

ANALYZING MACROECONOMIC FACTORS
THAT AFFECT HOUSING PRICE IN
PAKISTAN



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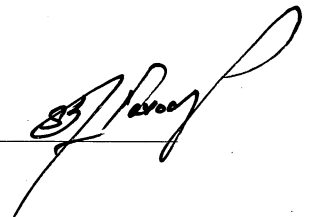
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At any time if my statement is found to be incorrect even after my Graduation the university has the right to withdraw my M.Phil degree.

Date: _____

Signature of Student

Yasir Ali

DEDICATION

*This dissertation is dedicated to my Parents for their endless love,
support, encouragement and prayers*

ACKNOWLEDGEMENTS

All praises to ALLAH, the compassionate, the omnipotent, whose blessing and exaltation flourished my thoughts and thrive my ambitions, provided me a rich environment of learning and cooperative teachers, helping friends and honored me among those who contribute to the sacred wealth of humanity. From the formative stage of this thesis to the final draft, I owe an immense debt of gratitude to my supervisor Dr. Attiya Yasmin Javid and co-supervisor Dr. Ahmed Faraz for their sound advices and careful guidance through the process. I can never repay you for all the help you have provided me and the precious time you spent making sure my thesis is always on track. I would also like to thank all of my teachers especially Dr. Hafsa Hina, Dr. Abdul Rashid, Dr. Farhat Mahmood, Dr. Ayaz Ahmed for their utmost guidance. I am deeply thankful to my immediate boss Mr. Iqbal Hassan Siddiqui for his constant support throughout M.Phil, and Cristina Harney for proofreading the dissertation. Last but not least I am extremely thankful for my siblings, and dear friends for their prayers and encouragement.

Thank you so much!

Yasir Ali

ABSTRACT

The prime aim of this research dissertation is to analyze the macroeconomic factors of housing price in Pakistan. At the outset phase, the study undertakes a detailed descriptive analysis of the housing sector of Pakistan and identifies that rapid population growth, unplanned urbanization, non-availability of mortgage financing, escalating cost of land and construction, prevailing plot culture and absence of viable housing policy are the key factors that causes a high volume of housing deficit in Pakistan. In the second phase, study empirically examines the impact of macroeconomic factors such as gross domestic product (GDP), inflation rate (CPI), population growth rate (POP), interest rate (DR), exchange rate (ER) ,and remittances (REM) on housing price (HPI). This study uses Quarterly data from Q1 2011 to Q4 2020, and an estimation technique of the Autoregressive Distributed Lag Model (ARDL). The findings of the study show that there is long run relationship between housing price (HPI) and gross domestic product (GDP), inflation rate (CPI), population growth rate (POP), interest rate (DR), exchange rate (ER) ,and remittances (REM). Furthermore, gross domestic product (GDP), inflation rate (CPI), and population growth rate (POP) has positive and statistically significant effect on housing price while interest rate (DR) has inversely connection with housing price in the long run. The general finding of this paper suggests that housing price (HPI) in Pakistan is affected by macroeconomic factors. The research study is useful for land developers, builders, real estate agents, speculators and potential buyers to know which factors to account while making housing investment decisions. In addition, the finding of this study is also useful for the government to formulate polices to stabilize the housing price, and make sure the provision of affordable housing to lower and middle income people.

Keywords: Pakistan, Housing price, Macroeconomic factors, Co-integration, ARDL, ECM

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LIST OF ABBREVIATIONS AND ACRONYMS

ARDL	Autoregressive Distributed Lag Model
DR	Discount Rate
GDP	Gross Domestic Product
HPI	Housing Price Index
IFS	International Financial Statistics
PBS	Pakistan Bureau of Statistics
PSLM	Pakistan Social and Living Standards Measurement Survey
SBP	State Bank of Pakistan
WDI	World Development Indicator

CHAPTER 1

INTRODUCITON

1.1. Background

In the development of society, land plays a crucial role. A reasonable amount of housing is essential for human survival with dignity and without it; many other basic human rights will be comprised. People are more likely to participate in their communities on a social, economic, and political level if they have access to adequate housing. Since a house is a durable asset, in that its price will increase every year, many considerations must be taken by the buyer before purchasing a house, with regards to price, location accessibility, facilities, and many more. However, house prices and affordability issues have become a serious problem among buyers in Pakistan.

Pakistan's total housing shortage is estimated about 10.3 million units, which is evident of grossly inadequate housing supply. It is projected that the urban housing shortfall is around 3.4 million units, while the rural housing deficit is more than 7 million units. In addition, the projected gap of 350,000 units is increasing each year, and the incremental deficit is expected to raise 400,000 units per year in the near future (Iqbal, 2020; Khalil & Nadeem, 2019)

The formal housing sector already remains unaffordable for a majority of the population of Pakistan. On average, 1% of the housing units are developed annually to meet the demand of 68% of the total population in Pakistan, which includes people who earn a maximum of Rs 30,000 per month. Additionally, 56% of the housing units target 12% of the total population with Rs 100,000 monthly income or above (Hasan & Arif, 2018; Shaikh, 2019).

Basically, there are three main factors that contribute to the country's housing crisis. The first factor that contributes to the housing crisis in Pakistan is demographic and social; the country has a fast-growing population that is continuously urbanizing. The supply of new housing stocks is unable to meet the demand of the growing population, especially in urban areas. The second factor is the increasing prices of land and construction, since land is a major store of value, land prices in Pakistan increase more than the rate of income. Similarly, in recent years the construction costs have been increasing dramatically.

In Pakistan, housing prices increased by 134 percent from 2013 to 2018. Furthermore, prices of urban plots increased by 151 percent in the same period (zameen.com). Rent rates in Pakistan have also skyrocketed. Over the last five years, rent prices in residential areas have increased by 180 percent. The figure 1.1 represents the house and plot prices per square feet of Pakistan from 2011 to 2020. There is a consistent increase in both plot and house prices for last 10 years.

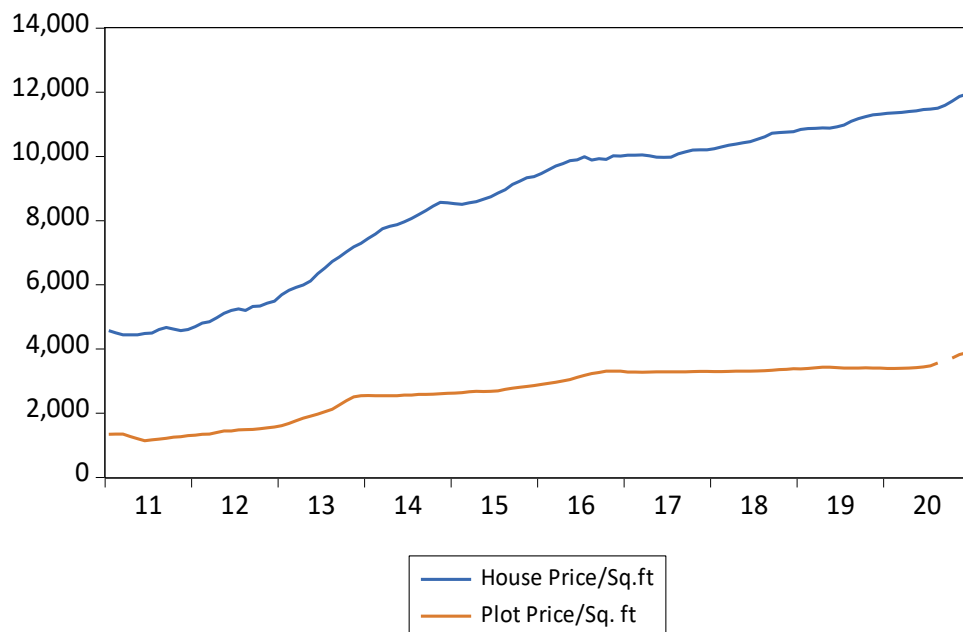


Figure 1.1 (House & Plot Prices in Pakistan)

(Source: Zameen.com)

If we look at the per capita income it has hardly increased to double digits at 20 percent in the same period. This problem is particularly acute in Pakistan, where house prices to income ratios remain much higher than in developed and similarly situated countries. The United States has a house price to income ratio of (4.18), Egypt has a ratio of (14.11), India has a ratio of (14.06), and Pakistan has a ratio of (20) (Towergate Insurance).

The third and most important factor is the non-availability of housing finance, especially for buyers and developers. Pakistan has a mortgage to GDP ratio of 0.27% which is far below the South Asian average of 3.4% (World Bank, 2018). Furthermore, the role of House Building Finance Corporation (HBFC) is not much appreciated. Homeownership is becoming increasingly unaffordable and inaccessible across the country due to a lack of accessible and affordable housing finance.

1.2. Motivation of the Study: Housing in Pakistan

For the past many years, Pakistan has been facing housing issues both in quantity, and affordability terms. This issue is more acute in urban areas. According to the World Bank estimates approximately 47% of households in the urban area live in informal settlements/slums with the least access to basic civic infrastructures and sanitary facilities. The expanding informal settlements in cities are squeezing the public health and long-term social capital costs of nearly half of the urban population.

A review of the literature shows that majority of the studies regarding macroeconomic factors and housing price has been done in the developed countries. In this regard, literature in developing countries is very scarce. The aim of this

research analysis is to study the macroeconomic factors which are affecting housing prices in Pakistan. We have selected to study this topic for the following reasons.

Firstly, there is a constantly growing housing gap in Pakistan. The current housing stock is insufficient to meet the needs of the entire country. The existing housing stock is estimated to be around 23.8 million units, while housing demand is about 34.1 million units (PBS Census, 2017; PSLM, 2018-19). It implies that Pakistan currently has a 10.3 million-unit housing deficit.

Secondly, the real estate/housing sector has a direct link with the commercial growth of the cities. In Pakistan, more than 5.2bn US dollars per year is spent in the housing/construction sector. Besides this, billions are spent on buying residential and commercial plots. Construction output contributes 2.5 percent of GDP with a 1% share of the housing sector (PBS; 2018). Furthermore, 40 plus small and large manufacturing industries directly link with the housing/construction sector with the second-highest employment sector after agriculture.

Thirdly, the real estate/housing sector has been the best investment hub for local and overseas Pakistanis for the past couple of decades due to the safe nature of the investment and consistent price appreciation of the assets. According to a recent analysis, the top four most popular investments for Pakistanis are related to housing and land (Tirmizi, 2020).

Fourthly, as there is almost negligible work on this topic in Pakistan so the current study may lead to provide a basis for further research. Furthermore, to understand the incremental pattern of housing prices in Pakistan, the analysis of key macroeconomic factors of both fiscal and monetary policy help investors and policymakers to form a more informed decision.

1.3. Problem Statement

With a growing population and rapid urbanization, access to affordable housing has become a serious concern for lower and middle-income classes in Pakistan. Pakistan housing crisis is multiple and varied in nature, the supply of housing has been squeezed by a variety of structural issues and other limitations. The formal housing sector already remains unaffordable for the majority of the population segment. The demand and supply gap reinforces the people to live in slums and informal settlements with low quality/ substandard housing facilities. The housing shortage in Pakistan is the function of both quantity and affordability.

With the growing unaffordability of housing due to an increase in the housing prices in Pakistan and deterring economic condition, it is of relevance to investigate the current housing market of Pakistan and to conceive our own opinions on the heating housing market.

In this context, the study aims to focus on major macroeconomic variables and the housing sector of Pakistan. The link between housing prices and major macroeconomic variables will provide useful insights along with vital information regarding the impact of those variables on housing prices to policymakers, developers, property agents, and potential buyers for a more informed decision.

1.4. Objective of the Thesis

The primary objective of this dissertation is to study the macroeconomic factors that affect housing prices sector of Pakistan. At the outset phase, the study undertakes a detailed descriptive analysis of the housing sector of Pakistan and identifies factors that cause a high volume of housing deficit in Pakistan. In the second phase, this study analyzes the macroeconomic factors of housing price in Pakistan.

1.5. Research Question

To achieve the required objective, this study addresses the underneath research questions.

- What are the factors the causes high volume of housing deficit in Pakistan?
- What are the long run macroeconomic determinants of housing price in Pakistan?

1.6. Scope of the Study

The study aims to focus on major macroeconomics variables and Pakistani housing market. The link between Housing prices and major macroeconomics variables will provide useful insights and perspectives along with vital information regarding the major macroeconomic variables in explaining housing price in Pakistan to the policymaker, land developer, builders, portfolio managers, property agents and potential buyers for more informed decision making.

1.7. Significance of the Study

Previous studies mainly focus on the microeconomic attributes of housing demand in Pakistan and use the traditional approach of income and utility to determine the housing price. The current study intends to highlight the macroeconomic factors that impact housing prices in Pakistan by using the time series data. This study adds to the literature in a number of ways. Firstly, the study identifies all the potential factors that are causes of a housing crisis in Pakistan. Secondly, the findings of the study will help policymakers, land developers, property agents, and potential buyers for more informed decision making. Thirdly, this study will provide a useful policy recommendation to improve the housing conditions in Pakistan.

1.8. Organization of the Thesis

After the introduction chapter, the dissertation is organized as follows: Chapter 2nd sheds light on the housing sector of Pakistan, and discusses the impact of urbanization on housing demand and prices in urban areas of Pakistan. In chapter 3rd a detailed literature review related to the topic will be discussed. The chapter 4th discusses the research methodology of the study, chapter 5th results discussion, and chapter 6th concludes the study with recommendations.

CHAPTER 2

STYLIZED FACTS ABOUT HOUSING IN PAKISTAN

2.1. Introduction

Pakistan has become the world's sixth most populated developing country as a result of its increasing population (PBS Census, 2017). The housing situation in Pakistan has remained under immense pressure due to high population growth, rapid urbanization, increasing per capita income, escalating cost, industrialization and economic development. These factors created a huge housing shortage in the country, particularly in big cities (Karachi, Islamabad, Lahore, Peshawar, Rawalpindi, and Faisalabad). Pakistan's population was approximately 32.5 million at the time of independence since then it has increased to 207 million with a 2.4 percent growth rate (PBS Census, 2017). This growth accelerated the process of urbanization. According to the most recent census, conducted in 2017, the population of Pakistan's ten biggest cities has risen by 74.8 percent since the 1998 census. The urban population is on the rise, accounting for 36.38 percent of the overall population. Pakistan has the highest rate of urbanization in South Asia. With this growing pace, more than half of the population is expected to live in cities by 2030 (Jabeen et al., 2017).

Migration from rural to urban areas plays a critical part in the process of urbanization. The growing population coupled with this migration increases the city's density resulting in a large urban agglomeration. Due to this not only demand for new housing units increased, but it also exerted pressure on existing stock of housing. Pakistan has a national housing deficit of about 10.3 million units with an annual deficit between 3.5 to 4 million units every year (Iqbal, 2020; Khalil & Nadeem, 2019). Furthermore, in the near future, this incremental gap is likely to increase to 400,000 units per annum.

The objective of this chapter is to study the stylized facts of housing sector in Pakistan. This chapter details reviews of the housing sector in Pakistan and highlighted the key factors that causes the housing deficit in Pakistan. Moreover, this chapter will also discuss the role urbanization in growing housing demand/ prices in urban areas.

The rest of the chapter will be discussed in the following manners: Section 2.2 sheds light on the housing market in Pakistan. This section discusses the importance of housing sector, available housing stock and deficit both in total and province wise. Section 2.3 highlighted the factors that contributed in the housing crisis in Pakistan and Section 2.4 discusses the urbanization and it impact on housing demand/ prices. In the last section 2.5 review of National Housing Policy 2001 and conclude the chapter.

2.2. The Housing Sector in Pakistan

The real estate/ housing sector constitutes housing, apartments, retail construction, hoteling, and the rental of premises for official or commercial purposes and has emerged as the most important sector in the economic growth of Pakistan. In the construction process of the Pakistan gross domestic product (GDP), the construction sector is part of the industrial sector while housing is part of the service sector. The top four most popular investments for Pakistanis are related to housing and land. The 2.1 figure shows the total assets in the real estate/ housing sector are worth over 1.2 USD trillion, which is more than 4 times the total size of the Pakistan economy.

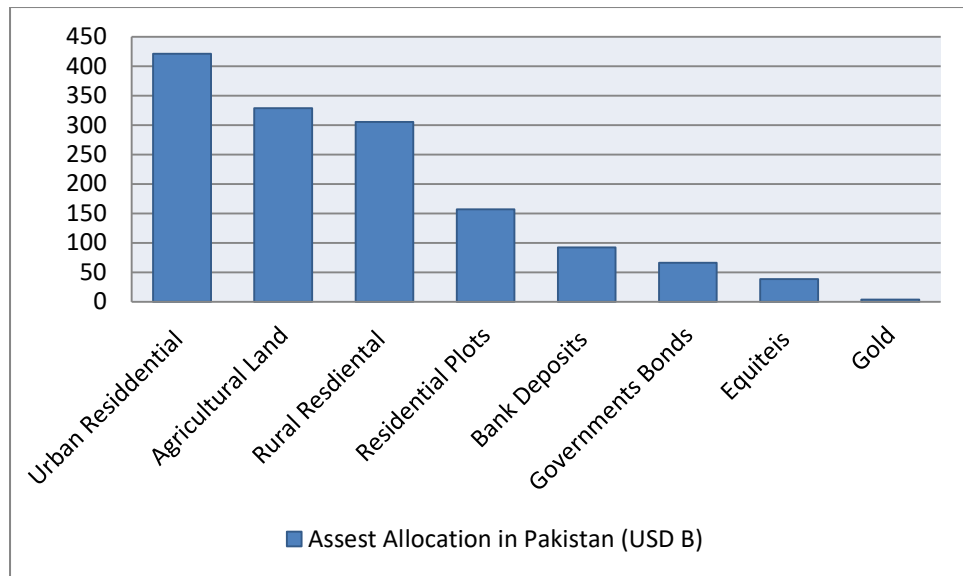


Figure 2.1 (Source: PBS, SBP, PSX, Mutual Fund, and Zameen.com)

The real estate/ housing sector has a direct link with the commercial growth of the cities. In Pakistan, more than 5.2bn US dollars per year is spent in the housing/construction sector. Besides this, billions are spent on buying residential and commercial plots (Umar et al., 2019). The Statistics depicted that, both the housing and construction sector contributed 7.4% to Pakistan's GDP (PBS; 2018). Furthermore, if we added allied sectors (e.g. cement, steel, electrical appliances, wooden) the contribution is higher than 10% to 12%. If we analyze the growth of both sectors, the housing sector has been growing at over 10% and the construction sector 8% each year since 2015. However, if you consider real growth, both sectors have, on average grown by 4% annually (PBS; 2018). In addition, 40 plus small and large manufacturing industries directly linked with the housing/construction sector are the second-highest employment sectors after agriculture.

Investment in the housing sector through the construction of new dwelling units is a viable macroeconomic tool for the midterm. The estimates indicate that an increase of 100,000 housing units in Karachi city in a year contributes 2.2% to the overall GDP of national output (Aslam & Sattar, 2018). Moreover, increasing housing

construction activities drive growth across the economy, including 40 plus connected industries, such as the cement industry, steel and iron industry, electronics, and wood products.

According to different sources, currently Pakistan has a national backlog of housing about 10.3 million units, with an annual deficit of 350,000 units (Ahmed et al., 2020; Hasan & Arif, 2018; Jabeen et al., 2015). Moreover, in near future, this incremental shortfall is expected to increase to 400,000 units per annum. The urban housing deficit is expected to be approximately 3.4 million units, whereas the rural housing need is more than 7 million (Figure 2.2).

According to the provincial statistics in (figure 2.3), the housing deficit in Punjab is projected to be about 5.5 million units, followed by Sindh (3.1 million), Khyber Pakhtunkhwa (1.3 million), and Balochistan (0.5 million). Sindh has the greatest deficit (57 percent of existing housing stock), followed by Balochistan (42 percent), Punjab (40 percent), and Khyber Pakhtunkhwa (37 percent).

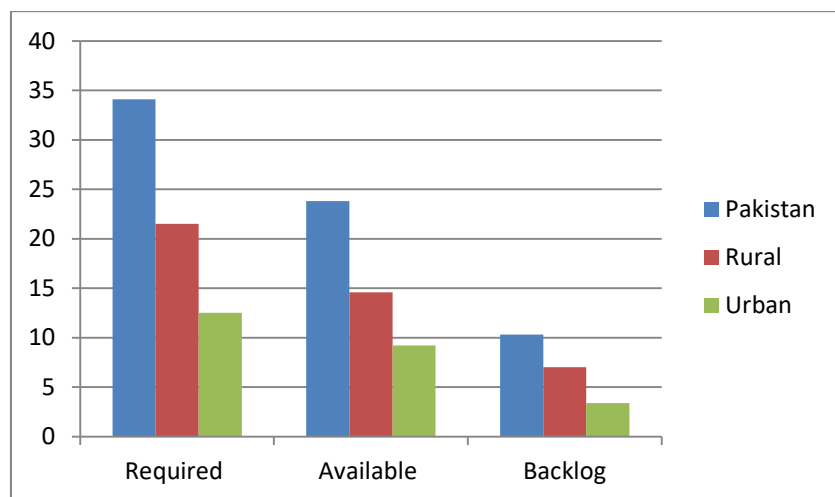


Figure 2.2 (Pakistan Housing needs (Million))
(Source: Estimate based on PSLM and Census 2017)

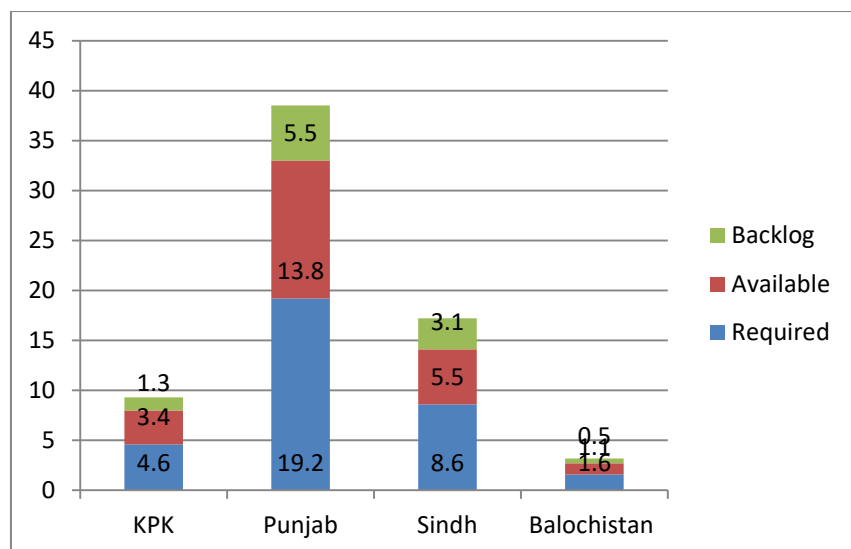


Figure 2.3 (Province Wise Housing needs of Pakistan (Million))
(Source: Estimate based on PSLM and Census 2017)

TABLE 2.1
Province wise housing needs (million)

Province	Required	Available	Backlog
Punjab	19.3	13.8	5.5
Sindh	8.6	5.5	3.1
Baluchistan	1.6	1.1	0.5
KPK	4.7	3.4	1.3

(Source: Estimate based on PSLM and Census 2017)

2.3. Causes of the Housing Crisis in Pakistan

Several economic, social, and demographic factors have added to the growing housing crisis in the country. The first factor that contributes the most is demographic

and social. The rapidly growing population has added a large number of families to the ranks of people in need of housing. Secondly, the large amount of population growth occurred in urban areas, ending in rapid urbanization. Additionally, economic growth has contributed to a considerable increase in the size of middle-class families in Pakistan. Beside this, the changing culture and decreasing household size have increased the demand for housing even more. The supply of new stocks of housing units is not sufficient to meet the growing demand of households.

Thirdly, a large number of households in Pakistan spent a greater share of their income to meet family expenditures, and savings have been inadequate to finance housing. The fourth factor is the increasing cost of land and construction, as land is the primary store of wealth, the cost of land rises faster than income.

The fifth and most important factor is the non-availability of housing finance, especially for buyers and developers. The Banks in Pakistan have been risk-averse and don't lend money to low or middle-income groups. As a result, Pakistan has the lowest mortgage financing penetration in South Asia. The inability and inaccessibility of homeownership across the country are increased by a lack of accessible and cheap housing financing. The supply of low-cost housing units has not been expected from builders / developers, who are already face financing hurdles, regulatory constraints, and high land prices. In the last, due to the inadequate maintenance, civil strife, natural catastrophes and other factors existing housing units have been depleted.

2.3.1. Increasing Population / Urbanization and Family structure

Pakistan placed 6th in the world population with 207 million inhabitants and 32 million households (PBS Census, 2017). Several economic, social, and demographic factors have added to the growing housing crisis in the country. Firstly, Pakistan has a population growth rate that is nearly exponential. According to the

2017 Census, Pakistan has population growth rate is 2.4%, which is much higher as compared to the China (0.54%), United States (0.72%), and India (1.24%) (Javed et al., 2018). Secondly, Pakistan is undergoing an urban transformation. The UN Development Program report for Pakistan 2019 states that Pakistan is the most urbanized South Asian country. According to the statistics of the 1998 census, 32.5% of Pakistani lived in urban areas (PBS; 1998); which is increased to 36.4% in 2017 (PBS Census, 2017). It seems to be a small increase when we consider that Pakistan's population increased by 50% over the same period. But it is a large introduction in the urban population. According to the United Nations Population Division by 2025, half of the country total population would be counted as urban (Jabeen et al., 2017). Rural to urban migration accounts for 20% of total migration to urban areas.

The growing population linked with rural to urban migration and strangled Pakistani cities has caused enraged rent conditions and housing shortages. Rapid urbanization raises the need for housing in Pakistan, particularly in big cities (Karachi, Lahore, Faisalabad, Multan, and Rawalpindi).

Pakistan currently has a total housing shortage about 10.3 million units. The anticipated urban housing deficit is over 3.4 million units, whereas the rural housing shortage is above 7 million. Considering the prevailing demographic trends and decreasing household size, it can be expected that the housing shortage will continue to increase in the future. The recent studies conducted by (Iqbal, 2020; Naqvi, 2020) estimated that by 2025, housing demand in Pakistan will grow to 17.2 million housing units.

2.3.2. Escalating Cost of Land / Construction

Land prices and construction costs have increased substantially in recent years. The general average price per square feet of land is estimated about 3,885

rupees (zameen.com). Moreover, the cost of a gray construction is estimated at approximately 1,250 rupees per square foot (Khalil & Nadeem, 2019). According to these estimates, the cost of 80 square-yard single family houses about 3.3 million rupees, which is considerably out of reach for the majority of Pakistan’s population.

The impact of inflation on increasing construction costs is significant in the case of Pakistan. The Consumer Price Index (CPI) increased by 15% in 2018-19. Moreover, the price index for construction materials grew by 16% during the same period (Pakistan Bureau of Statistics).

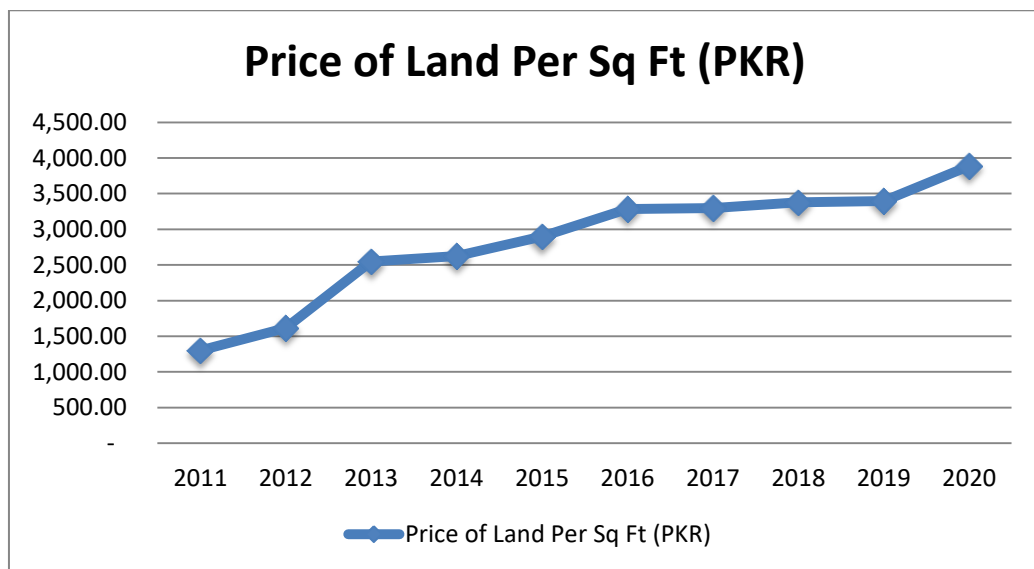


Figure 2.4 (PRICE / SFT OF LAND PKR)

(Source: www.zameen.com)

2.3.3. Absence of a viable housing finance sector (Mortgage Finance)

Mortgage finance is the key driver of housing growth across the world. Mortgage finance and construction finance are the two types of housing financing. Mortgage finance helps buyers to increase the affordability of housing units. The availability of mortgage financing has a trigger-down impact on construction financing (Doling et al., 2013).

The well-developed mortgage industry enables builders to obtain construction financing from banks and complete the project on time. In the absence of a viable mortgage market, the builders rely on their own equity financing or waiting for buyers installments, which delays the construction completion process. The inflationary environment like ours, escalate the construction cost and pushes the builder to raise the housing prices. Consequently, the housing project with mortgage-backed financing has better chances of timely completion. The availability of mortgage finance not only increases housing affordability but also increases the supply of housing stock. Unfortunately, such financing is virtually nonexistent in Pakistan.

The mortgage finance to GDP ratio in Pakistan is well below as compared to the South Asian average of 3.4 and 10% of India. The government of Pakistan captured the mortgage sector for 50 years through the House Building Finance Corporation (HBFC). After the census of 1998, the government decided to create a comprehensive National Housing policy in 2001 and opened the door for the private sector to participate in 2003. Despite this, the mortgages rose to around 1% of GDP in 2006 and dropped to 0.27% in 2019. As of 2018, the outstanding housing loan was 70,000 mortgages with an amount of 83 billion loans for 13 years. The statistics of the World Bank report shows that every year on average 1500 new mortgage loans are granted with a loan to value (LTV) ratio of 48%. This situation compelled the borrowers to manage the remaining amount of 52 percent of the price from their own sources (World Bank, 2018)

In 2020 State Bank of Pakistan gave direction to commercial banks to set a 5% of housing finance in their lending portfolio. As a result, the mortgage to GDP ratio will increase to 3%. Still, Banks have been reluctant to lend money for house financing due to the legal framework that favors borrowers more. Being a part of the

Naya Pakistan Housing Scheme, the government set up the Pakistan Mortgage Refinance Company, Credit Guarantee Trust, and SBPs markup subsidy to improve the risk-reward framework for banks. The issue is that not only the existing mortgage market in Pakistan is relatively very small but additionally, it only serves the country's highest income segment. "Again, of the rich and privileged, by the rich and privileged, for the rich and privileged".

2.3.4. The Supply and Demand Gap

The growing gap between housing demand and supply has now become a global phenomenon. However, the problem is particularly acute in Pakistan. The aforementioned migration dynamic results in a demand-supply imbalance. Pakistan now has a total housing shortage of 10.3 million units. According to estimates, urban housing shortages are projected at 3.4 million housing units, while rural housing shortages are estimated at around 7 million housing units (Iqbal, 2020).

The formal housing sector already remains unaffordable for a majority of the population of Pakistan. When we look at the housing supply in Pakistan, we can see that on a yearly basis, 1% of dwellings are built for 68 percent of the entire population. These 68 percent of people have a monthly salary of fewer than 30,000 Rs. On the other hand, 56 percent of housing units are built each year to serve only 12 percent of the population with an income of \$100,000 or more (Shaikh, 2019).

Currently, Pakistan's housing market is unable to meet the rising demand for affordable homes. In order to keep up with the rising population, Pakistan needs 700,000 new housing units per year. Out of this, 350,000 are needed for the urban area. The demand-supply gaps of housing in urban areas reinforce people to live in slums (Katchiabadis), and informal settlements. According to an estimate, 25% of this unmet demand is catered through slums, 15% through densification of existing cities,

and about 60% through informal subdivision of agricultural land (Hasan & Arif, 2018). Table 2.2 Illustrate the demand-supply gaps of housing stocks in Pakistan.

TABLE 2.2
Demand and Supply situation

Total demand (per year)	700,000 Units
Urban Requirements	350,000 Units
Rural Requirements	350,000 Units
Lower Income groups Needs	62%
Lower middle income groups Needs	25%
Higher/Upper middle income group Needs	10%
Formal Supply (per year)	250,000 Units
Urban Supply	150,000 Units
Rural Supply	100,000 Units

(Source : Hasan and Arif (2018))

2.3.5. The Plot Culture

Another factor that added to the country's housing woes is the prevailing plots culture in Pakistan. In Pakistan, real estate investors believe that investing in purchasing plots is the most profitable and secure option. Despite this, most salaried people opt to buy plots rather than house or flats (Aftab, 2019).

The continuance of obsolete legislation, complex construction standards, and weak regulatory oversight is the main reasons for this mode of investment. Moreover, the real estate market in Pakistan rife with speculative buying. The undocumented plot transactions added more burden to the existing plots prices. As a result, property prices rise, making housing inaccessible for the majority of potential buyers.

2.3.6. Lack of Affordability

The larger number of households in Pakistan spent a greater share of their income to meet family expenditures. Of this expenditure, an outsized amount is spent on housing and utilities. The latest statistics depicted, house rent alone makes up almost 20% of the urban consumption basket, and spending on housing has been on the rise. According to the last survey of Household Integrated economic survey 2018-19, urban consumers now spend 28.6% on housing and utilities compared to 26.1% in 2014. While the situation is slightly better in rural areas, it is still worse than in comparable countries. Spending on housing is 17% of India's, 16% of Vietnam's, and 15% of Malaysia's consumption.

The main reason for the increase in price is the shortage of up to 10.3 million homes in Pakistan. Approximately 40% of this shortfall is centered in urban areas. The shortage is also predominantly in the bottom 80% of income earners in Pakistan. As a result of the shortage, housing prices have been on the rise, disproportionately burdening the poor of the country. Lack of affordability is the main reason why the demand for housing is not fulfilled and shortage remains.

2.4. Urbanization in Pakistan

Migration and urbanization have a great impact on the economy and growth of the country. It has an impact on family structures, job market opportunities, education, health, the environment, the security system, and governance. In the development of housing market dynamics, migration and urbanization play a crucial role. The local migration impact on housing prices depends upon the size of migration flow and supply of housing units.

The rural to urban migration increases the housing demand in Pakistan. Due to this rapid influx, many problems arise, such as insufficient infrastructure, Roads, high

housing rents, high housing prices, and congestion. Additionally, as a result of the increasing migration, housing conditions of households in Pakistan's urban areas are worsening (Haque, 2006). The physical impact may be seen in the form of informal settlements created by migrants.

Numerous factors contributed to this influx, the primary motive for migration is the search for new employment opportunities; however, improved living standards in urban areas also appear to be a cause of rural to urban migration. Apart from that, better education, health facilities, and Infrastructure are also other factors that contribute to migration.

2.4.1. Urbanization Trend in Pakistan

According to the Population Census 2017, 74.8 percent of the population increased in 10 major cities in Pakistan as compared to the 1998 census. Population growth in urban regions is increasing, with 36.38 percent of the overall population now residing in cities. Based on a comparison of urbanization rates, Sindh is Pakistan's most urbanized province with 52.02 percent population living in urban areas. The province of Punjab has the largest population share in the pie, although its proportion has fallen since the 1998 census. There was a small rise in Punjab's urban population percentage, which went from 31.27% to 36.71% from 1998 to 2017. Khyber Pakhtunkhwa's population has grown to 18.77 percent in 2017 from 16.87 percent in 1998. Urbanization in Baluchistan has grown from 23.89 percent in 1998 to 27.55 percent in 2017.

During the same period, Urbanization in Federally Administered Tribal Areas increased from 2.69 percent to 2.84 percent. In contrast to the provinces, urbanization in Islamabad Capital Territory is decreasing. The urban population fell to 50.58

percent in 2017 from 65.72 percent in 1998. Table 2.3 shows the province-wise result of urbanization trends in Pakistan.

TABLE 2.3
Urban Share of Population

Area	Populations (millions)			Urban Share (%)		
	1981	1998	2017	1981	1998	2017
Pakistan	84.25	132.35	207.77	28.3	32.52	36.38
KPK	11.06	17.74	30.52	15.06	16.87	18.77
FATA	2.20	3.18	5.00	-	2.69	2.84
Punjab	47.29	73.62	110.01	27.6	31.27	36.71
Sindh	19.03	30.44	47.89	43.32	48.75	52.02
Baluchistan	4.33	6.57	12.34	15.62	23.89	27.55
Islamabad	0.34	0.81	2.00	60.06	65.72	50.58

(Source: Pakistan Bureau of Statistics)

Figure 2.5 presented the annual urbanization rate of Pakistan for the last 10 years. These statistics show a growing trend of urbanization. In 2011, 35.2% of Pakistan's population lived in the cities, which increased to 36.03% in 2015, and 37.17% in 2020.

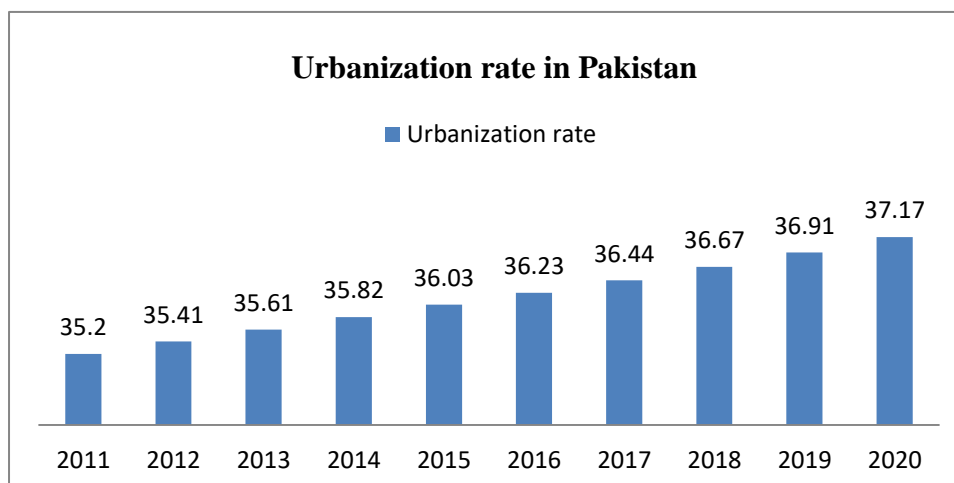


Figure 2.5 (Source; Federal Bureau of Statistics)

Table 2.4 shows the population of Pakistan's ten largest cities in 1998 and 2017. From 1998 to 2017, the population of ten main cities in Pakistan grew from 23.41 million to 40.92 million people. The cities include Karachi, Lahore, Faisalabad, Multan, Peshawar, Hyderabad, Quetta, Gujranwala Rawalpindi, and Islamabad.

TABLE 2.4
Population of Major Cities of Pakistan

Major Cities	Census 1998 (million)	Census 2017 (million)
Karachi	9.33	14.91
Lahore	5.14	11.12
Faisalabad	2.00	3.20
Rawalpindi	1.40	2.09
Gujranwala	1.13	2.02
Peshawar	0.98	1.97
Multan	1.19	1.87
Hyderabad	1.16	1.73
Islamabad	0.52	1.01
Quetta	0.56	1.00
Total	23.41	40.92

(Source: Pakistan Bureau of Statistics)

Karachi ranked the most populous city of Pakistan with 14.91 million inhabitants. In the last 19 years, the population of Karachi has increased by 59.8 percent. In same period, the population of Hyderabad has grown from 1.16 million to 1.73 million at rate of 49.1%. Hyderabad and Karachi are home to around 35% of Sindh's total population.

While Lahore's population grew by 116.3 percent from 5.14 million in 1998 to 11.12 million people in 2017, Faisalabad's population grew by 60.0 percent from 2.0 million in 1998 to 3.2 million people in 2017. Rawalpindi's population grew by 49.3 percent, from 1.40 million to 2.09 million, and Gujranwala's population grew by 78.8 percent, from 1.13 million to 2.02 million in same time span. Peshawar's population grew from 0.98 million in 1998 to 1.97 million in 2017. Over the same course of time, Quetta's population has grown by 78.6 percent, from 0.56 million to 1 million.

2.4.3. Impact of Urbanization on Housing Prices

Pakistan is the developing country of the world situated in South Asian region. It has a total population of 207 million people and an annual growth rate of 2.4 percent (PBS Census, 2017). According to the study of (Kugelman, 2014) by 2050, the total population of Pakistan is estimated to reach 380 million people.

Currently, the growing population of Pakistan is urbanizing rapidly. The rural areas of Pakistan lacking the provision of basic facilities compelling the People to migrate to urban areas for better-earning opportunities, education, health services, and living facilities for their families. The high influx rate of rural to urban migration worsened the condition of already congested cities. It is, therefore, a dire need to ensure enough resources of food, housing, education, health, and infrastructure to meet the demand of fast growing population.

The country's gross domestic product (GDP) is dominated by urban activities, which account for 78 percent of the country's GDP (Karrar & Qadeer, 2013). United Nations Population Division estimates that half of the country's population will be urban by 2025 (Jabeen et al., 2017). In Pakistan, rapid urbanization is increasing the need for homes, particularly in the major cities (Karachi, Lahore, Faisalabad, Multan, and Rawalpindi). Pakistan's cities are not well structured to meet the rising demand

for housing, forcing people to live in slum and squatter colonies, which are polluting the cities. As a result of the mishandled housing crisis, many families are forced to live in poor and unsafe housing circumstances.

The housing market in Pakistan's major cities has been under immense pressure due to real demand resulting from a large influx of people from rural areas, as well as constantly rising remittance inflows over the last decades. This demand is driven further by property purchases for speculation, wealth hiding, and tax evasion. As the result, price pressures in the property market have continued. Plot prices in Pakistan have nearly tripled since June 2011, while home prices have increased by 139 percent (zameen.com)

This high price of plots affecting residential units shows a consistently high level of speculative interest in large city center property markets. The figure 2.6 shows the percentage increase of the prices of plots and houses in the major cities of Pakistan (Islamabad, Lahore, and Karachi).

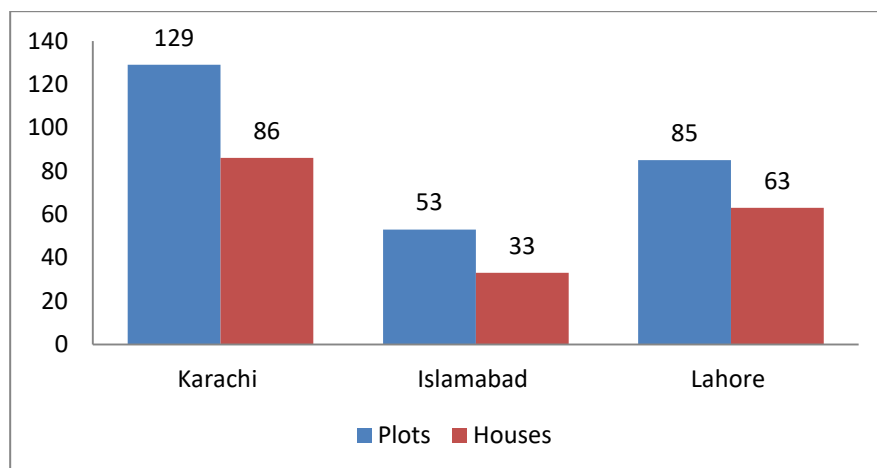


Figure 2.6 (Source; Zameen.com)

The growing trend in housing prices has affected the lower and middle-income households, who make up a large percentage of the economy's population; moreover,

the ongoing inflationary scenario has severely reduced buying power. Because of ongoing unplanned urbanization, demand for housing has outpaced supply, resulting in a price surge.

2.4. Overview of National Housing Policy 2001

The demand for housing has risen tremendously over time as a result of the constantly growing population and unplanned urbanization. Pakistan's government has failed to develop an effective national housing policy to solve the housing market's issues. The issue has been made worse by the poor implementation of the National Housing Policy of 2001.

Pakistan had not developed any housing policy at the national or provincial levels until 1992. In 1992, the first National Housing Policy was formulated, and it was later amended in 1994. This policy suggested several novel ideas for increasing the housing supply and improving the quality of existing homes. Before that, construction activities were carried out without any formal housing policy. Unfortunately, the government failed to execute this policy. Following the 1998 census, the government recognized the importance of the housing sector, and in 2001 established a National Housing Policy (NHP) to address the rising demand-supply gap of housing.

National Housing Policy (NHP 2001) is Pakistan's only policy addressing housing concerns. After failing to achieve goals with previous policies and efforts, this policy focuses on the essential necessities that create a conducive environment for the country's housing sector. In short, the policy is designed to develop, execute and support certain measures that guarantee adequate housing across the country.

There are several important problems that are addressed in the National Housing Policy (NHP 2001), such as land use and financing of housing and the construction

service sector; low cost housing; building materials; infrastructure development; zoning laws; and institutional structures. The Policy not only highlights the various issues and challenges that affecting the housing sector; also suggests strategies measures for resolving those issues and challenges.

The following are some of the issues and challenges raised in the National Housing Policy 2001.

- Housing problems arise mostly as a result of the fast growing population
- The expansion of squatter/slums settlements, encroachment, and abandoned public land is held accountable for housing deficits.
- Lack of adequate housing land, especially close to urban areas.
- Financial issues, particularly for the households with low income.
- The existing housing stock is deteriorating rapidly.
- A lack of accessible home financing as a key impediment to housing production.
- Inflationary pressure causing a huge increase in the cost of construction material for housing
- Lack of technology use in the construction

To address these challenges and fulfill future housing needs at a low cost, and of good quality, the planned NHP 2001 designed to accomplish the following goals and objectives:

- To suggest a capacity-building plan and institutional structures.
- Empowering all players, including the public and private sectors, to contribute to the growth of the housing market.
- To suggest a plan for making housing financing and home renovation credits more affordable, particularly for low-income people.

- Strategy for improving housing conditions by development, capacity building, and the implementation of novel concepts.
- Strategy for upgrading existing cities with improved planning and infrastructural improvements.
- Promote Research & Development culture to design a model for low-cost housing.
- Providing a safety net against evil and mobilizing resources.
- Incentives can be provided through tax reform.
- A national initiative for the development of small and medium-sized communities with growth potential.

2.5. Conclusion

In this chapter, we have discussed the housing sector of Pakistan in detail. The chapter discussion revealed that Pakistan has a huge gap of demand and supply in housing units. The demand for housing has surged exponentially as a result of substantial population growth and rapid urbanization. The Government of Pakistan has failed to establish an adequate housing policy to overcome the housing sector's problems. The situation has gotten even worse due to the poor implementation of the National Housing Policy (2001). Pakistan's national housing policy not only lacks the concept of sustainability, but it also lacked a housing policy till 2001. Despite the transition in the “development paradigm from Millennium Development Goals to Sustainable Development Goals” the approach has remained the same for the past 19 years. Mortgage financing has remained very low in Pakistan due to complex and stringent procedures and a high rate of interest.

CHAPTER 3

LITERATURE REVIEW

3.1. Introduction

Housing has gained a lot of attention due to the growing population and rapid urbanization across the globe. While examining the variations in housing prices, many academics identified macroeconomic factors of housing prices i.e. gross domestic product, Per capita income, Inflation rate, Population, tax rate, employment level, interest rate, and accessibility of funding.

Many existing research studies show that how changes in such macroeconomic variables influence housing prices (Adams & Füss, 2010; Al-Masum & Lee, 2019; Hott & Monnin, 2008; Lee, 2009; Manganelli, 2015; Manganelli et al., 2014; Pillaiyan, 2015; Reen & Razali, 2016; San Ong, 2013; Umar et al., 2019; Zalieckaitė et al., 2007). In this chapter, the study review the existing literature related to the objectives of the dissertation.

The remaining chapter is discussed in the following way; Section 3.2 presents the detail of the theoretical framework. Section 3.3 discusses the empirical studies regarding housing and macroeconomics variables from both developed and developing countries. The last section concludes the chapter.

3.2. Theoretical Review

Housing is a novel market product that has certain distinguishing features like durability, heterogeneity, and immovability. Numerous demographic, social, and economic factors influenced the housing market by determining the demand of housing. Housing prices like other consumable goods are affected by demand and supply determinants. However, housing has certain distinguishing features like

durability, heterogeneity, and immovability that differentiate it from other markets making it difficult to achieve the equilibrium between demand and supply.

Theoretically, from a microeconomic perspective, joint interaction of supply and demand forces determined the housing price (DiPasquale & Wheaton, 1994). As a result, the demand and supply of housing units intensify the price fluctuations in the housing market. The prices of properties are not rapidly reactive to changes in the housing price in the economy as a whole and thus show stickiness. According to Chen et al. (1986), asset price and macroeconomic factors have a long-run equilibrium connection.

Macroeconomic conditions affect housing prices. Gross Domestic Product (GDP) shows an overall overview of a country's economy. It could be used to forecast the economic development. Guo and Wu (2013) stated that GDP is an essential determinant to housing prices other than illustrating the economic condition. Housing plays a twofold role of investment and consumption good. According to Lin et al. (2019) when the prices of housing increase it has negative impact on consumption as results in sluggish economic growth.

A borrower has to pay the principal with an additional amount of payment determined by a percentage of interest rate charged by the bank. Thus, this can definitely affect the prices of houses as higher expenses of borrowing will generally lessen the housing demand as well as leading to house price reduction (Domingo & Fulleros, 2005; Goddard & Marcum, 2012; Hott & Monnin, 2008). The inflation rate influences the housing prices through an increase in the construction costs Tsatsaronis and Zhu (2004). The increase in the inflation rate makes the prices of raw materials for houses and buildings increase and push up construction costs. Consequently, housing price increase when the inflation rate

increases. Kamal et al. (2016) found that inflation rate is an important factor that might increase the housing prices.

The increase in the size of the population has positively correlated with the change in house prices. As housing is a basic need, the growing population would increase the demand for housing. As a result, rising population pressure drives up housing costs. Bujang et al. (2010) population growth might have a substantial impact on the housing market. The population growth may boost housing demand and push up house costs (Gao & He, 2014).

Exchange rate is also as important as other indicators mentioned before. With the depreciation of currency against the foreign currency, more investors from outside the country would be attracted to invest in host country real estate market (Abelson et al., 2005; Asal, 2018). Domestic and foreign income sources, such as remittances, also have an impact on house prices. The foreign remittances added to the domestic income and increased the purchasing power of latent households in acquiring a home for consumption and investment purpose.

3.3. Empirical studies

3.3.1. Gross domestic product (GDP)

The overall economic situation of the country is represented by gross domestic product (GDP). Better economic performance fosters general demand and increases prices, including higher home prices. In literature, when we analyze the income and the housing market there is a significant relationship existed.

Adams and Füss (2010), analyze the macroeconomic determinants of housing prices on cross country level. Their study observed that an increase in economic activity has an increasing impact on housing prices. Baharudin and Jusoh (2019)

Studies utilizing yearly data and the “Vector Error Correction Model (VECM)” showed that the gross domestic product (GDP) positive connection with housing prices. Housing prices are influenced by the gross domestic product (GDP), which tends to rise in response to positive economic growth. Reen and Razali (2016) studies show that the GDP growth rate significantly affects housing prices. Similarly, Tripathi (2019) reported that GDP has a substantial rising effect on housing prices. The increase in GDP raises the income of individuals, which leads to increasing demand for housing.

A research conducted by San Ong (2013) on macroeconomics variables has revealed that the gross domestic product (GDP) is the main determinants that influence property prices. Tsatsaronis and Zhu (2004) using data from 17 developed countries and variance decomposition, found that the long-term contribution of GDP does not exceed 10% of the overall variation in housing price. It was found in the study by Kok et al. (2018) that the gross domestic product (GDP) has a significant impact on housing prices in the short term as well as the long term house prices fluctuate by 60 percent because of the real GDP growth rate.

However, D Trofimov and CD Xuan (2018), found that GDP has a negative impact on and housing prices. The constant high economic growth rate creates an oversupply in the housing sector, which may lead to a decrease in prices. The study accompanied by Pillaiyan (2015), revealed that there is no substantial connection between GDP and home prices.

3.3.2. Interest Rate (DR)

The increase and decrease in the interest rate directly affect the borrower's capacity to borrow money. Based on Barakova et al. (2003), the availability to access cheap loans raises demand for homes, resulting in higher housing prices.

According to Mishkin (2007), Customers may get mortgages more easily with a reduced interest rate, which leads to increased housing demand and, eventually, higher property prices.

Brueggenman and Fisher's (2008) study shows that property price and the interest rate has a significant relationship. The study of LIM and LAU (2018) results revealed a positive correlation between housing price and interest rate. Kok et al. (2018) investigated macroeconomic variables and housing prices by employing Structural VAR and quarterly data. An interest rate shock, according to the study, has a very small impact on housing prices. According to Valadkhani et al. (2019), higher interest rates have a greater negative impact on house prices than lower interest rates. Results of this investigation are consistent with those of (Simokengne et al., 2013).

Parrikar (2019) investigated macroeconomic factors of housing price in India by VECM approach. The finding of study revealed that interest rate has very weak negative association with housing price. Umar et al. (2019) performed research in Pakistan to determine the influence of monetary policy on housing prices. Their findings indicated that house prices and the discount rate have an inverse connection and that inflation is a cause of rising house prices.

3.3.3. Inflation (CPI)

An increase in the price of goods and services in a country over a given period of time is called inflation. The study of Lee (2009) shows that the inflation rate is the most important factor affecting housing prices, both in the short and long-terms. The increase in the prices of construction materials raises the construction cost as a result cost of houses increased.

Pillaiyan (2015) study implies that inflation rate have a significant long-run

relationship with house prices. The study results are also supported by Ganeson and Abdul Muin (2015) in which they found that inflation and unemployment rate have a strong correlation with housing prices. According to a study conducted by Tripathi (2019), the inflation rate has a positive and substantial link with house price. Parrikar (2019) studied the influence of macroeconomic factors on housing prices in India by using VECM approach and found that inflation rate has strong positive effect on the cost housing. Apart from the ongoing increase in the general price level for products and services, the increase in the cost of housing is attributed to the increase in the inflation rate (Goddard & Marcum, 2012; Oktay et al., 2014; Zalieckaitė et al., 2007).

3.3.4. Population Growth Rate (PGR)

Pakistan is the 6th most populated country in the world, with a population of 207 million and an annual growth rate of 2.4% (PBS Census, 2017). Demographics and housing market relationships were first studied by (Mankiw & Weil, 1989). Their findings indicated that a high birth rate and an increase in average age of the population had a considerable influence on housing demand and pricing.

According to Engelhardt and Poterba (1991), factors such as population growth, population ageing, and family composition have a positive impact on housing demand and house prices. San Ong (2013) found that population growth and Malaysia's GDP had a positive effect on housing prices. According to other studies, such as Esteban and Altuzarra (2008), D Trofimov and CD Xuan (2018) and Aris (2018) population growth and housing prices have a positive relationship with each other.

3.3.5. Exchange Rate (ER)

In macroeconomic factors, apart from inflation rate, interest rate, GDP, exchange rate also has an impact on the housing prices. According to Asal (2018), the exchange rate is an influential factor in determining housing prices. When compared to foreign currencies, a weak exchange rate has a positive effect on housing prices. As a result of the study by Abelson et al. (2005), the appreciation in the exchange rate has an increasing impact on the housing prices. The research also provided similar findings as Asal (2018), in which the depreciation in the domestic exchange rate encourages domestic housing assets to foreigners, and increases the demand of housing.

Abelson et al. (2005) noted that the exchange rate affected the housing price in the short. Mallick and Mahalik (2015) found a negative relationship between the exchange rate and housing prices in the short run. Kok et al. (2018) on the other hand, used quarterly data to examine macroeconomic variables and housing prices. There was a statistically significant and positive correlation found between the exchange rate and housing prices over the long run. Tripathi (2019) investigated the cross-country macroeconomic determinants of housing prices. Their research showed that the appreciation of real exchange rates increased the prices of housing.

Kiong and Aralas (2019) examined the determinants of housing by employed the “Autoregressive Distributed Lag Model, Error Correction Model”. The study's findings imply a negative and long-term relationship between the exchange rate and the price of a property. The study conducted by Mokhlis et al. (2020) while analyzing the macroeconomics factors of housing price in Malaysia noted that the exchange rate has an inverse association with the house price index.

3.3.6. Remittance

Foreign income sources, such as remittances, also have an impact on real estate prices. The foreign income club with the domestic income and enhance the purchasing power of household to buy the houses. The study of Akbar Zaidi (2015) revealed that remittance has grown form 136m US dollar in 1972 to US 19,727.23m in 2018.

Gilani et al. (1981) study found that the major share of Pakistani remittances is used to meet the expenditures of their families. The consumption share consists of 62% of remittances, while the 22% share is invested in the real estate/housing market. The Amjad and Ahmed (1986) study revealed similar findings which state that a major share of remittances from the Middle East migrants spend on household consumption, whereas only 21.68% of that amount is spent on real estate and housing.

Osili (2004) investigated the relationship between migrants and their native communities by using data of the Nigerian migrants living in the USA. The study observed a general trend of investing remittances in real estate, the housing market, and businesses in their home country. Furthermore, the study of (Serageldin et al., 2004) showed a similar trend in Cuenca Ceity, which causes high prices in the real estate/ housing market. Ahmed et al. (2010) examined the welfare of the housing sector in Pakistan. A large amount of foreign remittance is spent on health, education, and buying durable things like plots, houses, etc. Similarly, Kagochi and Kiambigi (2012) studied the impact of remittance on the housing sector in Kenya. Their study concluded that remittance has a positive correlation with housing construction and increases their prices.

The study conducted by Mallick and Mahalik (2015) examined the housing price in 15 cities in India employing the OLS estimation technique. Their study depicted that remittance has an increasing impact on housing prices. Similarly, in Bangladesh, Mottaleb et al. (2016), found that remittances increase household income and provide an opportunity to invest in the housing market. LLESHAJ and KORBI (2019) analyzed the endogenous factors of housing prices in Tirana (Capital city of Albania). The study used the Unrestricted Vector Auto-regression (VAR) method and the statistical significance analysis of the parameters. The study findings depicted that, Housing prices have a statistically significant relationship with Remittance and exchange rate. Moreover, 1% increases in REM causes a 0.65% increase in the housing price index.

TABLE 3.1
Summary of literature review

Authors	Data & Time	Methodology	Results
Ahmed (2020)	2014-2019 Quarterly	Granger Causality, Variance Decomposition	GDP and CPI has positive correlation with housing price, but only CPI has significant impact.
Tripathi (2019)	1970-2017 Annually	Random effect model	The GDP growth rate, Inflation rate, Population and real exchange rate have a positive and significant effect on real house prices. The real interest rate does not have any effect on real house prices
Umar et al. (2019)	2011-2016 Monthly	VAR Approach	There is inverse and significant relationship

			between interest rate and housing price. Inflate rate (CPI) positively impact housing price.
Parrikar (2019)	2010-2017 Quarterly	Vector Error Correction model (VECM)	The study found that GDP, exchange rate, and inflation rate has increasing impact on housing price.
Baharudin and Jusoh (2019)	2005-2019 Annually	VECM Approach	Gross domestic product has positive impact on housing price. While Interest and inflation rate has negative relationship with housing price.
Al-Masum and Lee (2019)	1991-2016 Quarterly	VECM Approach	Interest rate has negative association with housing prices. Moreover population growth rate has positive and insignificant impact on housing price.
D Trofimov and CD Xuan (2018)	2000-2015 Quarterly	VECM Approach	GDP and lending rate has a negative association with housing price. Population growth rate, and inflation rate has a positive and significant impact on housing prices.
Kok et al. (2018)	2002-2015 Quarterly	Structural vector autoregressive regression (SVAR)	Exchange rate, real GDP have a positive and significant impact on housing price. Interest rate shocks negative and very little impact on housing price.

LIM and LAU (2018)	2006-2015 Quarterly	ARDL model	Interest rate has a positive impact on housing price.
Gasparėnienė et al. (2016)	2008-2015 Annul	OLS	GDP, Inflation rate, interest rate and availability of bank loans have significant impact on the housing price.
Mottaleb et al. (2016)	HIES data 2000,2005,2010	OLS qunatile regression	Remittances have positive and significant impacts on housing price.
Algieri (2013)	1970 to 2010 Annual	Multivariate unobserved component model	The long-run interest rates and inflation has a significant contribution in explaining real house prices.
Dumičić et al. (2012)	2002-2011 Quarterly	VAR approach	Gross domestic product and inflation rate have a positive relationship with housing prices.
Adams and Füss (2010)	1975-2007 Quarterly	Panel Co-integration analysis and ECM	GDP growth has an increasing impact on the housing prices.

3.4. Research Gap

Housing prices in Pakistan have increased rapidly in the past many years. The increase in house price appreciation rate resulted in the deterioration of housing affordability. In recent past, various studies concluded that macroeconomic factors such as gross domestic product (GDP), gross disposable income, money supply, unemployment, interest rate, exchange rate, inflation rate, and population shows a relationship with house prices. This brings up the question of whether macroeconomic variables have influenced Pakistan's housing prices. There is research gap found in the literature that macroeconomic factors of housing price in

Pakistan are not seriously addressed. Therefore, the study aims to fill this gap by examining the association between housing prices and major macroeconomic variables. Further, it also examines the macroeconomic factors that affect housing prices in Pakistan in short and long run.

3.5. Hypothesis

H1 There is a significant and Positive relationship between Gross domestic product (GDP) and Housing price (HPI) in Pakistan.

H2 There is a significant and Positive relationship between the Inflation rates (CPI) and Housing price (HPI) in Pakistan.

H3: There is a significant and positive relationship between the Population growth rates (POP) and Housing price (HPI) in Pakistan.

H4: There is a significant and negative relationship between Interest rate (DR) and Housing price (HPI) in Pakistan.

H5: There is a significant and positive relationship between exchange rate and Housing price (HPI) in Pakistan.

H6: There is a significant and positive relationship between Remittance and Housing price (HPI) in Pakistan.

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CHAPTER 4

DATA AND METHODOLOGY

4.1. Introduction

In this chapter, we discuss the theoretical framework of our model, data description, and econometrics technique that are used to determine the macroeconomic factors that are affecting housing price in Pakistan. The secondary data collected from different domestic and international sources such as World Development Indicators (WDI), International Financial Statistics (IFS), and State Bank of Pakistan (SBP), Federal Bureau of Statistics (FBS), and Zameen.com. The study analysis used quarterly time series data from 2011 through 2020. To check the stationary of the variables, the study applied “Augmented Dickey-Fuller (ADF), Phillips Perron (PP), and KPSS tests”.

Granger (1981) introduced the concept of co-integration which illustrate that the long run equilibrium relation between dependent and independent variables. To check the long term association between housing price and different macroeconomic variables, the study used ARDL Bound test proposed by Pesaran, Shin and Smith (2001). After that, we have applied the “Autoregressive Distributed Lag (ARDL)” model to examine the short and long run relationship between housing price and macroeconomic variables.

In the last, different diagnostic checking tests such as “Jarque Bera (JB) test, Breusch Pagan Godfrey test (Heteroskedasticity), Breush Godfrey Serial Correlation LM test, and Ramsey RESET test” are applied to ensure the study analysis is meaningful. In addition, to check the stability and changes of “ARDL parameters Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Recursive Residuals of Squares (CUSUMSQ)” are applied.

4.2. Theoretical framework

Housing prices like other consumable goods are affected by demand and supply determinants. However, housing has certain distinguishing features like durability, heterogeneity, and immovability that differentiate it from other markets making it difficult to achieve the equilibrium between demand and supply. Theoretically, from a microeconomic perspective, joint interaction of supply and demand forces determined the housing price (DiPasquale & Wheaton, 1994). Hence, the price fluctuations are caused by a state of imbalance in housing demand and supply. According to Chen et al. (1986), asset price and macroeconomic factors have a long-run equilibrium connection.

This research employs DiPasquale and Wheaton (1994) theoretical framework for the long-run supply and demand model in the housing market. According to the DiPasquale and Wheaton (1994) model, the demand and supply function is as follows:

$$D_t = \beta_0 + \beta_1 X_t^D + \beta_2 Z_t^D + \mu_t \quad (\text{Eq.4.1})$$

$$S_t = \beta_0 + \phi_1 X_t^D + \phi_2 Z_t^D + v_t \quad (\text{Eq.4.2})$$

Where X_t^D and Z_t^D is a vector of macroeconomic factors that could be affect the housing prices through demand and supply in the housing market. The Vectors X_t^D and Z_t^D represent the microeconomics levels of country specific factors that could be effect the demand and supply. For estimation of macroeconomics factors that affect housing price, both of the vectors will be capture into error term.

$$D_t = \beta_0 - \beta_1 HP_t + \beta_2 GDP_t + \beta_3 CPI_t + \beta_4 POP_t + \beta_5 DR_t + \beta_6 ER_t + \beta_7 REM_t + \epsilon_t \quad (\text{Eq.4.3})$$

$$S_t = \alpha + \phi_1 HP_t - \phi_2 CONST_t + v_t \quad (\text{Eq.4.4})$$

Equilibrium in the housing market is established by equating supply and demand. By equating Eq. 5.3 and Eq. 5.4 we get the required housing function.

$$D_t = S_t$$

$$\beta_0 - \beta_1 HP_t + \beta_2 GDP_t + \beta_3 CPI_t + \beta_3 POP_t + \beta_4 DR + \beta_5 ER_t + \beta_6 REM_t + \epsilon_t = \alpha + \phi_1 HP_t - \phi_1 CONST_t + v_t$$

$$HP_t = \beta_0 + \beta_2 GDP_t + \beta_3 CPI_t + \beta_3 POP_t + \beta_4 DR + \beta_5 ER_t + \beta_6 REM_t + \epsilon_t \quad (\text{Eq.4.5})$$

Conceptual Framework

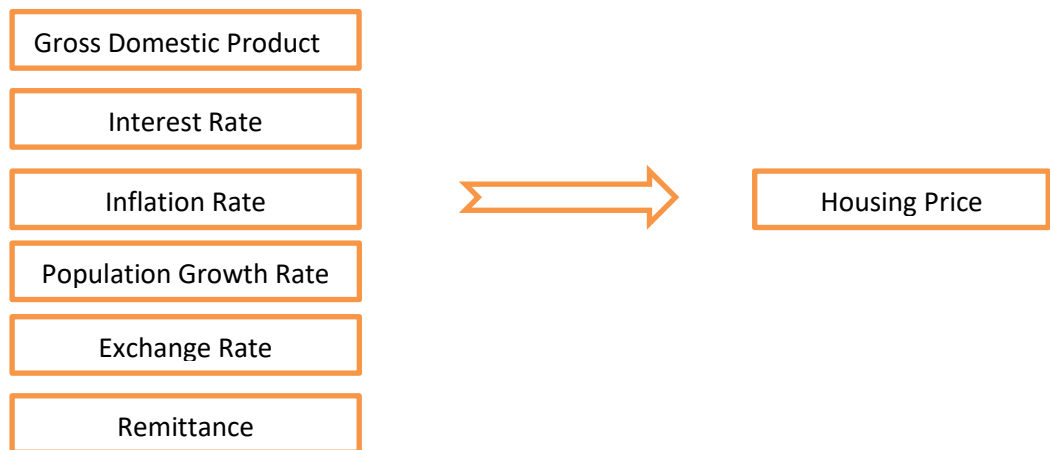


Figure 4.1

Based on the DiPasquale and Wheaton (1994) model the functional form is as follow:-

$$HPI = f(\text{Gross domestic product, Inflation Rate, Population Growth, Interest Rate, Exchange Rate, Remittance}) \quad (\text{Eq.4.6})$$

$$HPI_t = \beta_0 + \beta_1 GDP_t + \beta_2 CPI_t + \beta_3 DR_t + \beta_4 POP_t + \beta_5 ER_t + \beta_6 REM_t + \epsilon_t \quad (\text{Eq.4.7})$$

$$\ln HPI_t = \beta_0 + \beta_1 \ln GDP_t + \beta_2 \ln CPI_t + \beta_3 \ln DR_t + \beta_4 \ln POP_t + \beta_5 \ln ER + \beta_6 \ln REM + \varepsilon_t \quad (\text{Eq.4.8})$$

4.3. Data Description

The study analysis uses quarterly time series data from January 2011 to December 2020 for housing prices. The data regarding different macroeconomic variables were collected from different domestic and international sources. The table 4.1 depicted the summary of incorporated variables and source of the collected data set.

TABLE 4.1
Description of Variables and source of data

Variables	Unit Measurement	Source
Housing Price	House Price Index (HPI) Index Number =100	Zameen.com
Gross domestic Product	PKR Million	State Bank of Pakistan
Interest Rate	Discount Rate Percentage %	International Monetary Fund
Inflation	Consumer Price Index Index Number=100	International Monetary Fund
Population Growth Rate	Growth rate %	World Development Indicators
Exchange Rate	PK/US Dollar	International Monetary Fund
Remittances	US Dollar (Million)	State Bank of Pakistan

4.3.1. Dependent Variables

4.3.1.1. Housing Price

The housing price (HP) is the dependent variable of the study analysis and is measured as house price index (HPI). The data of housing prices were obtained from www.zameen.com, one of the creditable and fast-growing online property market websites in Pakistan. Umar et al. (2019) and Yousaf and Ali (2020) similarly employed the real estate data of Zameen.com to conduct their study analysis. The reason for selecting zameen.com is its high reputation among domestic and international real estate customers.

4.3.2. Independent Variables

4.3.2.1. Gross domestic Product (GDP)

Gross domestic product (GDP) represent the total market value of all the goods and services produced within the geographical boundary of the country over specified time period, usually one year.

$$GDP=C+I+G+(X-M)$$

The gross domestic product (GDP) data is extracted from State bank of Pakistan Handbook of statistics on Pakistan economy 2020. The gross domestic product (GDP) is available on yearly basis, the study quarterisation of the annual data of GDP by using the proportion of share of each quarter's estimated by (Arby & Batool, 2007; Kemal & Arby). The quarterly values represented the share of each quarter in annual GDP. We take the share of different quarters from those estimated values, and further quarterized the data from 2011 to 2020 by using share proportion of each quarter in annual GDP.

4.3.2.2. Interest Rate (DR)

Discount rate is measured in percentage; it is the rate of interest set by the state bank of Pakistan for lending to commercial banks. The increase and decrease in the interest rate directly affect the borrower's capacity to borrow the money. The data of discount rate is collected from International Financial Statistics (IFS) data base which is available on quarterly basis.

4.3.2.3. Inflation Rate (CPI)

Inflation measures the rate of increase in the prices of goods and services at a particular period in the country. The Inflation rate is measured as consumer price index (CPI) and reflects in percentage change. The quarterly data of inflation (CPI) is gathered from International Financial Statistics (IFS) data portal.

4.3.2.4. Population Growth Rate (POP)

Pakistan is the 6th most populous country in the world, with a population of 220 million and an annual growth rate of 2.4% (PBS Census, 2017). Population is defined as the total number of inhabitants of a country or region. Population growth rate is measured in annual percentage and extracted from the World Development Indicators. The population growth rate is available annually so we converted into high frequency data, a method suggested by (Chow & Lin, 1971)

4.3.2.5. Exchange Rate (ER)

Exchange rate (ER) measure the rate at which currency of one country is exchanged with another. Exchange rate (ER) measured in Pak Rupee per US dollar; the data of exchange rate is obtained from International Financial Statistics (IFS) data portal. The US dollar is the most widely traded currency in the world, and most direct quotes use it as the base currency. The majority of Pakistan's exports and imports are

transacted in US dollars, and several studies in the literature employ the direct exchange rate in the case of Pakistan.

4.3.2.6. Remittances (REM)

Remittance represents the amount of money which foreigner workers send to its native country. The quarterly data of Remittance is extracted from State Bank of Pakistan and measured in million dollars.

4.4. Econometric Techniques

The methodology of the study consists of various econometrics tests that are applied to determine the macroeconomic factor of housing price in Pakistan. At the outset, to check the unit root and ensure stationery, a different unit root tests is applied. The ARDL model is used to study the long run connection between housing price and macroeconomic factors. Lastly, a variety of diagnostic tests are performed to determine the model's dependability and durability.

4.4.1. Unit Root Test

Considering the nature and properties of time series data, usually economic variables have an issue of unit root. It is necessary to address this issue and find out the integrating order of the underlying series for analysis. The series with issue of unit root lead to spurious regression and meaningless results. To check the time series variable is stationary or non-stationary, a unit root test is used.

The unit root is tested using the “Dickey-Fuller test (ADF) (Dickey and Fuller 1979), the Phillips-Perron test (PP) (Phillips Perron, 1988), and the Kwiatkowski, Phillips, Schmidt and Shinn (KPSS) (1992)”. These tests have been used in a significant number of studies to assess unit root for both developed and developing nations in literature.

4.4.1.1. Augmented Dickey-Fuller (ADF) Test

The Augmented Dickey Fuller (ADF) test is most widely used by researchers to test the unit root in the literature. Suppose we have Y_t series to test the unit root. The ADF model with Y_t series is as follows.

$$\Delta Y_t = \mu + \phi Y_{t-1} + \sum_{i=1}^k \beta_i \Delta Y_{t-i} + \epsilon_t \quad (\text{Eq. 4.9})$$

Here

$$\phi = \alpha - 1$$

α = coefficient of Y_{t-1}

ΔY_t = 1st difference Y_t

ϵ_t = Error term

The Null hypothesis of ADF test is series is not stationary or series has a unit root. Whereas the alternative hypothesis is series is stationary. In above case we have following null and alternative hypothesis.

$$H_0: \phi = 0$$

$$H_1: \phi > 0$$

If we do not rejected H_0 Y_t series is non-stationary and alternatively we accepted H_1 and draw the conclusion that this series is stationary. However, the Augmented Dickey-Fuller (ADF) test struggle to test accurately if the series suffer from serial autocorrelation problem. Furthermore, if there is a structural break in the series, the ADF test leads to a false decision regarding series have a unit root or not.

4.4.1.2. Phillips Perron test (PP)

The second test which researchers use to check the presence of unit root in a time series data is Phillips Perron (PP). The test has the following equation form.

$$\Delta X_t = \theta X_{t-1} + \theta_i D_t - i + \epsilon_t \quad (\text{Eq.4.10})$$

Here

$$e_t = I(0)$$

Dt-i = Deterministic trend

The Null hypothesis of PP test is series is not stationary or series has a unit root. Whereas the alternative hypothesis is series is stationary.

$$H_0: \theta = 0$$

$$H_1: \theta > 0$$

The basic difference between ADF and PP tests is that PP test is non-parametric. The PP test has more accurate results in the presence of serial autocorrelation and heteroskedasticity in the error term of the time series data. The rest of the testing procedure is same as ADF. PP test is recommended for large sample size of financial data.

4.4.1.3. Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test

The Kwiatkowski-Phillips-Schmidt-Shin test (KPSS) test is also used to test the presence of stationary in the time series data. The test has the following model form

$$Y_t = X_t + e_t \quad (\text{Eq. 4.11})$$

$$X_t = X_{t-1} + \epsilon_t \quad (\text{Eq.4.12})$$

The null hypothesis of KPSS test is series is stationary against the alternative of non-stationary and test is conducted to test e_t . The critical value of the KPSS test is based on the Lagrange Multiplier (LM) test statistics.

4.4.2. ARDL Bound Test (Con-integration)

As stated earlier, using variables that have unit root in the study analysis may lead to spurious results. Such issues are usually settled with the differencing of the underlying variables. However, in this process, we lose important information about

the variables. The process of cointegration overcomes an issue of unit root without losing long-term equilibrium association between variables if it exists. The concept of cointegration implies that underlying variables have the same integrated order and there exists a linear relationship between non-stationary variables. Thus, it exhibits the long-run association within the integrated variables. The test determines whether the non-stationary variables are cointegrated or not. The objective of applying this test is to overcome the spurious outcomes and estimate the long-run equilibrium relationship.

In the literature there are three approaches to study the long run connection among the non-stationary variables. Engle-Granger residual based test developed by Engle and Granger (1987) and maximum likelihood test developed by Johansen and Juselius (1990), and ARDL bound test. The Engle-Granger technique has the drawback of using a single equation model and displaying more than two cointegration equations when there are more than two variables. The Johansen cointegration test, on the other hand, is particularly beneficial for more than two variables. Unlike the Engle-Granger test, it allows for several cointegration relationships. The disadvantages of the Johansen test are that it requires the integration of order one for non-stationary variables, and it generates inaccurate outcomes for small sample size.

The study applied ARDL bound test approach to determine the cointegration between housing price (HPI) and macroeconomic factors. The ARDL bound test presented by “Pesaran and Shin (1999), and Pesaran, Shin and Smith (2001)” has several advantages on others traditional methods for cointegration. Firstly, this method can be applied to mixed order of integration. Secondly, ARDL bound test is very useful for the small data set (Haug; 2002). Thirdly, in the process of data

generating to select modeling framework this method allows to pick up sufficient number of lag. Lastly, the ARDL bound test provides accurate and complete information concerning the structural breaks in the time series data. The equation 4.13 represents the ARDL model for housing price (HPI) and macroeconomic variables.

$$\begin{aligned} \Delta \ln HPI_t = & \\ & \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta \ln HPI_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta \ln GDP_{t-i} + \sum_{i=0}^n \alpha_{3i} \Delta \ln CPI_{t-i} + \\ & \sum_{i=0}^n \alpha_{4i} \Delta \ln POPI_{t-i} + \sum_{i=0}^n \alpha_{5i} \Delta \ln DR_{t-i} + \sum_{i=0}^n \alpha_{6i} \Delta \ln ER_{t-i} + \\ & \sum_{i=0}^n \alpha_{7i} \Delta \ln REM_{t-i} - 1 + \beta_1 \ln HPI_{t-1} + \beta_2 \ln GDP_{t-1} + \beta_3 \ln CPI_{t-1} + \\ & \beta_4 \ln POPI_{t-1} + \beta_5 \ln DR_{t-1} + \beta_6 \ln ER_{t-1} + \beta_7 \ln REM_{t-1} \end{aligned} \quad (\text{Eq.4.13})$$

Here,

α_0 Intercept term

μ_t White Noise Residual

β_1 to β_7 are the long run coefficient

α_1 to α_7 represent short run elasticity of the model

To find out the long run relationship between housing price (HPI) and macroeconomic variable, firstly this study selected the appropriate lag length by using Vector Autoregression (VAR) model. After that study applied ARDL bound test to determine the existence of cointegration between housing price (HPI) and selected macroeconomic variables. The null and alternative hypothesis of bound for cointegration test by using equation 4.13 is as follow.

$$H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = \beta_7 = 0$$

$$H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq 0$$

The null hypothesis stated that there is no cointegration among the variables. In contrast, the alternative hypothesis states that the variables are cointegrated. If a

long-run nexus exists between housing prices (HPI) and macroeconomic factors, the study uses the error correction model (ECM) to determine the short-run association.

4.4.3. Diagnostic Testing

To cross-check our estimated model, whether it is suffering from serial correlation, heteroscedasticity, model specification error, existence of non-normality of the error term, stability of model or not. This study will conduct the following diagnostic tests to ensure that the estimated model has no such econometric problems. The presence of these econometric problems in the model leads to biased and inconsistent results.

- “Breusch-Pagan-Godfrey test (Heteroskedasticity)”
- “Breush-Godfrey Serial Correlation LM test”
- “Jarque-Bera (JB) test for Normality”
- “Ramsey RESET test”
- “Cumulative sum of recursive residuals (CUSUM)”
- “Cumulative sum of recursive residuals of squares (CUSUMSQ)”

CHAPTER 5

EMPIRICAL RESULTS AND DISCUSSION

5.1. Descriptive Analysis

Before moving towards multivariate analysis, the descriptive statistics of the underlying study variables are presented in Table 5.1. The statistics results reveal that the average value of Housing price index (HPI) is 5.192 with standard deviation 0.319 respectively. Similarly gross domestic products (GDP) average 19.418 with standard deviation 0.146, Inflation (CPI) 2.197 with standard deviation 0.171, population growth rate (POP) 0.728 with standard deviation 0.024, interest rate (DR) with standard deviation 0.28, exchange rate (ER) 4.707 with standard deviation 0.196, and remittances has an average value 7.337 with standard deviation 0.267 respectively.

The house price index (HPI), gross domestic product (GDP), and population growth rate (POP) are negatively skewed while interest rate (DR), exchange rate (ER), inflation rate (CPI), and remittances are positively skewed. The estimated values of kurtosis and skewness are statistically insignificant and show that variables are normally distributed. Moreover, the values of Jarque-Bera of different variables in the model confirm the normality of the selected data sets.

Table 5.2 represents the pair-wise correlation matrix of the study variables. The house price index has positive and statically significant relationship with gross domestic product, inflation rate (CPI), and exchange rate (ER). In contrast, it has positive and statically insignificant relation with remittances (REM). On the other hand house price index (HPI) has negative and statically significant correlation with interest rate (DR) and population growth rate (POP). Gross domestic product (GDP) has a positive and significant relationship with remittances (REM), exchange rate (ER), and inflation rate (CPI). Whereas, it has a negative and statistically insignificant

relationship with interest rate (DR) and population growth rate (POP). The results show inflation (CPI) has positive correlation with remittances (REM) and exchange rate (ER) while negative with interest rate (DR), and population growth rate (POP). Population growth rate (POP) has negative correlation with remittances (REM), exchange rate (ER) and positive with interest rate (DR). The correlation matrix shows interest rate (DR) has a significant negative relation with remittances and insignificant positive with exchange rate (ER). Lastly the exchange rate depicted statistically significant positive relationship with remittances (REM).

The overall results of the correlation matrix show that the selected variables of the model have both positive and negative relationships with the housing price index. Furthermore, the results of the pair-wise correlation matrix confirm that there is no problem of multicollinearity among the regressors.

TABLE 5.1
Descriptive Statistics

	LNHPI	LNGDP	LNDC	LNCPPI	LNPOP	LNER	LNREM
Mean	5.192	19.418	2.197	5.002	0.728	4.707	7.337
Median	5.33	19.422	2.251	4.994	0.737	4.652	7.367
Maximum	5.556	19.651	2.639	5.341	0.77	5.118	8.175
Minimum	4.578	19.105	1.833	4.675	0.683	4.446	6.812
Std. Dev.	0.319	0.146	0.28	0.171	0.024	0.196	0.267
Skewness	-0.784	-0.174	0.05	0.083	-0.598	0.894	0.49
Kurtosis	2.159	2.271	1.677	2.389	2.563	2.624	3.95
Jarque-Bera	5.272	1.088	2.935	0.667	2.704	5.561	3.103
Probability	0.072	0.58	0.23	0.717	0.259	0.062	0.212
Sum	207.671	776.721	87.866	200.09	29.139	188.279	293.475
Sum Sq. Dev.	3.958	0.827	3.056	1.135	0.022	1.491	2.787
Observations	40	40	40	40	40	40	40

TABLE 5.2
Pair-wise Correlation Matrix

LNHPI	1.000						
LNGDP	0.751 (0.000)***	1.000					
LNCPI	0.946 (0.000)***	0.775 (0.000)***	1.000				
LNPOP	0.842 (0.000)***	-0.726 (0.000)***	-0.967 (0.000)***	1.000			
LNDC	-0.484 (0.002)***	-0.263 (0.115)	-0.235 (0.161)	0.021 (0.903)	1.000		
LNER	0.772 (0.000)***	0.671 (0.000)***	0.920 (0.000)***	-0.976 (0.000)***	0.120 (0.481)	1.000	
LNREM	0.847 (0.000)***	0.751 (0.000)***	0.819 (0.000)***	-0.733 (0.000)***	-0.442 (0.006)***	0.638 (0.000)***	1.000
	LNHPI	LNGDP	LNCPI	LNPOP	LNDC	LNER	LNREM

Note: *, **, *** “represent the level of significance at 10%, 5% and 1% respectively”.

5.2. Unit Root Test

The results of different unit root test of the selected study variables are presented in Table 5.3. The ADF, PP and KPSS tests was conducted both with constant and constant along with trend jointly. The results of these tests showed that housing price (HPI), gross domestic product (GDP), and remittances (REM) are stationary at level. On other hand inflation (CPI), population growth rate (POP), interest rate (DC), and exchange rate (ER) are stationary at first difference.

As evident, the variables under study analysis have different integrating order. In the mixed order of integration, the best suitable estimation technique to apply is Autoregressive Distributed Lag Model (ARDL) developed by “Pesaran and shin (199) and Pesaran et al (2001)”.

TABLE 5.3
Unit Root Tests

Variables	Level			1st Difference			Order
	C			C			
	ADF	PP	KPSS	ADF	PP	KPSS	
lnHPI	-3.162	-2.251	0.712*	-2.999	-3.138	0.415**	I(0)
	(0.030)**	(0.193)		(0.044)**	(0.032)**		
lnCPI	0.058	-0.003	0.774	-1.73	-4.642	0.239***	I(1)
	(-0.958)	(0.953)		(0.408)	(0.001)***		
lnPOP	1.559	0.798	0.696*	-0.538	-4.889	0.275***	I(1)
	(0.999)	(0.993)		(0.871)	(0.000)***		
lnGDP	-1.426	-4.188	0.900	-1.047	-65.272	0.123***	I(0)
	(0.557)	(0.002)***		(0.724)	(0.000)***		
lnREM	-0.998	-2.388	0.761	-5.732	-34.771	0.500*	I(0)
	(0.744)	(0.152)		(0.000)***	(0.000)***		
lnER	-1.061	0.308	0.774	-1.843	-3.492	0.239***	I(1)
	(-0.72)	(0.976)		(0.354)	(0.014)**		
lnDC	-2.434	-1.946	0.228***	-3.539	-3.539	0.135***	I(1)
	(0.14)	(0.309)		(0.012)**	(0.012)**		
Variables	Level			1st Difference			Order
	C&T			C&T			
	ADF	PP	KPSS	ADF	PP	KPSS	
lnHPI	-1.641	-0.636	0.193*	-4.14	-4.115	0.097***	I(0)
	(0.758)	(0.9)71		(0.012)**	(0.013)**		
lnCPI	0.058	-1.405	0.109***	-1.796	-4.575	0.233	I(1)
	(0.958)	(0.844)		(0.685)	(0.004)***		
lnPOP	-1.794	-0.419	0.147**	-1.282	-4.935	0.206*	I(1)
	(0.68)	(0.983)		(0.874)	(0.002)***		
lnGDP	-3.841	-38.37	0.105***	-0.773	-65.669	0.098***	I(0)
	(0.027)**	(0.000)***		(0.958)	(0.000)***		
lnREM	-6.341	-6.341	0.128**	-5.644	-34.715	0.500	I(0)
	(0.000)***	(0.000)***		(0.000)***	(0.000)***		
lnER	-2.497	-1.294	0.109***	-2.407	-3.591	0.233	I(1)
	(-0.328)	(-0.875)		(-0.37)	(0.044)**		
lnDC	-2.312	-1.807	0.155*	-3.558	-3.558	0.073***	I(1)
	(0.418)	(0.682)		(0.047)**	(0.047)**		

Notes: Table 5.3. “Indicates the outcomes of the ADF, PP, and KPSS tests P-values are shown in parenthesis. *, **, and *** signify that the null hypothesis is rejected at 10%, 5%, and 1% significance levels, respectively”.

5.3. Optimal Lag Length selections Criteria

By considering the sample size of the data and number of the variables the optimal lag selection criteria are captioned in the table 5.4. The maximum number of lag length for Vector Auto Regressive process is 3. The results show that all criterions choose the optimal lag order 3 except the Log L. On the basis of AIC, SC, LR, HQ and LR criterion lag length 3 is used for ARDL model.

TABLE 5.4
VAR Lag Order Selection Criteria
HPI, GDP, CPI, POP, DC, ER, REM
Time Period: 2011Q1-2020Q4

Lag	LogL	LR	FPE	AIC	SC	HQ
0	369.046	NA	7.47E-18	-19.570	-19.265	-19.463
1	637.527	420.861	5.52E-23	-31.434	-28.996	-30.574
2	716.561	93.987	1.47E-23	-33.057	-28.486	-31.446
3	814.694	79.567*	2.57E-24*	-35.713*	-29.008*	-33.349*

Note: * “denote the lag order selected by the criterion”.

LR = “Sequential modified LR test statistic”

FPE = “Final prediction error”

AIC = “Akaike Information criterion”

SC = “Schwarz information criterion”

HQ = “Hanan-Quinn information criterion”

5.4. ARDL Bounds Testing

To determine the long run relationship between housing price index (HPI) and gross domestic product (GDP), inflation rate (CPI), population growth rate (POP), interest rate (DR), exchange rate (ER) and remittances (REM) ARDL bounds testing is applied. In Table 5.5, the results of the ARDL bound test are presented. F-statistics

is determined to be 17.025, which exceeds 5% significance level's upper bound value of 3.28. So, we rejected the null hypothesis of no cointegration in favor of the alternative that there is a long-term connection between housing price (HPI) and study variables. The computed F-statistics established the cointegration among the variables of the model. After that relationship between housing prices (HPI), Gross domestic product (GDP), inflation rate (CPI), population growth rate (POP), interest rate (DR), exchange rate (ER), and remittances is assessed over the long run. These results are shown in Table 6.6

TABLE 5.5
ARDL Bound Testing (Co-integration) ARDL (1, 1, 0, 0, 1, 0, 0)
Dependent variable; HPI

Significance Level	Critical Value		F-Statistics
	Lower Bound	Upper Bound	
10%	1.99	2.94	
5%	2.27	3.28	17.025
2.50%	2.55	3.61	
1%	2.88	3.99	

Note: Bound test for cointegration value are based on Naryan (2004) Restricted Constant and no Trend.

5.5. Estimated Long Run Dynamics

The coefficient of gross domestic product shows there is positive relationship between gross domestic product (GDP) and housing price (HPI). The results indicate that 1% increases in the gross domestic product (GDP) increases the housing prices (HPI) by 1.43% and this relationship is significant at 5% level of significance. This study finding is consistent with previous studies (Baharudin & Jusoh, 2019; Reen & Razali, 2016; San Ong, 2013; Tripathi, 2019). The increase in the gross domestic

product (GDP) boosts the income of the people. This increases the demand for housing, and prices increase with this growing demand.

There is positive and statistically significant long run relationship between housing price (HPI) and inflation rate (CPI). The estimated results reveal that 1% increase in the inflation rate (CPI) increases the housing prices (HPI) by 3.54% and relationship is significance at 1% level of significance. This result is supported by various previous studies (Dumičić et al., 2012; Parrikar, 2019; Pillaiyan, 2015; Umar et al., 2019). The impact of inflation in increasing construction costs is significant in the case of Pakistan. The Consumer Price Index (CPI) increased by 15% in 2018-19. Moreover, the price index for construction materials grew by 16% during the same period (Pakistan Bureau of Statistics). This increase in inflation rate (CPI) caused soaring housing prices (HPI).

Population growth rate (POP) has positive and statistically significant association between housing prices (HPI) in case of Pakistan. The increase in 1% of population growth rate (POP) causes 12.99% increases in the housing prices (HPI). The outcome is also consistent with prior research (D Trofimov & CD Xuan, 2018; (San Ong, 2013) and (Aris, 2018). Pakistan placed 6th in the world population with 207 million inhabitants, and growth rate of 2.4% (PBS Census, 2017). This growing population created a supply and demand gap in the country, so rising demand increased the price of housing in Pakistan.

The variable interest rate (DR) shows the negative and statistically significant association between housing prices (HPI). The results indicate that 1% increase in interest rate (DR) decrease the housing prices (HPI) decrease by 0.26% and vice versa. This result of the study is according to economic theory (high cost of financing

decreases housing purchases), and prior empirical studies (Simo-Kengne et al., 2013; Umar et al., 2019; Valadkhani et al., 2019).

Similarly, the exchange rate (ER) and remittances (REM) show a positive and insignificant relationship with housing prices (HPI) in Pakistan. The overall long run estimates show that gross domestic product (GDP), inflation rate (CPI), population growth rate (POP) has positive and statistically significant impact on housing price (HPI). Whereas, interest rate (DR) has negative and statistically significant impact on housing prices (HPI). The exchange rate and remittances results show a positive and insignificant relationship with housing prices (HPI) in the long run.

TABLE 5.6

Long Run Estimates of ARDL model (1, 1, 0, 0, 1, 0, 0)

Dependent Variables: Housing price (HPI)

Time Period: 2011Q1-2020Q4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP	1.437	0.537	2.674	0.013
LNCPI	3.539	0.672	5.270	0.000
LNPOP	12.993	5.112	2.541	0.017
LNDC	-0.260	0.101	-2.559	0.017
LNER	0.635	0.517	1.228	0.231
LNREM	0.077	0.100	0.766	0.450
C	3.054	11.607	0.263	0.795

5.6. Estimated Short Run Dynamics

Table 5.7 shows the results of short-run estimates of the ARDL model. The estimates show that inflation rate (CPI) has positive and statistically significant impact on housing prices (HPI) in short run. 1% increases in inflation rate (CPI)

causes 0.44% increase in housing prices (HPI). Similarly interest rate has positive impact on housing prices in short run with a magnitude of 0.08%. Furthermore, population growth rate (POP), exchange rate (ER), and Remittances (REM) shows positive but statistically insignificant impact on housing price (HPI) in case of Pakistan. Whereas, gross domestic product (GDP) has negative and insignificant impact on housing prices (HPI) in short run.

The error correction term (ECT) has a negative and highly statistically significant value at 1% level of significance indicating a long-run relationship between housing price (HPI) and selected macroeconomics variables. The negative value of ECM represents the rate of adjustment from short-run to long-run equilibrium. The coefficient value of $ECM = -0.46$ shows that short-term disequilibrium be adjusted at the speed of 46%.

The lag value of housing price (HPI) is positive and significant, while the lag of interest rate (CPI) is negative. This demonstrates that both lags significantly impact housing prices in the short run. The lag value of gross domestic product (GDP) shows a negative and insignificant relationship.

TABLE 5.7

Short Run Estimates of ARDL model (1, 1, 0, 0, 1, 0, 0)

Dependent Variables: Housing price (HPI)

Time Period: 2011Q1-2020Q4

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNHPI(-1))	0.817	0.079	10.395	0.000
D(LNGDP)	-0.040	0.032	-1.249	0.224
D(LNGDP(-1))	-0.011	0.031	-0.349	0.730
D(LNCPI)	0.446	0.214	2.087	0.048
D(LNPOP)	0.680	1.040	0.654	0.519
D(LNDC)	0.088	0.037	2.371	0.026
D(LNDC(-1))	-0.116	0.037	-3.166	0.004
D(LNER)	0.031	0.093	0.336	0.740
D(LNREM)	0.014	0.011	1.246	0.225
D(ECM(-1))	-0.426	0.139	-3.075	0.005
R – squared	0.821	Mean dependent var	0.027	
Adjusted R – squared	0.754	S. D. dependent var	0.023	
S. E. of regression	0.011	Akaike info criterion	-5.874	
Sum squared resid	0.003	Schwarz criterion	-5.425	
Log likelihood	109.858	Hannan – Quinn criter.	-5.721	
F – statistic	5.415	Durbin – Watson stat	2.039	
Prob(F – statistic)	0.001			

5.7. Diagnostic Tests

TABLE 5.8
Diagnostic Tests

Diagnostic checking	t-statistics / F-statistics	P-value	Results
Jarque-Bera test	1.0714	0.5853	Error terms are normally distributed
LM Test for Serial Correlation	0.0350	0.8087	No autocorrelation
Breusch-Pagan-Godfrey Test (Heteroskedasticity)	0.2204	0.9820	No heteroskedasticity
Ramsey REST Test	1.4978	0.1478	No model specification bias.

5.7.1. Normality Test

The figure 5.1 depicted the descriptive stats of selected variables. The results show that the probability value of Jarque Bera is 0.585251. This is larger than the 5% level of significance. As a result, we accepted the null hypothesis of normality and infer that the time-series data of all the study variables are normally distributed.

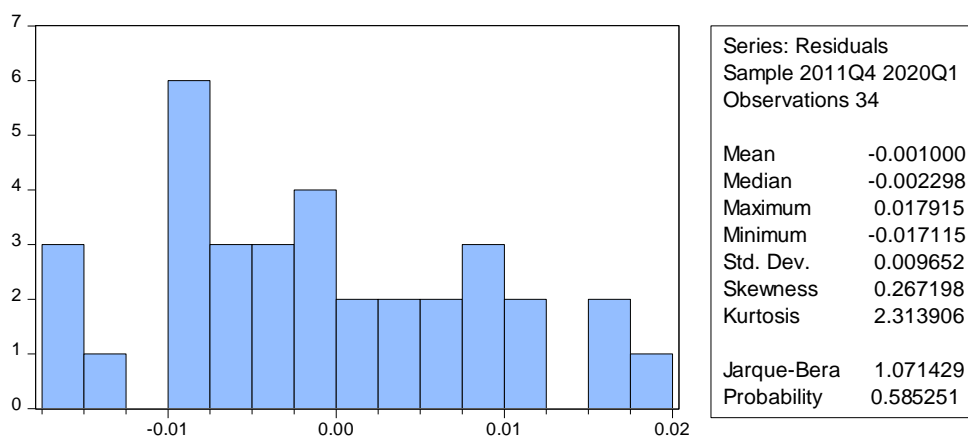


Figure 5.1

5.7.2. Breusch-Godfrey Test (Serial Correlation LM Test)

To check the issue for serial correlation in the model. The study employed the "Breusch-Godfrey Serial Correlation LM test." The P-value for Chi-Square is 0.8087, which is more than the 5% level of significance. Hence we accepted the null hypothesis of no serial correlation and infer that the model has no autocorrelation.

5.7.3. Breusch-Pagan-Godfrey Test (Heteroskedasticity)

To detect the existence of heteroscedasticity issue in the model, we have conducted "Breusch Pagan-Godfrey Test". The test results reveal that the model has no heteroscedasticity as the Chi-square P-value of 0.9820 is larger than the 5% significance level. As a result, we do not reject the null hypothesis and draw the conclusion that the model is homoscedastic.

5.7.4. Ramsey RESET Test

To test the model's specification, we used the Ramsey Rest test. The P-value of 0.1478 is more than the 5% critical value. As a result, we accepted the null hypothesis and infer that the model has no specification bias.

The stability test provides the information regarding the estimated model shift or not with the time. We have checked the stability of estimated parameters via the "Cumulative Sum (CUSUM) test and Cumulative Sum Square (CUSUMSQ)" test respectively.

Figures 5.2 and 5.3 shows that, at the 5% level of significance, the fitted blue lines fall within the critical limits of the red lines. As a result, we conclude that the calculated model is stable during the study period.

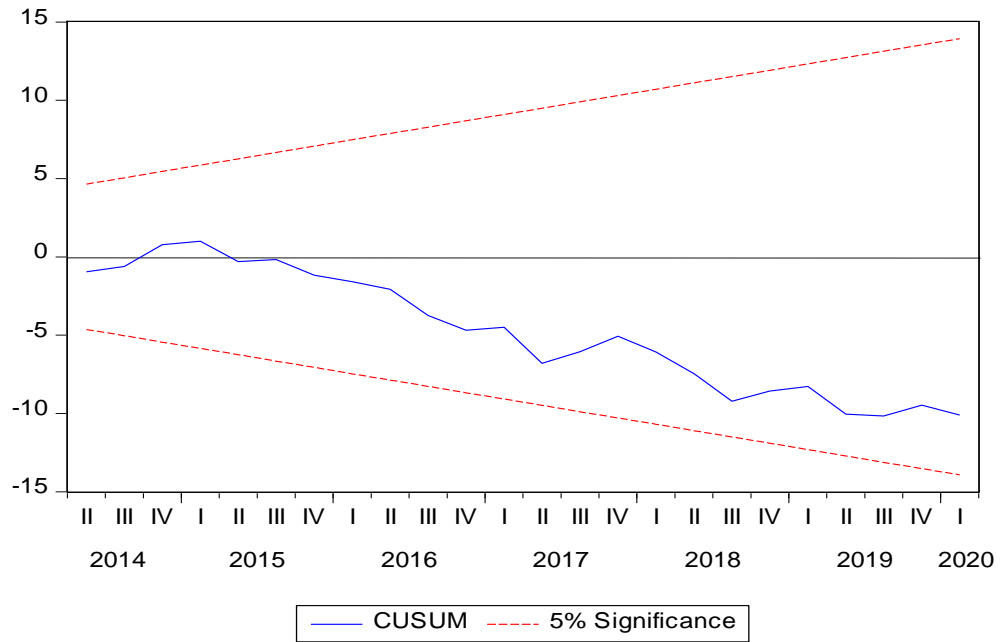


FIG.5.2
CUSUM TEST.

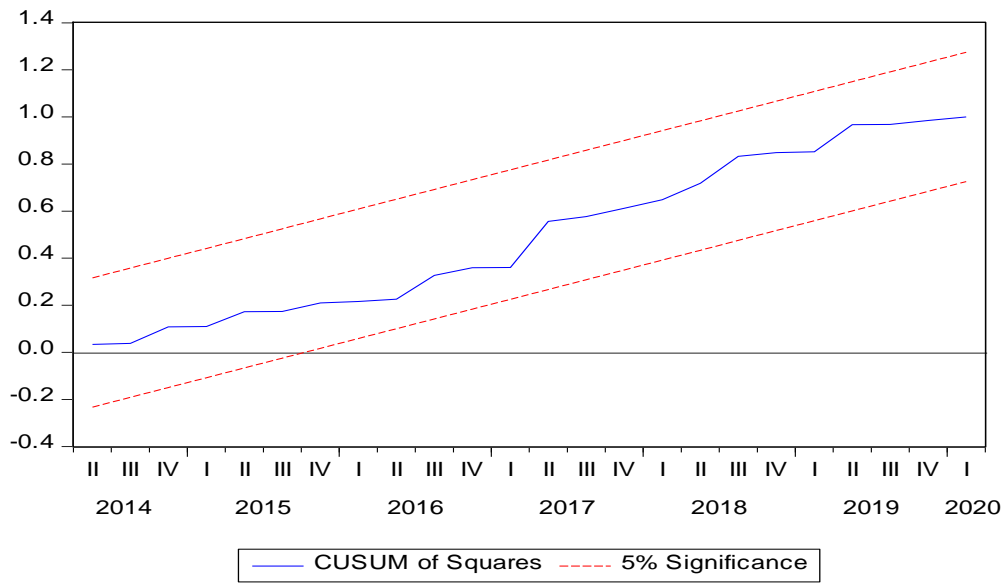


FIG.5.3
CUSUMSQ TEST.

CHAPTER 6

SUMMARY AND POLICY RECOMMENDATIONS

6.1. Introduction

This chapter discusses some key findings of the analysis and a summary of the study. Furthermore, give some policy recommendations based on this study to improve the housing conditions in Pakistan. Lastly, discuss the limitations and future study recommendations.

6.2. Summary of the Study

Housing is considered a basic human need after food and cloth. Millions of people across the globe are striving hard to own quality housing. In the past many years, Pakistan has been confronting with housing issues which are in both quantity and qualitative terms. This issue is more severe in big cities. The growing population and migration of people from remote areas for employment and better living facilities are the main reason for the deterring housing conditions. With the growing unaffordability of housing due to an increase in the housing prices in Pakistan and deterring economic condition, this study attempted to investigate the short run and long run macroeconomic factors of housing price in Pakistan. The existing studies mainly focus on the microeconomic attributes of housing demand in Pakistan and use the traditional approach of income and utility to determine the housing price.

At the outset phase, the study undertakes a detailed descriptive analysis of the housing sector of Pakistan and found that rapid population growth, unplanned urbanization, non-availability of mortgage financing, escalating cost of land and construction, growing unaffordability/ Low saving, prevailing plot culture and absence of viable housing policy and deterring economic conditions are key factors of

housing deficit in Pakistan. In the second phase the study uses quarterly data from Q1 2011 to Q4 2020, and an estimation technique of the Autoregressive Distributed Lag Model (ARDL) to analyze the macroeconomic factors of housing price in Pakistan. The findings of the study show that there is long run relationship between housing price and gross domestic product, inflation rate, population growth rate, interest rate, exchange rate and remittances. Furthermore, gross domestic product, inflation rate, population growth rate and interest rate are the key macroeconomic factors that affect housing price in short and long run.

6.3. Policy Recommendations

On the basis of the descriptive and empirical study analysis and its findings, the study gives the following recommendations to improve the housing conditions in Pakistan.

Empirical study basis Recommendations:

By referring to the empirical results, policymakers should keep a close eye on the changes of these macroeconomic factors, as they have a significant impact on short-run and long- run housing prices in the Pakistan.

- Strategies may be developed to promote to increase of the housing supply in order to mitigate the impact of the expansion of the gross domestic product (GDP) and the population growth rate (POP) on housing prices.
- The increase in inflation rate (CPI) is major concern to be addressed. The impact of inflation in increasing construction costs is significant in the case of Pakistan. Government may take policy measures to drop down the increasing rate of inflation (CPI) to decrease the price of construction materials. This will not only increase the construction activities and boost

the economy of Pakistan but also increase the supply of housing units.

- Aside from that, monetary policy may be changed to mitigate the negative impact of interest rates, as higher interest rates erode people's economic capacity to buy assets, and lowering demand. The government should encourage the financial sector, especially commercial banks, to promote the concept of mortgage financing and advance loans to people for buying houses on easy terms and conditions.

Descriptive analysis basis Recommendations:-

- Since demographic factors have a significant impact on housing prices, there is a dire need to increase the supply of housing units particularly for the lower and middle-income segment based on their preferences and affordability.
- To reduce the high cost of land for residential development, the government should utilize the public land which has been rest abandoned.
- To stop the horizontal expansion of cities, building regulations must be relaxed to allow high-rise building construction.
- To increase the supply of low-cost housing units, the government should apply the Affordable Housing Obligations (AHOs) model to all the new or existing constructions.
- Rather than pursuing unrealistic goals for new housing units, the government takes active measures to regularize existing informal settlements/slums, providing them with infrastructure and basic amenities as well as legal property rights. This would not only lower the cost of new construction/ infrastructure, but will also enhance the living conditions of millions of people.

- To promote the health and well-being of society, the current housing policy must be revisited, with a focus on sustainability and affordability for public housing schemes.

6.4. Limitations of the Study

The limitation of this research study is the limited number of data observation (40), as data of housing price (HPI) is available at zameen.com from 2011.

6.5. Recommendations for future research

This study addressed the gross domestic product (GDP), Inflation rate (CPI), Population growth rate (POP), Interest rate (DR), Exchange rate (ER), and Remittances (REM) as macroeconomic factors of housing price. However, a future study of the housing market in Pakistan could be considering additional factors like the construction cost, unemployment rate, capital expenditure, Stock prices, Property taxes, and Foreign direct investment.

In addition, a similar study can be conducted to investigate the impact of these macroeconomic factors on commercial and residential property prices. One can also study the nexus of macroeconomic variables of both fiscal and monetary policies to real estate investment in Pakistan.

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