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CO-MOVEMENT BETWEEN STOCK MARKET AND REAL ESTATE MARKET

Faryal Ikram*

*Department of Commerce, Karachi University

*faryalikram80@gmail.com

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Corresponding Author: *
Faryal Ikram

Abstract

The aim of this study is to examine the Co- movement between Stock Market and Real Estate in Pakistan. This study uses the time series data from January 2011 to June 2020 and assumes that the data is stationary. If the data is not stationary, the first difference (time-to-time periods) will be calculated to make it stationary. This process was created under a unit root test. Johnson's co-integration test is used to capture a long-term relationship between the stock price and the house price index. Johansen Maximum Likelihood (ML) procedure can further be used to determine whether there is a stable long-run relationship between the variables. Johnson's cointegration will be followed by VECM for more detailed analysis (a method of creating a relational model between economic variables in a non-structural way). These are vector autoregressive (VAR) and vector error correction (VEC) models. The volatility dynamics was tested using the GARCH and EGARCH models. The symmetric GARCH pattern cannot capture leverage or asymmetric effects (volatility is higher in a bear market than in a bull market). Exponential GARCH (EGARCH) is designed to eliminate the leverage effect of volatility. The results imply that there is no long-term relationship between stock price and real estate price in Islamabad and Karachi. But co integration exists in Lahore data which demonstrate an overall relation, no long term relationship with a very weak short-run relationship between variables. The economy in Pakistan is still growing and there is no wealth effect or credit price effect in the country where the average price of real estate is high. Real estate is also considered to be consumer goods in Pakistan. However, because of the critical role of the broker the price of real estate is very high. The government should play an important role in regulating the real estate prices, which can help to control speculation in this market.

خلاصہ

اس مطالعے کا مقصد پاکستان میں اسٹاک مارکیٹ اور رئیل اسٹیٹ کے مابین تعاون کی جانچ کرنا ہے۔ یہ مطالعہ جنوری 2011 سے جون 2020 تک کے ٹائم سیریز کے اعداد و شمار کا استعمال کرتا ہے اور فرض کرتا ہے کہ ڈیٹا سٹیشنری ہے۔ اگر ڈیٹا اسٹیشنری نہیں ہے تو ، پہلے فرق (وقت سے وقت تک) کا حساب لگایا جائے گا تاکہ اسے اسٹیشنری بنایا جا سکے۔ یہ عمل یونٹ روٹ ٹیسٹ کے تحت بنایا گیا تھا۔ جانسن کا شریک انضمام ٹیسٹ اسٹاک کی قیمت اور گھر کی قیمت کے انڈیکس کے درمیان طویل مدتی تعلقات کو حاصل کرنےکے لیے استعمال کیا جاتا ہے۔(Johansen Maximum Likelihood ML) کے طریقہ کار کو مزید اس بات کا تعین کرنے کے لیے استعمال کیا جا سکتا ہے کہ آیا متغیرات کے درمیان مستحکم طویل مدتی تعلق ہے یا نہیں۔ جانسن کو انضمام کے بعد وی ای سی ایم مزید تجزیے کے لیے

(غیر ساختی انداز میں معاشی متغیرات کے درمیان رشتہ دار ماڈل قائم کرنے اور ویکٹر ایرر کریکشن (VAR)کا طریقہ وہ ایک ویکٹر آٹو ریگریسیو ماڈل EGARCH اور GARCH ہیں۔ اتار چڑھاؤ کی حرکیات کو (VEC)ماڈل ماڈل لیوریج یا غیر GARCHماڈلز کے ذریعے چیک کیا جاتا ہے۔ سڈول متناسب اثر کو نہیں پکڑ سکتا (بڑھتی ہوئی مارکیٹ کے مقابلے میں گرنے GARCHوالی مارکیٹ میں اتار چڑھاؤ زیادہ ہوتا ہے)۔ ایکسپونینشل تیار کیا گیا ہے تاکہ اتار چڑھاؤ کے لیوریج اثر سے نمٹا (EGARCH) سکے۔
نتائج سے ظاہر ہوتا ہے کہ اسلام آباد اور کراچی میں اسٹاک کی قیمت اور رئیل اسٹیٹ کی قیمت کے درمیان کوئی طویل مدتی تعلق نہیں ہے۔ لیکن لاہور کے ڈیٹا میں کو انٹیگریشن موجود ہے جو کہ ایک مجموعی تعلق کو ظاہر کرتا ہے، متغیرات کے درمیان انتہائی کمزور قلیل مدتی تعلق کے ساتھ کوئی طویل مدتی تعلق نہیں۔ پاکستان میں معیشت اب بھی بڑھ رہی ہے اور ملک میں جہاں جائیداد کی اوسط قیمت زیادہ ہے وہاں دولت کا کوئی اثر یا کریڈٹ پرائس اثر نہیں ہے۔ رئیل اسٹیٹ کو پاکستان میں صارفین کی اشیا بھی سمجھا جاتا ہے۔ تاہم، بروکر کے اہم کردار کی وجہ سے رئیل اسٹیٹ کی قیمت بہت زیادہ ہے۔ حکومت کو رئیل اسٹیٹ کی قیمتوں کو کنٹرول کرنے میں اہم کردار ادا کرنا چاہیے، جس سے اس مارکیٹ میں قیاس آرائیوں پر قابو پانے میں مدد مل سکتی ہے۔

1.Introduction

1.1 Background

In many countries financial and macroeconomic variables insert an influence on real estate prices and stock prices globally. By adapting a series of economic reforms and opening new policies, Pakistan's economy has practiced enormous growth and attained a significant achievement over the last two decades. In recent years, Pakistan has experienced price fluctuations in the real estate and securities markets. Remarkable economic growth has created opportunities that have propelled Pakistan's major investment, equity and real estate markets into massive change, growth and expansion. On the other hand, since the three stock exchanges (Karachi Stock Exchange, Lahore Stock Exchange and Islamabad Stock Exchange) were merged into the Pakistan Stock Exchange in 2016, Pakistan's stock market functioned as a source of support, funding, reform and development public sector companies Yousuf, Imran and Ali,Shoaib. (2020).

Therefore, in order to ratify sustainable and steady economic development, examining the casual relationship between real estate and stock prices becomes a necessity. Managing an investment portfolio is absolutely a wise decision as it helps investors to save money and also provides steady rise in gain Ibrahim, M.H. (2010). A lot of determination and research is required to take decision of investment. There are many investment prospects in Pakistan. However, investing in real estate and stock market typically gives more profitable return. But choosing the best option between these two markets are quite difficult. Stocks require less money for investment, but investors having more capital like the real estate market to invest their money. Generally, both the stock markets and real estate markets in Pakistan have been developing rapidly. Therefore, it is necessary to discover the casual relationship between these two markets which will ultimately provide benefit to the potential investors who want to invest in Pakistan's real estates and stock markets also predict and diversify their investment portfolios.

1.2 Knowledge Gap

In the past years, many investors faced significant damages in stock markets and some ignored the chance to invest in real estate market. One major cause for the damages is the

knowledge gap of investors about these markets, because they are oblivious of the risks related to these the two markets, and they are unaware of transforming their investment portfolios to minimize these risks. Hence, this research introduces the investor basic rules, risks, and policies in stock markets and real estate in Pakistan. Moreover, by investigating co movement between these two markets it provides benefit to potential investors by educating about how to increase return by reducing risk Yousuf, Imran and Ali,Shoaib. (2020).

1.3 Real Estate Market and Stock Market in Pakistan

Two different avenues of investment are real estate and share. They both have their advantages and disadvantages. However, over the last few decades, both of these investment opportunities have, collectively, had somewhat similar returns in Pakistan. Any changes in these markets may have an impact on the economy of Pakistan through changes in business and economic activities. This situation is due to the steady devaluation of the Pakistani currency and the entrance of foreign investments and inflow of remittances in the real estate market and stock market through various channels. The influx of international capital (foreign investment and remittances) brings immense wealth, helping to stimulate directly and indirectly an increase in supply in the stock markets and real estate market.

The connection between stocks market percentage real estate and is a serious topic in investment all around the world and has been of great speculative interest for investors. Additionally, the relationships between both markets are also of need to financial regulators and policy makers. Therefore, a solid inference is needed and government interference is likely to succeed if both markets have strong inter connection. Jud, D and D. Winkler. (2002) have argued that real estate amounts have a less connection with stock prices but real estate market provides variation benefits for institutional and private investors. Case, K.E., J.M. Quigley and R.J. Shiller. (2005) have explained the intrinsic and active relation between the stock markets and real estate. In the past few decades, Pakistan has achieved rapid development in real estate market. The development of the real estate market has made a significant input to the quick development of Pakistan's economy and real estate has become an important investment sector.

The past data showed a boom in Pakistan's real estate and stock markets, which provided some better opportunities for investors to generate money-making investments. However, several investors have experienced tremendous losses in real estate markets in the past and missed the opportunity to invest in the stock market. One of the main reasons for the losses is the lack of information about these two markets. Investors are not aware of the risks associated with these markets and do not properly manage their portfolio investments to mitigate the risks associated with their investments. Moreover, the investment decision is based on the investor's propensity for risk-taking investment, for higher return and risk-free investment in risky investments in Pakistan. Liberal and risk-averse investors are always interested in risk-free assets due to investor's aggressive nature Batayneh, K.I., and A.M. Al-Malki. (2015).

This stretches to answer some specific areas of interest which would further investigate for Pakistan's markets, the systematical link between these two markets and whether any significant falls in stock market price led to fluctuations in the real estate market or vice versa. In history, even though not always, when stocks prices go down, bonds prices rise and their interest rates fall. But the relationship between stock market and real estate is somewhat less direct. If the prices of these two markets are analyzed it is found that price adjustment is not similar in both markets so it is very complicated to determine their relationship. When an investor invests in the real estate market, which includes a long-term investment and income will be generated through higher prices and rents from tenants, or the investment can be used for consumption. In real estate markets investment can be achieved both directly and indirectly. Whereas investing in the stock market is a good option if the investors do not have a large capital. Stocks are, in fact, liquid assets, which means that they make a return in the form of real cash within a very short period of time.

Although in real estate, houses are considered as consumption goods in Pakistan and also considered as substitute investment to stocks.

Pakistan real estate market was growing fast till 2019. Due to COVID-19, the real estate market faced serious hurdle. The real estate market is considered the mainstay of the Pakistan economy. Government has declared the real estate market as an industry which will lead the investment for the better growth. This new real estate market as industry is very suitable for industrious investors.

Since real estate market prices in Pakistan are anticipated to rise in the future because of new Government Impose excessive tax on investors which will discourage real estate investments. Additionally, cost of construction has already gone up massively in the past two years, so builders may also stop construction activities due to low demand and high risk of loss due to increasing inflation. In Pakistan real estates have been usually considered the most important investment selections for both households and firms. These real estate sector usually choose between physical assets such as houses, commercial plots and residential plots. On the other hand, stock markets choose between financial resources such as stocks and bonds. Traditionally houses are focused on much more among these assets in Pakistan as a result of which the prices of houses are markedly increased. Still both real estates and stocks are equally important.

1.4 Stock Investment

Stock investment is an investment where investors get benefit by purchasing common stocks from stock market through dividends distribution and capital gain. There are two types of company stock: common stock and preferred stock. Common Stock is a form of ownership in a firm called equity but Preferred stock has both features of equity and debt instruments. In this investigation, stocks are stated as common stocks (shares of the investment) for investors from the three stock exchanges (Karachi, Lahore and Islamabad Stock Exchange).

The Karachi Stock Exchange

The KSE-100 Index is running probably as a benchmark to break down costs on the Pakistan Stock Exchange (PSX) over a period. It was set up in 1991.

The Lahore Stock Exchange

The LSE-25 was made in October 1970 under the Securities and Exchange Commission by the Government of Pakistan in view of the necessities of the typical capital, Punjab.

The Islamabad Stock Exchange

ISE Network Index was launched in November 1996. ISE was merged with the LSE-25 in 2007 to create a unified trading platform to help increase market liquidity, advance amount finding, maximize transparency, growth business volume, broaden the investor base, limit risks and changes in trading, provide beneficial services to the investing public and improve the value of both exchanges.

1.5 Real Estate Types

There are 3 major types of real estate property in Pakistan: house property, residential property and vacant plot property. The types of residential buildings sold in Pakistan are considered as house property and are usually used as consumption. Therefore, this paper will focus on these three types of properties.

Two components can see the association between stock costs and land costs. These are abundance impact and credit impact. As expressed by Chen, (2001), Sutton, (2002), the abundance impact infers that houses can be utilized for two purposes, to be specific venture and shopper products. Thus, because of rising stock portfolio costs because of rising stock qualities, financial backers feel more alright with their resources, which inspires them to build their lodging interest by pushing the interest bend upwards, prompting value appreciation in land. Based on the credit-price effects, real estate theory serves as leverage for mortgages and credit-restricted enterprises, implying that rising house prices (higher mortgage guarantee) would make loans cheaper and easier for businesses and individuals at lower interest rates. This leads to an expansion of the firm's investment and an increase in the stock price in the future Kapopoulous and Siokis (2005).

The previous studies show the mixed results depending on the country's method of evaluation and economic conditions in terms of direction, magnitude and value of the casual relationship. There is a bi-directional causal relationship that reveals the dominance of asset control in developed economies. Evidence of the credit-price effect can be found in emerging markets. The results appear to be significant, given the similar development of the stock and real estate markets in developed economies such as the US and the UK. It enables the real estate market to act as an ideal replacement for investment as a result of higher share prices, which in turn leads to reallocation to household portfolio housing.

The most scientific studies are carried out in developing countries and few in developing countries, and none in Pakistan. It is, hence, essential to research the connection between land and stock costs to advance stable and feasible monetary improvement with regards to Pakistan.

1.6 Objective of thesis

Objective of this thesis is to examine the casual relationship between real estate and stock market using land price data available at Zameen.com as real estate price, and using Stock Exchange of Karachi 100 Index as stock market price. Records of this paper between January 2011- June 2020. The main objectives are

1. Study the causal relationship between the real estate market and the stock market.
2. Study the short and long term relationship between the real estate sector and the stock market.

2.Review of Literature

In the early literature investors had two main well documented investment alternatives, i.e., real estate assets and securities, Wang and Li (1995), Chen (2001), Green (2002), Naranjo and Ling, (1999). According to some researchers, stock prices and real state property prices were positively related, whereas according to other researchers both investments had a negative relation. Some researchers described real estate market as a tool of investment which has a substitute relation with stock and other financial assets, i.e., bonds, Thibodeau, Brueggeman and Chen (1984). These two investments, i.e., stocks and real estate markets possess the quality of substituting during investment opportunities. They reasoned that any increase in one of market affects the other market as well. Thus the positive relation between the two investments Kim, (1993), Lee and Chen, (1998).

In previous researches, researchers analyzed the relationship between stock and real estate market for developed countries in which they found different results in studies; some have positive and some have negative relationship among these two assets. However, investors have found low opportunities of variation in these two markets and result was indifferent whether positive or negative correlation. Most researchers investigated short and long term relation among these two markets. For short run authors suggestions were not to hold any asset in real estate and stocks for sufficient portfolio allocation. In the long term relation these two assets have wealth and credit effect. In the last decade of 20th century the relationship between stock and real estate prices has gained significant attention in research literatures. Researchers used different methods of analysis in first world and economically developed Asian countries and made a lot of aspects of the relationship among stock and real estate prices. Some authors studied the relationship between these two markets in the context of market segmentation or integration theory, with some emphasizing on wealth or credit price effect and some exploring the causality among the 2 markets.

The earlier category focusses on integration theory in the real estate market and stock market. These 2 markets are very important for the economy of any country, so understanding of market integration is important for a researcher. The instabilities in any market's essentials can shift capital towards other pertinent market. The investment choice of investors, financial regulators and policy makers depends on inter-relationship between these two markets. Government intervention plays a strongly connected relationship in both markets. The innate dynamic association among the stock and housing markets was proposed in different studies. These two assets constitute a reasonable replacement for investment allocation provided

that the stock and real estate markets are consolidated well and can affect the price volatility in the following market significantly. On the contrary, combining the two markets means that the investment strategy can reduce risk and intensely affect the inclusion of two assets in the portfolio (Fuerst and Lin, 2014). All findings are unclear from the literature on this topic. Some studies have evidence supporting segmentation. While some scholars accept that there is integration between the 2 asset markets. The second category of researchers applies Granger causality tests in vector autoregressive (VAR), threshold error correction model (TECM) and vector error correction (VEC) models to consider the relationship between the two markets (Keim and Gyourko, (1992); Okunev et al., (2000); Su, (2011); Chang and Sim, (2006); Su et al., (2011); Shirvani et al., (2012) McMillan, (2012); Relationship between these 2 markets isn't limited to one country and there have been many different research studies from different countries that explore the relationship between these two markets. Sutton, (2002) analyzed the relationship between the economies of USA, UK, Canada, Australia, Netherland and Ireland using the VAR model whose results supported the wealth effect that real estate price will respond positively to any change in stock price. On the contrary, the research done by (Chang and Sim, 2006) applying the VAR model learnt that the result has negative effect. Their results were in favor of the credit-price effect. Although, according to (Miller,2014), among lower frequencies the real estate and stock returns are correlated generally with some variations in the result across different periods of the sample. They used the VAR model, VECM and also TECM to study the relationship among these markets. The research done by Chang, (2013) which was based on result of both positive and negative effect showed that from 1890-2012, they had a positive relation while from 1998-2002 a negative relation was found. The use of GDP growth for controlled variable in the same paper showed that stock price and real estate price have positive relation to one another. Therefore, GDP growth calculation can be helpful to find relationship between these two markets.

The third research group deals with real estate and stock market relationships in or lead-lag (Granger causality) relationships (Siegel and Ibbotson, 1984; Hartzell, 1986; Hartzell and Eichholtz, 1996; Vandell and Worzala, 1993; Titman and Quan, 1999). While relationships may give extra knowledge regarding the co-movement of variables, they do not inform us about long-term co-integration between these markets. These current researches primarily use standardized time-domain methods, including the afore-named co-integration techniques, correlation analysis and casualty tests. Exceptions do come, nevertheless. Models like dynamic conditional correlation (DCC) are introduced by Liow (2012) to test time-dependent co-movement between real estate 7 stock markets. Sun and Louis (2013) investigated a direct correlation among housing and stock returns over the time frame of 1,2,3 and 4 years. In other words, the current literature generally overlooks the time-dependent category of the two market relationship. Additionally, these time-range studies of these relationships usually do not discuss the frequency-variation.

The research about transition mechanisms (Chen, 2001; Case and others, 2005; Siokis and Kapopoulos, 2005) allow financial decision-makers and investors to forecast possible success or transfer from one to the other market. Firstly, the "wealth effect" suggests that a rise in share prices can also effect a surprising stock gain and raise consumption and prices of real estate market; on one hand the benefits of real estate are both consumption and investment. The main two channels for this mechanism are:

The first mechanism is the "wealth effect". It proposes that a rise in stock price or an unexpected increase in share prices will increase consumption and investment in real estate market which may increases real estate prices. For Australia, Chen (2001) for Taiwan, Ibrahim (2010) for Thailand, several authors researched wealth effects like Abelson et al (2005) and Siokis and Kapopoulos (2005) for Greece, van den End and Kakes (2004) for Holland. Winkler and Jud (2002) also investigated the impact of housing as well as inventory on consumption on income, Benjamin et al., (2004), Jiang, Chang and Su (2013), Al-Malki and Batayneh (2015)

and Alp, Morri, Atasoy and Coskun (2018). Recent studies have focused a lot on cost variations especially in housing prices. More precisely, considering recurrent financial crises across the globe, the contribution of stock price variations in real estate domains has been given a lot of attention. The argument is that since it is both an investment as well as consumer good, the variations in stock market might affect real estate prices via the popular wealth effect theory (Ibrahim, 2010). This theory presumes that the investment in real estate can be used for investment as well as consumption. Hence, due to the increase in the value of share caused by soaring stock prices portfolio may increase, investors will be more at ease about their wealth which might encourage them to demand more for real estate tilting the demand curve uphill due to increase in real estate prices Al-Malki and Batayneh (2015).

Another medium is credit price impact that clarifies the relationship among stock and real estate prices. A credit policy influence suggests a simple relation running from real estate market prices to share prices. It can lead to house consumption and increase in business expenditure. The rises in investment and consumption will potentially result in share price increases. Chang and Sim (2006) looked into the impact of credit price in Korean market. Here rising in real estate prices can be a source of security to credit contained for real estate and establishments. This can cause an increase in the prices of real estate and also cause the investments from companies to increase. Both rises will eventually lead to a rise in share prices (via a prediction that earnings will rise due to increase in demand and firm being more efficient). Subsequently, therefore it can influence a series of abundance impacts brought about by heightening stock costs and an expanding cost through a cycle for offer and lodging both McMillan (2012). Total price of real estate in term of both investment and consumption can increase through an increase in stock market gain. The other can be managed through portfolio of the investor. As soon as the stock price increases, the portfolio of the investor in the stock market will also rise causing a redistribution of assets in portfolio through buying of assets like property and selling of the stock. Secondly, it is showed by the "credit-price effect" that a rise in real estate market price can cause a rise in share prices in turn. These result may lead to booms and busting on the macroeconomic cycle of these two markets.

Policy-makers and investors try to forecast future outcomes through different mechanisms from one market to another by interpreting the simple relationship between the real estate (house) and stock market. The data from 1998-2006 was taken to do an empirical research by applying Granger casualty test, Gao Bo, Song Bo (2007). While keeping the exchange rates and international short term flows of capital as variables, Liu Lin and Zhu Mengnan (2010) used VAR models to empirically analyze the relationship among stock and real estate prices. Their results showed that the short-term international flows of capital can cause an increase in real estate prices.

Yan Tao (2013) used the data of Shandong from early 2002 till late 2010 to find the relationship between house and international flows of capital. It was found out that the international flows of capital affected domestic real estate prices the most. Co integration test, Granger causality test and VAR were used by Lin Tianyu and Tan Xiaofen (2013) to analyze that for short term the “liquidity effect” due to inflow of money can influence real estate prices. When understanding the possible dynamic relation among real estate and stock prices, Smith and Lean (2014) listed five channels. “Credit price effect” and “Wealth effect”, two main channels are already discussed.

The third channel is substitution effect where share prices will affect the prices of the houses via other channels than revelation to capital and credit effects. It arises from the theory of modern portfolio and states that if the market worth of the property of portfolio changes, the portfolio has to be redistributed. This theory also emphasizes that instead of assessing every asset individually the investors need to estimate the contribution overall of every asset in portfolio and also the relationship between risk and return, to gain the highest return in the market. The predicted value of expected returns variance can be managed by the investor by allocating differentiating weights to the portfolio’s property in accordance with his overall market

Elton et al., (2011). Fluctuations in stock price or real estate affects the expected return variance which can be changed. When value of stock will increase its share price will also increase and ultimately cause its weight to increase in the portfolio. The portfolio investor will have to move from stock shares to house shares after redistribution of the portfolio and continuing with the same weight. Both markets affect each other because with a rise the demand for housing, prices will go up (Markowitz, 1952). Investors can maximize their own revenue by choosing separate proportions among both the assets.

The theory of modern portfolio shows the relationship among the stock and the real estate market to be casual. As the stock prices will increase and reflect the profitability of firms, employees will get rumination like incentives. The rise in prices of the stock will in turn lead to a rise in value of real estate for the purpose of consumption as well as investment resulting in escalating housing prices in Greece. Siokis and Kapopoulos (2005) analyzed the relationship among real estate and stock prices by applying Granger casualty test. The same results indicated for Athens. Anderson (2014) studied the association of the stock market in the U.S with the house market in the period of 1987 to 2013. Researcher applied Granger causality using VAR and bivariate correlation test. The results of the bivariate correlation analysis stated that the stock market and real estate are correlated greatly and positively. The calculations of the causality tests deduced that a unidirectional causality exists among the stock and house market. The research done by Ibrahim (2010) in Thailand concluded that co-integration exists among housing rates and stock rates with stock prices being ahead of the housing prices.

The next channel describes compositional risk that relates change in the share of expenditure to change in prices of assets. A composition risk framework was proposed by Piazzesi et al., (2007) where the shares in housing expenditures forecasts excess returns on the stock and fluctuations in the share in housing expenses drive asset rates. Consumption risk also effect investors, where the asset rates are associated with variations in overall consumption growth, suggest that business cycle is the main driver in moving the stock rates. When there are recessions in this cycle, investors anticipating a greater consumption in future tend to sell their stocks due to a rise in current consumption, ultimately resulting in a decline in stock prices. In Piazzesi et al, (2007) framework, inter-temporal rate of substitution in consumption rises because of the decrease in value of the share prices when housing rates are decreased. Nonetheless, a rise in composition risk; i.e., changes in the investors' portfolio in comparative housing shares, causes a reinforcement in the investors purpose of expected savings. When assets are risk-free, the expected savings reduce declining pressure on share prices.

The fifth channel considers, auto-correlated acclimation of real estate rates to fundamental fluctuations will presumably establish slow lead-lag relationships among movements of stock market price and house prices. Because the stock prices lead the housing prices in growth, to manage fluctuations in economic essentials, the housing market is slow to adjust due to the lead-lag relationship determined by Granger's causality test. This causality can be directly because of the gradual adaptation of the real estate prices. In other words, housing prices may respond gradually to changes in the economic fundamentals but these fundamentals are necessary driving factors for movements in housing rates. Okunev et al. (2000) in a study resulted that disruptions in market essentials or in a market segment cause shift of the capital from effected market towards the unaffected market. If various markets are incorporated, then a higher degree of asset substitution will result, considerably affecting price changes in the pertinent markets. They also observed that, investors can easily establish diverse portfolios if markets are not incorporated which might have considerable repercussions for portfolio investment. This shows interrelationship of two markets, but the extent of co-variation is not known. The degree of integration will assist researchers in estimating the degree of causality of various markets in an economy is important in estimating the degree of causality, and in this case presented result was for anticipating securitized real estate and stock markets to be either an integration or segmentation. Keim and

Gyourko (1992) proposed a conclusive argument inquiring on what account should a correlation be expected between securitized real estate and stock markets. In western companies, company's value is tied up in real estate. Under such conditions, it would be fair to expect that fluctuations in the rates of the land and housing possessed by the company are related in part to the risk in returns of the stock market. Whereas a part of this real estate market risk may not have any correlation with the company's business risk, but it can be assumed that some is almost positively correlated with that risk. Therefore, a positive correlation should occur among real estate return and stock market return as a result of the proportion of real estate market risk which has an association with the economy. As a result, there are frequent economic determinants that might have an effect on the returns of these two markets. Correlation shows there is some level of relationship in which one market can affects the other market. It may either be positive or negative relation. High correlation values show that variation in positive or in negative movements in either will affect the other market significantly. The measure of covariation showing how much two variables change together. There will be no co-variation between them if two variables are independent of each other. Then different models taken by researchers for this study include was development of structural models of demand and supply as a proportion of a system of simultaneous equation or the development of reduced form equation models which combine demand and supply elements Hendershott and Abraham, (1992).

Titman, S and Quan, D.C. (1996) observed that labor cost, interest rate and the extent of economic activity affect not only real estate but stock prices as well. The expectation was that the extent of economic activity will positively affect both real estate and stock market prices. However, other possible elements can cause a negative correlation between the two. They continued to argue that this negative correlation caused by such elements can also be seen in economically developed countries like Japan and North America. For example, analysts have declared the technological advances and U. S's foreign competition to be one of the drivers of the recent reductions in the bull market's real wage rates. They also argued that other elements that cause a positive relation among stock and real estate market are of lesser importance in these economically developed states because individuals there are comparatively more volatile. When the rates in major cities like New York escalate too much, businesses can shift to less expensive areas and this along with supply responses is the reason for the little effect on the U.S. real estate market due to increased economic activity. In Asia, in countries like Singapore and Hong Kong, real estate rates and stock returns are not that important factors and tend to have a negative relation between them.

All older studies, diagnosing that standard of co integration technique do not recognize economic phenomena like the effect of market resistances and because of asymmetric information and high transaction rates on the adaptations to the long-term equilibrium, apply co integration modeling. Large variances that surpass the threshold cause these adaptations to the long-term equilibrium Fomby and Balke (1997). As Pitarakis and Gonzalo (2006) indicated other nonlinear relations such as threshold effects in the long-term equilibrium by omitting the presence of some components, which can cause confusions of equilibrium relationships since the co integrating vector will not be constantly approximated anymore Siegel and Ibbotson (1984), Hartzell (1986). In China, Su and Liu (2010) used this framework to analyse the bivariate relation among the real estate and stock market.

To summarize the review of established literature, most of the studies have been done in countries like USA and UK which are economically developed but still few studies have focused on European countries or countries in the EU panel. In Asia, China, Korea, Singapore, Thailand and Hong Kong were some countries where a number of individual studies were done. Their findings showed that the real estate and stock markets are co-integrated. They propose that in investment shares, the real estate and stock markets act as surrogates of each other, yet in Pakistan if investors make a combined portfolio of real estate and stock markets they will not gain the advantage of diversification. The observation was that in the long run the real

estate market is ahead of the stock market in investment gain and the same results were also seen in the short run. The main reason behind it is the credit-price in most of the real estate markets of Pakistan. These connections can prove to be very useful for investors if they want to predict stock and real estate markets in Pakistan, Imran Yousuf, Shoaib Ali (2020).

3. Data and Methodology

3.1 The Empirical Framework

The Data

The VAR model uses the following variables: house price (HP), share price (SP), plot price (PP) and residential plot price (RP). All factors are changed over to normal logarithms. Property costs and stock costs were gotten from three significant urban areas. (Karachi, Lahore, Islamabad). This study used monthly data taken from the official websites of the KSE 100 Index, LSE-25, ISE Network Index and Zameen.com. The data consists of 120 observations from January 2011 to December 2020.The fluctuation of these four variables are showed in Figure 1. A visual inspection of the index rows shows that all the rows follow the same upward and downward trends, showing cooperative movement between the rows. Figure 2 shows a graph of the return series for SP, HP, PP and RP. Month to month returns on land and stock costs are around nothing and are addressed by pooled instability.

Descriptive Statistics

Table 1 shows descriptive monthly statistics on stock prices, house prices, property prices, and residential plot prices in Pakistan. The table shows that average monthly prices are positive across stock prices and property prices. Monthly stock prices are higher than all real estate prices. However, given their standard deviation, stock prices are more volatile than real estate prices.

The frequency distribution of stock prices and property prices is abnormal. The coefficient of skewness for a normally distributed series is zero. However, a coefficient of skewness of zero is unlikely for real data, so Ballmer (1979) proposed an empirical rule: in case skewness is not exactly - 1 or extra noticeable than +1, the appropriation is remarkably slanted. In the event that the skewness is among - 1 and - 1⁄2 or + 1⁄2 and +1, the conveyance is modestly slanted. In the event that the skewness is among −1⁄2 and + 1⁄2, the conveyance is pretty much symmetric. Thus, the coefficient of asymmetry of share prices and real estate prices is between -1 and - 1⁄2, which indicates a moderate price bias in the aforementioned series. The kurtosis is usually much higher or lower, indicating extreme leptokurtic or extreme flatness (Parkinson, 1987). The evidence for the kurtosis relationship of stock prices and property prices ranges from 2.073, 2.12, 2.34 (RP) to 2.37, 2.79, 2.41 (PP) in Karachi, Lahore, and Islamabad, respectively, indicating that the line is low and has a long tail for all selected variables.

The Jarque Bera (JB) test all the more plainly shows the ordinary appropriation of the column. In case it is zero, it shows that the succession of executions is conveyed regularly. All series, including share price and property value, show higher and positive Jarque Bera (JB) value. Usually the skewness value is zero and the kurtosis value of 3 and zero JB means that the observed distribution has a perfectly normal distribution. Therefore, the frequency distribution of the skewness and leptocurrency of stock prices and house prices indicates that the distribution is not normal. In other words, the abnormal frequency distribution of the stock price and the property price series deviates from the precondition of the random walk model. The coefficient of variation (CV) is used to compare the variability of two or more series showing the percentage of variation in the mean and the standard deviation. The coefficient of variation (CV) throughout the study shows that the price series have discrepancies and it is not necessary to emphasize them.

Table 1: Descriptive Statistics

	LOG(SP)				LOG(HP)		LOG(PP)			LOG(RP)		
	Khi	Lhr	Isl	Khi	Lhr	Isl	Khi	Lhr	Isl	Khi	Lhr	Isl
Mean	10.229	10.23881	4.456094	8.987	9.116611	3.894159	7.816	7.463285	3.463465	8.306	9.109228	3.616734
Std. Dev.	0.458	0.462238	0.193018	0.313	0.334097	0.139246	0.356	0.258836	0.1784	0.339	0.389409	0.150173
CV	4.477	4.327	3.487	9.339	9.139	7.112	8.142	8.042	6.442	8.669	8.556	7.009
Minimum	9.297	9.308820	4.037581	3.483	8.517193	3.605951	4.555	8.324579	3.075182	4.081	8.324579	3.301681
Skewness	-0.755	-0.767560	-0.894494	-0.723	-0.45286	-0.866103	-0.933	-0.70786	-0.886969	-0.747	-0.69475	-0.861431
Kurtosis	2.211	2.202116	2.478987	2.028	1.893413	2.346099	2.372	2.794115	2.410099	2.073	2.121370	2.344125
Jarque-Bera	13.438	9.713123	17.215	14.033	9.713123	16.99778	17.934	9.721708	17.32857	14.309	12.83785	16.85052
Observations	119	119	119	119	119	119	119	119	119	119	119	119

3.2

Stationarity Test

Running a vector regression (VAR) model using non-stationary variables will lead to dangerous outcomes (Sims, Stock and Watson, 1990). In this way, the initial stage to be performed is to check the stationarity of all factors remembered for the framework in their level structure.

The Augmented Dickey-Fuller (ADF) test was led utilizing the accompanying conditions:

$$\Delta Yt = a0 + \beta Yt\text{-}1$$

$$\Delta Yt = a0 + a1t + \beta Yt\text{-}1$$

where, ΔYt is the first difference of the series Y, k is the number of lags, and t stands for the time period. The null and alternative hypotheses may be written as:

$$H0: \beta = 0;$$

$$H1: \beta < 0.$$

Table 2 shows the aftereffects of the unit root test utilizing the lengthy Dickey Fuller (ADF) strategy for all factors. The outcomes show that every one of the factors are not fixed in their levels at the 5percentage degree of importance. The ADF root test module and the Phillips Perron (PP) test are used where an error member is expected to be normal. To check the process of generating data correction, it is necessary to check the importance of the intersection and trend, and also to make sure that there is no autocorrelation. The results of the Phillips Perron (PP) test are shown in Table three, which shows that the variables are non-stationary in their level data for all variables and are stationary at the level of the intersection point in the first difference. This means that stock prices, house prices, land prices and house prices are equal to 1 (1) in the first difference with intersection and trend.

If all variables are to be stable in the ADF and PP tests at (1), a Johanson Cointegration test is suggested to determine the long-term relation between stock prices and immobilization prices.

Table 2: Augmented Dicky Fuller test

Variables		With Intercept						With intercept and trend						N
		Level		1st Difference				Level			1st Difference			
		Khi	Lhr	Isl	Khi	Lhr	Isl	Khi	Lhr	Isl	Khi	Lhr	Isl	

LnSP	Coefficient	-1.839	-0.0182	-0.01933	-8.136*	0.7933*	-0.79445*	0.227	-0.0122	-0.01266	-8.595*	-0.96634*	-0.96725*	119
	P values	0.360	0.0401	0.0521	0.000	0.000	0.000	0.998	0.5603	0.5633	0.000	0.000	0.000	
LnHP	Coefficient	-2.473	-0.0176	-0.01166	-5.696*	-5.606*	-5.696*	0.178	0.03275	0.03285	-9.981*	-1.10367*	-1.10216*	119
	P values	0.125	0.0633	0.0843	0.000	0.000	0.000	0.998	0.4222	0.4212	0.000	0.000	0.000	
LnPP	Coefficient	-1.842	-0.0872	-0.08508 42	-10.802*	-1.015*	-1.01514*	-0.254	-0.8003	-0.8023	-11.099*	-1.05578*	-1.05648*	119
	P values	0.358	0.0008	0.0008	0.000	0.000	0.000	0.991	0.991	0.991	0.000	0.000	0.000	
LnRP	Coefficient	-2.426	-0.0225	-0.02297 6	-5.772*	-0.709*	-0.70629*	-0.265	-0.00144	-0.00124	-6.393*	0.83345*	0.94889*	119
	P values	0.137	0.0321	0.0332	0.000	0.000	0.000	0.991	0.9312	0.9512	0.000	0.000	0.000	

3.3

Johnson Co-Integration Rank Test

The Johnson cointegration is used to determine the long-term relationship between the share price and the house price, the lot price, and the residential lot price. To test the joint integration between 2 time series *yt* and *xt*, consider *yt* as a purpose of *xt*, which can be represented as follows:

$$yt = f(xt) + ut,$$

Where: *yt* and *f (xt) are* both integrated of order one, that is, *yt* ~ *I* (1) and *f(xt)* ~ *I* (1), and *ut* stands for the stochastic troubles. The co integration tests have been developed on the assumption that *f(xt)* is a linear function of *xt*.

The unit root test justifies us to apply Johnson's cointegration test to the long-term relationships between variables in these three cities. It is a tool for testing cointegration in a multidimensional context where it is possible to have more than one cointegration vector. It follows the same principles as the Engle-Granger approach for cointegration, since the order of integration of the variables is first estimated if the variables are equal to I (1), the Johansen maximum likelihood (ML) procedure. If there is a stable long-term relationship between the variables. The range test is set to autocorrelation.

a. The invalid speculation of the reach test is that there is no cointegration between the securities exchange and the housing market; An elective theory is that there is cointegration between the two resources. The invalid speculation is dismissed when the basic worth surpasses the test measurement.

b. The invalid theory of the linearity test is that there is a direct relationship without cointegration between the value and housing markets; an elective speculation is that there is no straight relationship and there is cointegration between the two resources. The invalid theory is dismissed when the determined worth of T · R2 surpasses the basic worth.

The Johansen ML procedure provides a set of results that can be used to determine the number of cointegrating present vectors. There will be a probable vector g - 1, where is the number of variables included in the model. Based on this result, long-term factors can be identified and a final error correction model can be generated. In fact, this approach results in 2 sets of coefficients, β, which are long-term

coefficients, and α, which are correction coefficients and are approximately equal to the error correction time.

The technique produces two insights: a probability proportion test dependent on the most extreme eigenvalue of the stochastic network, and a test dependent on the following of the stochastic lattice. These insights will then, at that point be utilized to decide the quantity of cointegrating vectors. The confirmation depends on an investigation of the framework π, where π can be deciphered as a lattice of long haul coefficients. The cointegration test between factors is determined by noticing the position of a framework π through its eigenvalues. π can be characterized as the result of two frameworks:

$$\pi = \alpha\beta'$$

The matrix β indicates the vectors of the cointegrator, and α indicates the number of each vector of the cointegrator that appears in each VECM equation, also known as the "match parameter". The main difference between the 2 test statistics is that the Trace test is a joint test in which the null hypothesis is that the number of cointegrating vectors is less than or the same to r matched to the common alternative that there are more than *r*. Whereas the maximum eigenvalue test performs separate tests for individual eigenvalues, where the null hypothesis is that the number of cointegrating vectors is *r*, as opposed to the alternative (r + 1). The two statistics are as follows:

$$\lambda_{Trace}(r) = -T\sum_{i=r+1}^{g} in(1-\hat{\lambda}_i)$$

$$\lambda_{Max}(r, r+1) = -T\ln(1-\hat{\lambda}_{r+1})$$

Where $\hat{\lambda}_i$ is the expected value of the *i*th ordered Eigen value from the π matrix. The standard method to the Johansen ML procedure is to first calculate the Trace and Maximum Eigen value statistics, then compare these to the appropriate critical values. They are usually provided by a computer program as they are distributed in a non-standard way.

The results of Johanson Cointegration test are given in table 4 and 5. It shows the result of stock prices and house prices, plot prices and residential prices respectively. The result examines the null hypothesis of non-co-integration (r=0) on the basis of trace statistics and maximum own value, which indicates that the null hypothesis does not reject at a 5percentage level of significance. It implies that there is no co-integration equation that shows that stock prices and house prices have no long-run relationship in Karachi and Islamabad Market, while integration exists in Lahore Market.

In the event that the Johanson Co joining Test shows that there is no drawn out connection between the factors, then, at that point the VAR is utilized to examine the short-run relationship in Karachi and Islamabad market.

Table 3 Phillips Perron Test

Variables		With Intercept						With intercept and trend						N
		Level			1st Difference			Level			1st Difference			
		Khi	Lhr	Isl	Khi	Lhr	Isl	Khi	Lhr	Isl	Khi	Lhr	Isl	
LnSP	Coefficient	-1.843	-0.01922	-0.01933	-8.062*	-0.938*	-0.93897*	0.748	-0.01245	-0.01266	-8.093*	-0.96235*	-0.96725*	119
	P values	0.358	0.0501	0.0521	0.000	0.000	0.000	0.999	0.5621	0.5633	0.000	0.000	0.000	
LnHP	Coefficient	-2.002	-0.01622	-0.01632	-9.704*	-1.074*	-1.07836*	-0.188	-0.03244	-0.03285	-10.037*	-1.10206*	-1.10216*	119
	P values	0.286	0.0818	0.0828	0.000	0.000	0.000	0.993	0.42143	0.4212	0.000	0.000	0.000	
LnPP	Coefficient	-1.657	-0.08003	-0.08023	-11.001*	-1.038*	-1.05648*	-0.554	-0.08003	-0.08023	-11.126*	-1.05608*	-1.05648*	119

	P values	0.450	0.0043	0.0063	0.000	0.000	0.000	0.980	0.0061	0.0063	0.000	0.000	0.000	
LnRP	Coefficient	-1.994	-0.01708	-0.01718	-5.722*	-0.817*	-0.87977*	-0.204	-0.00123	-0.00124	-6.281*	-0.94669*	-0.94889*	119
	P values	0.307	0.00783	0.0074	0.000	0.000	0.000	0.992	0.95502	0.95512	0.000	0.000	0.000	

Table 4: Johanson Cointegration test (Stock price as dependent variable)

	Null Hypothesis		J_{trace}			J_{Max}			
			Khi	Lhr	Isl	Khi	Lhr	Isl	
SP→HP	r=0	Coefficient	9.315	21.0849	7.0899	9.116	19.17418	8.16448	log(SP) = -28.189log(HP) se 9.116
		p-value	0.337	0.0001	0.0001	0.277	0.0006	0.0003	
	r=1	Coefficient	0.199	6.0716	6.080005	0.199	4.801961	6.000901	
		p-value	0.656	0.0085	0.0085	0.656	0.0085	0.0085	
SP→PP	r=0	Coefficient	12.242	26.1503	9.15066	9.866	21.3839	8.36408	log(SP) = 7.619log(PP) se 2.897
		p-value	0.146	0.0004	0.0004	0.221	0.0038	0.0041	
	r=1	Coefficient	2.376	6.78164	6.73334	2.376	7.74164	6.73334	
		p-value	0.123	0.0053	0.0043	0.123	0.0041	0.0043	
SP→RP	r=0	Coefficient	14.833*	23.8324*	13.80254*	10.037	14.8008	11.77218	log(SP)= -1.302log(RP) se 0.075
		p-value	0.063	0.0353	0.0333	0.210	0.0028	0.0108	
	r=1	Coefficient	4.796*	6.947658*	8.630008*	4.796*	6.949058*	8.630008*	
		p-value	0.029	0.0268	0.0238	0.029	0.0218	0.0238	

3.4
VAR Causality Test

Current econometricians point to a method of creating a relational model between economic variables in a non-structural way. They are vector autoregressive model (VAR) and vector error correction model (VECM).

The VAR model depends on the measurable properties of the information. In the VAR model, each endogenous variable in the framework is viewed as the slacked worth of all endogenous factors in the framework; consequently, the univariate auto-backward model is summed up to the vector auto-backward model comprising of multivariate time series factors. Sims (1980) presented the VAR model in the financial field and advanced the broad utilization of the unique examination of the monetary framework.

Engle and Granger consolidated the co-mix and blunder amendment models to decide the follow mistake rectification model. However long there is a co-incorporation connection between factors, the blunder amendment model can be gotten from the auto-backward slack

model. What's more, every condition in the VAR model is an auto-backward slack model; in this way, it tends to be viewed as that the VEC model is a VAR model with co-mix requirements. Since there is a co-mix relationship in the VEC model, when there is a wide scope of transient powerful vacillations, VEC articulations might confine the drawn out conduct of endogenous factors and be combining on their co-mix relationship.

In light of Granger (1988), the heading of causality between house costs (HP), plot value (PP), private plot price(RP) and stock costs (SP) is dictated through Granger Causality test created from vector autoregressive (VAR). Table four and five shows the aftereffects of Granger non-causality test. After effects of short-run Granger causality can be summed up as follows:

1. There is a measurably huge direct fundamental relationship that runs from the stock value (SP) to the house value (HP), plot value (PP) and private plot price(RP).
2. There is no genuinely critical direct causal relationship that runs from stock value (SP) to the house value (HP), plot value (PP) and private plot value (RP).

The results give direction and short-term dynamics and are not informative of plot price and residential plot price in this case most variables are insignificant while other statistics are also weak. In house price variables are significant and short term dynamics are clear, now in this case Johnson Co-integration and VAR will be followed by VECM for further analysis.

Table 6: Regressions results for error correction model of House prices and stock prices

	Khi		Isl	
Error Correction:	D(LOG(HP))	D(LOG(SP))	D(LOG(HP))	D(LOG(SP))
CointEq1	-0.012*	-0.024	-1.483*	0.1861
SE	-0.004	-0.021	-0.218	-0.364
t-value	-2.795	-1.104	-6.792	0.510
D(LOG(HP(-1)))	0.009	0.648	0.1919	0.008
SE	-0.093	-0.451	-0.166	-0.278
t-value	0.101	1.438	1.151	0.031
D(LOG(HP(-2)))	0.192*	0.386	0.0173	0.133
SE	-0.092	-0.444	-0.108	-0.168
t-value	2.089	0.868	0.1722	0.792
D(LOG(SP(-1)))	-0.007	0.091	-0.126	-0.8169
SE	-0.023	-0.113	-0.059	-0.098
t-value	-0.319	0.811	-2.144	-8.282
D(LOG(SP(-2)))	0.021	0.072	-0.157	-0.372
SE	-0.023	-0.111	-0.057	-0.095
t-value	0.923	0.653	-2.752	-3.897
C	0.007*	-0.003*	0.003*	-0.098*
SE	-0.002	-0.008	-0.002	-0.0003
t-value	4.263	-0.335	-0.114	-0.208
R-squared	0.142	0.071	0.6691	0.467
Adj. R-squared	0.100	0.026	0.6515	0.4393
Sum sq. resids	0.015	0.357	0.073	0.2065
S.E. equation	0.012	0.059	0.028	0.0469
F-statistic	3.370	1.565	3.029	1.518
Log likelihood	325.280	155.251	218.571	167.293
Akaike AIC	-5.913	-2.764	-4.251	-3.286
Schwarz SC	-5.764	-2.615	-4.0951	-3.066
Mean dependent	0.009	0.008	-0.006	0.105
S.D. dependent	0.013	0.060	0.047	0.062

3.5

VECM Estimation and Analysis

The VECM equation takes the form below.

$$y_t - y_{t-1} = (A_1 + A_2 - I_p)y_{t-1} + A_2(y_{t-2} - y_{t-1}) + \Phi D_t + u_t$$

$$\Delta y_t = \Pi y_{t-1} + \Gamma_1 \Delta y_{t-1} + \Phi D_t + u_t$$

From table 6 it very well may be seen that, different things equivalent, every rate point expansion in house cost will cause the increment of 0.009 rate focuses in stock cost, and every rate point expansion in will stock value cause the reduction of 0.007 rate focuses in house cost. From table 7 it very well may be seen that, different things equivalent, every rate point expansion in stock cost will cause the growth of 0.091 and0.093 percentage points in house price, and each percentage-point growth in will house price cause the decrease of 0.007 and 0.002 percentage points in stock price in Karachi and Islamabad respectively. Volatility dynamics in Karachi and Islamabad are further checked by the GARCH and EGARCH models.

Table 7: Regressions results for error correction model of stock price and house price

	Khi		Isl	
Error Correction:	D(LOG(SP))	D(LOG(HP))	D(LOG(SP))	D(LOG(HP))
CointEq1	0.001	0.001*	0.024	0.107*
	-0.001	0.000	-0.041	-0.003
	1.104	2.795	1.813	2.124
D(LOG(SP(-1)))	0.091	-0.007	0.093	0.002
	-0.113	-0.023	-0.102	-0.031
	0.811	-0.319	0.061	-0.009
D(LOG(SP(-2)))	0.072	0.021	0.032	0.001
	-0.111	-0.023	-0.221	-0.033
	0.653	0.923	0.353	0.623
D(LOG(HP(-1)))	0.648	0.009	0.003	-0.157
	-0.451	-0.093	0.097	-0.057
	1.438	0.101	1.081	0.199
D(LOG(HP(-2)))	0.386	0.192*	0.279	-0.176
	-0.444	-0.092	0.131	0.017
	0.868	2.089	0.877	1.893
C	-0.003	0.007	-0.167	0.108
	-0.008	-0.002	-0.098	-0.002
	-0.335	4.263	-0.005	3.002
R-squared	0.071	0.142	0.467	0.663
Adj. R-squared	0.026	0.100	0.439	0.656
Sum sq. resids	0.357	0.015	0.205	0.0767
S.E. equation	0.059	0.012	0.0479	0.0251
F-statistic	1.565	3.370	1.517	3.001
Log likelihood	155.251	325.280	167.213	218.504
Akaike AIC	-2.764	-5.913	-3.229	-4.257
Schwarz SC	-2.615	-5.764	-3.068	-4.011
Mean dependent	0.008	0.009	0.005	-0.002
S.D. dependent	0.060	0.013	0.067	0.023

GARCH Model

This examination utilizes a lengthy form of the ARCH model called by Bollerslev (1986) summed up autoregressive contingent heteroscedasticity (GARCH), as Alexander (2001) contends that ARCH models are not regularly utilized in monetary business sectors since basic GARCH models perform much better. The contingent change of the GARCH (p, q) model can be composed as follows:

$$\varepsilon_t \mid \Omega_{t-1} \sim N(0, h_t^2),$$

$$h_t^2 = \omega + \sum_{i=1}^{p} \alpha_i \varepsilon_{t-1}^2 + \sum_{j=1}^{q} \beta_j h_{t-j}^2,$$

$$\omega > 0, \alpha_i, \beta_j \geq 0 \rightarrow h_t^2 \geq 0, \; i = 1, \ldots p, \text{and } j = 1, \ldots q$$

where Ω_{t-1} is the set of all information available at time $t-1$, ω is the mean of yesterday's forecast, αi is the coefficient of the ARCH term $\varepsilon_{t-1} - 1$ and β_j is the coefficient of the GARCH term h_{t-j}^2.

A huge positive worth of βj demonstrates that unpredictability is relentless, while α + β is short of what one or extremely near one shows a fixed covariance model with a serious level of industriousness and long memory in the restrictive difference.

On the off chance that α+β>1, the GARCH model is non-fixed; the unpredictability will ultimately detonate to boundlessness as time goes to limitlessness and, α+β =1 shows an instance of a confined form of the standard GARCH model which is notable. In this investigation, we utilize the GARCH (1,1) model as Alexander (2001) contends that more than the GARCH (1,1) model is infrequently required.

The Equation for GARCH

$$GARCH = C_2 + C_3 \varepsilon_{t-1}^2 + C_4 GARCH_{t-1}$$

This tests examine the null hypothesis of no autocorrelation in the estimated residuals and squared standardized residuals up to a specific lag respectively GARCH.

Table 8: Estimation of GARCH (1, 1) and EGARCH (1,1) of house price and stock price

Model	Pakistan		Ω	α	β	Γ
GARCH	House Price	Coefficient	0.001	0.916*	0.068	
		p-values	0.269	0.017	0.696	
	Stock Price	Coefficient	0.001	0.917*	0.066	
		p-values	0.264	0.018	0.713	
EGARCH	House Price	Coefficient	-2.822*	1.923*	0.072	0.775*
		p-values	0.003	0.002	0.829	0.000
	Stock Price	Coefficient	-2.891*	1.925*	-0.074	0.773*
		p-values	0.004	0.002	0.825	0.000

3.5 EGARCH (1,1) Model

The even GARCH model can't get the impact or hilter kilter sway (unusualness is higher in the falling industry area than in the rising industry area). Nelson (1991) is cultivating an Asymmetric Volatility Model named Exponential GARCH (EGARCH) to address the impact effect of unusualness. The unexpected distinction state of the EGARCH (1, 1) model can be created as follows

$$Ln\sigma_t^2 = \omega + \alpha |z_{t-1}| + \lambda z_{t-1} + \beta Ln\sigma_{t-1}^2$$

Where the left side is the logarithm of the contingent fluctuation. It shows that the influence impact is remarkable and that the gauge of the contingent difference should be non-negative. Z_{t-1} shows the awry effect of both positive and negative shocks. The lopsidedness term λ<0 infers that negative shocks greaterly affect instability than on sure shocks. The negative lopsided term additionally recommends, for influence, that negative shocks clearly greaterly affect future instability than positive shocks of a similar extent.

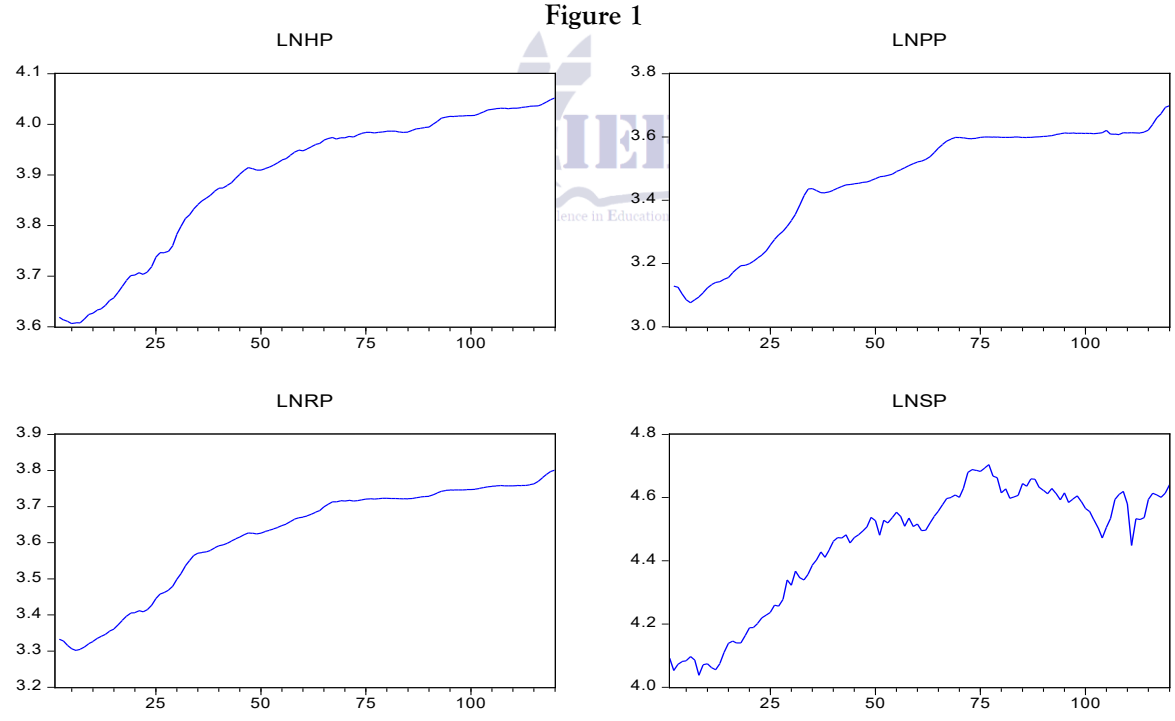
$$Ln(GARCH) = C_2 + C_3 \left| ABS\varepsilon_{t-1} / @SQRT * GARCH_{t-1} \right| + C_4 \left| \varepsilon_{t-1} / @SQRT * GARCH_{t-1} \right| + C_5 Ln(GARCH_{t-1})$$

α is the estimated GARCH coefficient, and β is the estimated EGARCH coefficient, Ω is the estimates of asymmetric coefficient in the EGARCH (1, 1) model, mean refers to the average values of conditional correlations estimated by the model. Only in case of Plot price(PP) and stock price(SP) results indicates that the asymmetric correlation coefficient (α) is statistically significant. Stock price(SP) to house price(HP) are less sensitive than others and volatility is higher in rising market.

Table 9: Estimation of GARCH (1, 1) and EGARCH (1,1) of plot price and stock price

Model	Pakistan		Ω	α	β	Γ
GARCH	Plot Price	Coefficient	0.002*	1.021*	-0.022	
		p-values	0.031	0.000	0.885	
	Stock Price	Coefficient	0.003*	1.023*	-0.023	
		p-values	0.031	0.000	0.880	
EGARCH	Plot Price	Coefficient	-4.062*	1.500*	0.024	0.477*
		p-values	0.001	0.000	0.916	0.032
	Stock Price	Coefficient	-3.788*	1.498*	-0.025	0.475*
		p-values	0.001	0.000	0.911	0.032

Figure 1



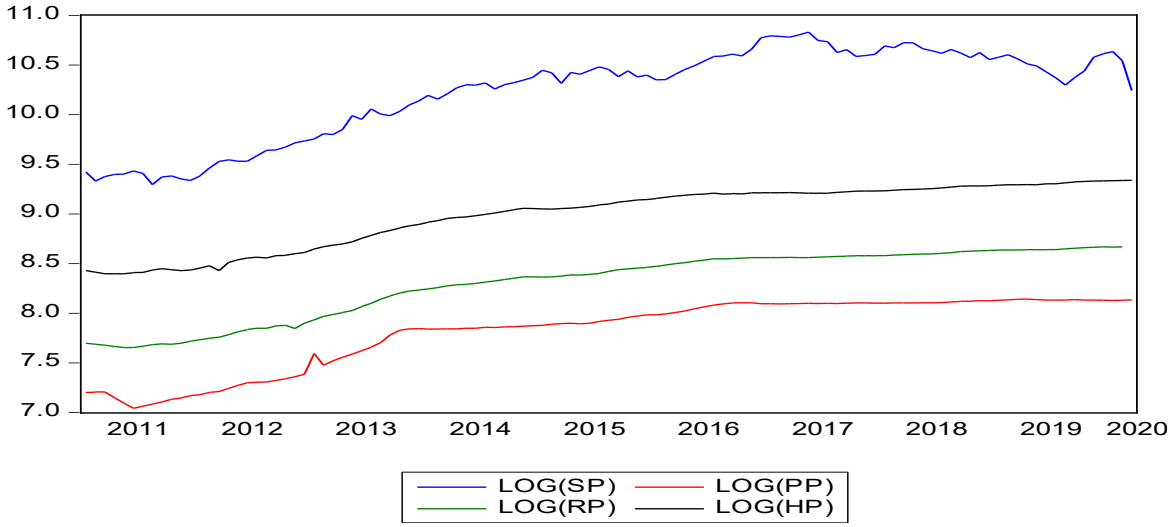
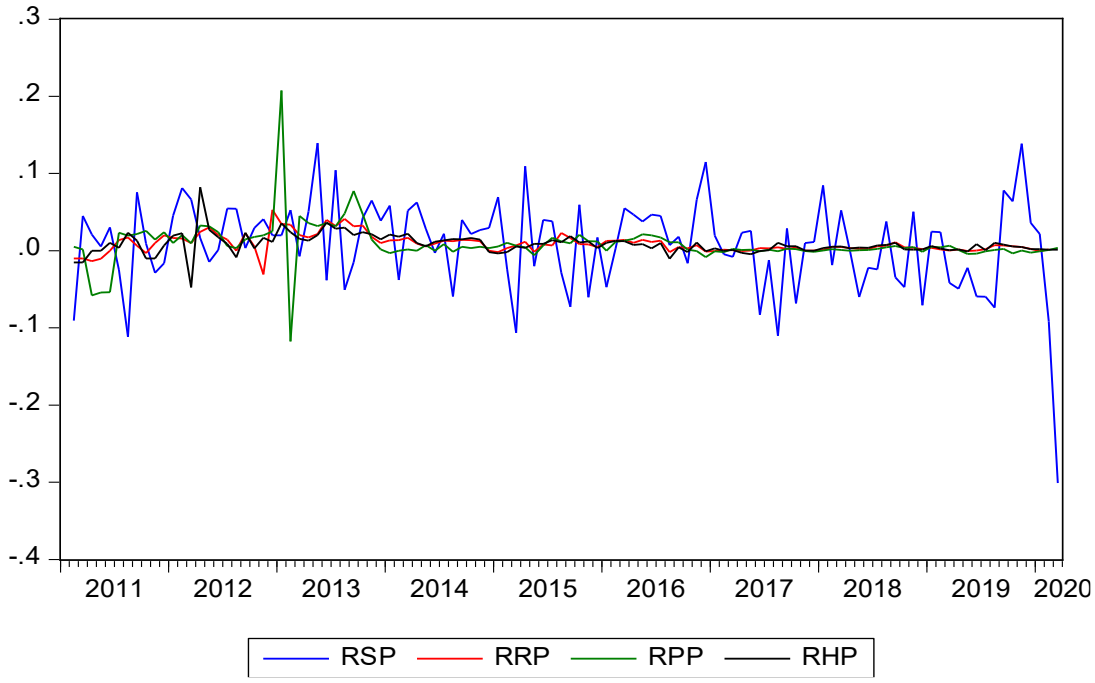


Figure 2



4.Interpretation of Results

4.1 Karachi Real Estate Market and Stock Market

From Karachi real estate and stock market, study concluded that the null hypothesis is accepted and rejected the alternative hypothesis that is that a linear relationship and cointegration does exist between these two markets.

Nonetheless, considering that all the determined coefficient changes are pitifully sure or feebly bad, the investigation discovered that there may in any case be a connection between the profits of the Karachi housing market and the value markets, albeit the ends dependent on the importance test they are as yet dubious. Specifically, due to contending speculation channels, there might be a reliably bad connection between the two business sectors, and besides, the aftereffects of observational examination show that there are additionally causal and monetary connections between the two business sectors, which can be highlighted:

1. It is the huge development and undeniable degree of productivity of the land

area that sets out theoretical open doors for representatives, private financial backers and worldwide hot cash, which is moved from wasteful securities exchanges to the quickly developing housing markets. What's more, this progression of assets will lessen the productivity and improvement of the securities exchanges over the long haul.

2. Speculation in the real estate market is also partly responsible for this negative effect. There are some problems in the real estate market of Karachi that impede its development, and they need to be urgently addressed by both government agencies and registered real estate companies. For example, investor confidence in investing in the Karachi real estate market could be restored if government agencies enact stricter and tougher market rules. In addition, attempts by listed real estate companies to increase their ability to generate profits and improve their governance and corporate governance will ultimately contribute to the development and reform of the real estate market in a much healthier investment environment.

4.2 Islamabad Real Estate and Stock Market

In Islamabad there was no factual huge impact of stock price (SP) on plot price(PP), private plot price(RP) and house price(HP) costs. As capital city the monetary development variances assume a critical part in deciding the progressions in land costs. A lot of persistence is required for investing in real estate. So, for investors who are looking for short term gains, the real estate sector is not the right place and they should look for some alternative option. In short time horizon, any speculation can cause the housing price to increase and it is essential for investors to judge the market. Investors need to pay special attention to those unpredictable factors, in particular the seeping in and out of the economy of speculative money.

Another thing to take into consideration in real estate is that investor will need to invest a lot in purchasing an asset. Getting a real estate investment is all about taking a risk, which is higher if the capital is bigger. So, it is preferable for investor to select stock market. But to make a lot of profit in the future with capital that is put in the investment, there is also a lot of information and attention required for the risk associated with stock market.

Another problem in real estate is that a lot of fixed costs like the costs for maintenance insurance, costs for renovation, and others are linked with this market. These expenditures might produce a little bit of pessure on the financial side. A good choice in the investment market is trading in stocks.

4.3 Lahore Real Estate and Stock Market

The findings of Lahore illustrate that there is co integration between real estate markets and the stock market in long run. They suggest that the real estate and stock markets may be suitable substitutes in investment allocation and the benefit of diversification can be obtained by investors by making a portfolio of real estate and stock markets in Lahore Market. Moreover, short-run causality is evident from majority plot markets to the stock market. Therefore, in both the long and short run. The real estate market leads the stock market, implying that if the investor has good knowledge about the market then investing in real estate can benefit him. These causality results are beneficial for investors in the prediction of real estate and stock markets.

5.Conclusion

This postulation has been affected by the huge development of the land and value markets in Pakistan over the previous decade and spotlights on the connection between these two significant capital business sectors. This study attempts to answer the question of whether there is a cooperative movement of profitability between the two, and also attempts to examine the short-term and long-term relationship between the two markets. This analysis helps to understand and assist potential investors who are attracted to real estate and equity investments in Pakistan, which are believed to have a promising future.

Based on monthly data from 2011 to 2020 and using the VAR model, the results imply that there is no long-term relationship between stock price and real estate price in Islamabad and Karachi. But co integration exists in Lahore data which demonstrate an overall relation, no long term relationship with a very weak short-run relationship between variables. This might be because the Pakistani citizens have less

knowledge about investment in the stock market than in the real estate market. Due to this they invest more in the real estate market and less in the stock market. Furthermore, investment in the stock market is risky compared to the real estate market, because of which they avoid investing in the real estate market. The nature of Pakistani investors is "more concerned with losses than with profit". Moreover, the prices of the real estate market are comparatively high as a result of the average price of stock market. There is no wealth effect or credit price effect in the country where the average price of real estate is high. Real estate is also considered to be consumer goods in Pakistan. However, because of the critical role of the broker the price of real estate is very high. Buying of real estate stock prices is based on brokers. But, the broker is playing bluff in real estate. For example, at the initial stage of the purchase of brokers, PKR 50000 is used to provide a photocopy of documents. Token money is taken at 10percentage of the total value of the property. The purchaser is bound because these amounts are part of the total price of the property.

Likewise, since land is treated as heterogeneous, the cost of land at a similar society of a similar plot is unique, which is the reason costs are excessively high. The land should be directed by the public authority, and each specialist should enroll. Every single uninformed representative and sellers who come up short on the ability to direct individuals further and as a rule bringing about misrepresentation ought to limited by the Government. A land expert in the nation is required both at the common and government level to assist with securing the privileges of land dispensed people. Additionally, there is a urgent need to direct the development of social orders by engineers and manufacturers, as the course of land affiliation requires quite a while to finish. Administering some land controllers will fabricate individuals' trust, particularly abroad Pakistanis, to put their well deserved cash in this area without the dread of tricks. Long haul approaches should be worked by the public authority to grow the duty base. Burdening as of now citizens would accomplish more damage since it will crush the duty base as individuals begin utilizing cash exchanges as opposed to banking exchanges and disguise their riches. The framework should be improved progressively as quick track changes can have adverse results for the economy, particularly land.

These two markets have been assigned different risk categories. In particular, since real estate is not as liquid as stocks, investors can alleviate the problem by trying to sell real estate in the short term. In addition, due to the high investment in home purchases and the high level of leverage required to support it, investors are more susceptible to changes in house prices, although house prices in Pakistan as a whole have risen compared to the last decade. In particular, from 2011 to 2019, it was generally believed in the real estate market that there were bubbles in the Pakistani real estate market, which are most significant in metropolitan areas such as Karachi and Islamabad. This super-exponential acceleration in real estate prices, shown by rapid growth, strongly suggests that a housing bubble is looming in Karachi and many other parts of Pakistan.

Suggestions Based on Research Conclusion

The real estate and the stock exchange markets are two significant markets in the economy of any country. The strength of an economy is measured with them and with this, close and efficient monitoring is essential. Many macro-economic factors affect these markets and they have been included as controls in the study. The economy in our country is still growing and since our literature is largely based on developed economies, many lessons are learnt and the study presents the following recommendations:

1. An important part is played by the government in regulating the real estate prices, which can help to control speculation in this market.
2. The investors in the real estate market should understand that there is a big difference between the demand and the ability of the Pakistan citizen in purchasing a house or plot.
3. Most of the Pakistan expatriates tend to invest their money in DHA and Bahria town, and this causes significant variations in the prices and the volume.
4. The Pakistani banks have to make new polices for financing particularly in housing loans, such as increasing the loan period.

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