, lawn garage and balcony are in 43%, 87%, and 38.2% respectively.

4.3 Model Estimation

The regression results of the influencing factors of house rents are reported in Table 4.6. The results show that most of the variables are statistically significant. Income and house rents are positively related. One unit increase in income increases the house rent by 0.82%. Its coefficient is also statistically significant. The age of the building has negative relationship with house rents and its coefficient is also statistically significant. Similarly the houses with more bath rooms and bedrooms have higher rents and its coefficient is also statistically significant. Houses which have larger covered area have high rents; its coefficient is also statistically significant. Greater the distance to work place, less will be the house rents; if the work place is nearer the rents will be high.so the distance to work place has negative relationship with rents. Garage is a compulsory component of house, these days everyone go for a house with a garage for its vehicle so houses with a garage have high rents. It has a positive relation with house rents. Its coefficient is also statistically significant. Availability of balcony in a house especially on top floors increase the rent of house, TV lounge in the house has positive relation with rents a house with a TV lounge increase the rents.

Government water facility in a house increases the house rents its coefficient is also statistically significant. A house with Gas and electricity connection increases the rents, and are positively related with each other its coefficient is also statistically significant. Availability of Lawn in a house increases the rent of a specific house its coefficient is also statistically significant. Availability of trees in the house increases the rents of a house it has positive relation with rents. Availability of Proper Sewerage system in a house has positive relation with rents. Its coefficient is also statistically significant, Security system installed in a house increase the house rents, and thus it has positive relation with house rents. Its coefficient is also statistically significant. Distance to the nearest school increases the rents it has positive relation with rents. Its coefficient is also statistically significant. Distance to the nearest college has also positive impact on rents. Nearer the refreshment sites like parks have higher will be house rents, its coefficient is also statistically significant. Playground and public transport in vicinity have positive relation with rents. Availability of health facility near the house is positively related with rents. No of floor acquired and especially the high u go in a building the lesser will be the rent so it has negative relation with rents. Building characteristics like total covered area, total number of bathrooms, proper sewerage system, security system, total number of TV lounge, availability of lawn and availability of school, college public transportation, park, play ground in the vicinity, gas, water and electricity facility in house, Presence of trees in the house

balcony, garage, no. of bedrooms, distance to the nearest hospital are all significant variables and have positive impact on house rents. All the above variables have positive impact on house rents. On the other hand age of the building, distance to the industry, distance to work place and no. of floors has negative impact on house rents.

In addition in the second part of the table report the diagnostics of the model, including R square, adjusted R square and F-statistics. R square shows the coefficient of determination, and adjusted R square shows stability of parameters and F-statistics shows the model fit.

Table 4.6 Regression results of the determinants of house rents

Independent Variables	Coefficients	Robust Std. Errors	T-values
Intercept	3.265***	0.319	10.247
Per month income of Household	0.823**	0.151	5.442
Age of building	-0.002**	0.000	-5.437
No. of bathrooms	0.082**	0.021	3.838
Number of bedrooms	0.142**	0.043	3.273
Availability of balcony	0.045	0.192	0.236
Total covered area of plot	0.921***	0.093	9.877
No. of TV Lounge	0.081	0.088	0.925
Distance to work place	-0.058	0.812	-0.072
Availability of Garage	0.636**	0.094	6.751
Govt Water facility	0.923***	0.099	9.283
Gas facility	0.821***	0.089	9.242
Electricity facility	0.412**	0.059	6.991
Availability of Lawn	0.548**	0.082	6.674
Availability of Tree	0.008	0.346	0.023
Availability of Proper Sewerage system	0.825*	0.561	1.469
Security system available	0.199*	0.091	2.188
Distance to industry	0.009	0.812	0.011
Nearest School	0.023**	0.009	2.574
Nearest College	0.081	0.425	0.191
Nearest Play ground	0.085	0.081	1.041
Nearest Park	0.012**	0.004	2.942
Public transport facility	0.035	0.048	0.723
Health facility	0.046**	0.010	4.419
No. of floors	-0.023	0.022	-1.081
Diagnostics			
R-square	0.680		
Adjusted R-square	0.670		
F-Statistics	15.214		
Prob (F-Statistic)	0.000		

*, **, *** shows statistical significance at 1%, 5% and 10% level of significance

CHAPTER 5

SUMMARY AND CONCLUSION

5.1 Summary

This study aimed to analyze the impact of socioeconomic and environmental factor on rental price of houses in Islamabad. This study area covered different sectors of Islamabad including the E, F, G, I and Bara kahu. The field survey was conducted for the data collection. The data was obtained from the total 380 respondents by using the questionnaires.

This study contained five chapters; in the first chapter the study discussed the brief description of housing market and structure of houses in Islamabad. The second chapter consists of the determinants of rental prices such as location characteristics and physical characteristics were discussed. In third chapter, theoretical framework was developed for analyzing the relationship between rental prices and socioeconomic and environmental variables. In this chapter the hedonic price theory was discussed and justifies the variables which are frequently used in empirical studies. According to the Hedonic theory, houses are considered heterogeneous goods and have different dimensions. Every inhabited component have different package of characteristics containing environmental, structural and locational factors. In the fourth chapter the Hedonic price model was estimated for Islamabad. The Hedonic price model is estimated in log linear form using OLS method. The different economic and environmental factors were taken into account in the model estimation. The estimation result showed that the variables such as Building characteristics like total

covered area, total number of bathrooms, proper sewerage system, security system, total number of TV lounge, availability of lawn and availability of school, college public transportation, park, play ground in the vicinity, gas, water and electricity facility in house, Presence of trees in the house, balcony, garage, no. of bedrooms, , distance to the nearest hospital are all significant variables and have positive impact on house rents. All the above variables have positive impact on house rents. On the other hand age of the building, distance to the industry, distance to work place and no. of floors has negative impact on house rents in Islamabad. In addition in the second part of the table report the diagnostics of the model, including R square, adjusted R square and F-statistics. R square shows the coefficient of determination, and adjusted R square shows stability of parameters and F-statistics shows the model fit. The regression results of the influencing factors of house rents are reported in Table 4.6. The results show that most of the variables are statistically significant. Income and house rents are positively related. One unit increase in income increases the house rent by 0.82%. Its coefficient is also statistically significant. The age of the building has negative relationship with house rents and its coefficient is also statistically significant. Similarly the houses with more bath rooms and bedrooms have higher rents and its coefficient is also statistically significant. Houses which have larger covered area have high rents; its coefficient is also statistically significant. Greater the distance to work place, less will be the house rents; if the work place is nearer the

rents will be high.so the distance to work place has negative relationship with rents. Garage is a compulsory component of house, these days everyone go for a house with a garage for its vehicle so houses with a garage have high rents. It has a positive relation with house rents. Its coefficient is also statistically significant. Availability of balcony in a house especially on top floors increase the rent of house, TV lounge in the house has positive relation with rents a house with a TV lounge increase the rents. Government water facility in a house increases the house rents its coefficient is also statistically significant. A house with Gas and electricity connection increases the rents, and are positively related with each other its coefficient is also statistically significant. Availability of Lawn in a house increases the rent of a specific house its coefficient is also statistically significant. Availability of trees in the house increases the rents of a house it has positive relation with rents. Availability of Proper Sewerage system in a house has positive relation with rents. Its coefficient is also statistically significant, Security system installed in a house increase the house rents, and thus it has positive relation with house rents. Its coefficient is also statistically significant. Distance to the nearest school increases the rents it has positive relation with rents. Its coefficient is also statistically significant. Distance to the nearest college has also positive impact on rents. Nearer the refreshment sites like parks have higher will be house rents, its coefficient is also statistically significant. Playground and public transport in vicinity have positive relation with rents. Availability of health facility

near the house is positively related with rents. No of floor acquired and especially the high u go in a building the lesser will be the rent so it has negative relation with rents.

5.2 Recommendations

The study may have a number of practical applications.

- From the environmental point of view locational characteristics of the houses attract the lessee and it has significant impact on the rental price of the houses. Therefore the government should build the small parks, lakes, streets and make a best sewerage system as well as extend the environmental services.
- Water, Gas, Electricity is the most significant variables that impact house rents therefore the owner of the houses should focus on these basic needs.

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Appendix A

QUESTIONNAIRE

I. General Information:

a. Name of the household head?
_____

b. Name of the respondent?
_____

c. Location of the area?
_____

d. Why are you living in this particular house? -
_____

e. Why are you living in this particular area?
_____

f. What is the education of the respondent in years?	g. What is the age of the respondent in years?	h. Total # of people in the HH?	i. Total # of school going children in HH?	j. Total # of people earning in the HH?	k. Per month income of the HH?	l. per month expenditures of the HH?	m. Monthly rent you pay for this house? (PKR)	n. Occupation of the head of the HH?

II. House Interior Information:

a. Age of the building in years?	b .Total Covered area? (sq. foot)	c. # of floors in the House?	d. Total # of rooms	e. # of bedrooms	f. # of bathrooms	g. # of cupboards	h. # of TV lounge

i. What is the type of washroom wall material?

Tiles	Marble	Cement	chips	Other

j. What is the floor material of the house?

Earth / Mud	Cement	Chips	Marble tiles	Other

k. What is the type of roof material?

Straw	Mud	Wood	Girder T-Iron	Concrete

III. Utility Services:

Do the following facilities are available in your house?

Sr. No	Facility Name	Yes	No
a.	Electricity		
b.	Separate meter of electricity		
c.	Telephone connection		
d.	Cable TV connection		
e.	Internet		
f.	Govt. Water		
g.	Self-bored water		
h.	Gas connection		
i.	Separate gas meter		
j.	Proper sewerage system		
k.	Security system		
l.	Street lights near you house		
m.	Night watchman		

n.	Approximate Electricity bill PKR/ month	
o.	alternate use of electricity	
p.	Approximate gas bill PKR/ month	
q.	alternate use of gas	

IV. About house items:

	Yes	No
a. Does the house have any store room?		
b. Does the house have any laundry?		
c. Is there any lawn in the house?		
d. Is there any garage in the house?		
e. Is there any pool in the house?		
f. Is there any balcony in the house?		

V. Environmental Amenities:

a. Is there any refreshment site near your house?	Yes	No
If yes, what is the distance to the site in km?		
What type of refreshment site is it? specify		
b. Is there any landfill/ dumping site near your house?	Yes	No
If yes, what is the distance to the site in km?		
c. Is there greenery outside your house?	Yes	No
d. Does your house have Margalla hill view?	Yes	No
e. Is there any good view near your house?	Yes	No
f. Is there any lake view in front of your house?	Yes	No
g. Is there any open nali in front of your house?	Yes	No
h. Is there any hygiene problem near your house	Yes	No

If yes, what type of problem are you facing?	• Flies • Mosquitoes • Insects • Cockroaches • Lizards • others	Yes	No
i. Is there any polluting industry near your house?	Yes	No	
If yes, what is the distance to the site in km?			

VI. Neighborhood:

a. Distance to main high way (km)	b. Distance to utility Store (km)	c. Distance to the play ground (km)	d. Distance to the public park (km)	e. Distance to the *secondary hospital (km)	f. Distance to work place (km)	g. Distance to school (km)	h. Distance to college (km)	i. Distance to the market (km)	j. Distance to the mosque (km)	k. Distance to the transportation (km)

* Primary Care: The Community Health System: This system is the main primary care provider
Secondary care: is the health care services provided by medical specialists and other health professionals.

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