The Nexus Between Macroeconomic Variables and Pakistan Equity Market Index

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Abstract

The equity market is a composite indicator of a country's economy. When analyzing the equity market, researchers usually came with sort of dilemma, specifically when data are not all organized at the same frequency. Most macroeconomic data are sampled on monthly (e.g., Inflation) or annually (e.g., Gross Domestic Product), whereas most financial variables (e.g., Equity Market Return) are sampled daily or even more frequently. Hence, it becomes very fascinating to analyze whether one can use low frequency macroeconomic variables in order to predict equity market. The core aim of this study is to shed light on the impact on long run and short-run relationships among macroeconomic variables and Pakistan's equity market by employing mixed frequency data for the period 2011 to 2021. The variables may be contributed to equity market return (PSX), gross domestic product (GDP), interest rate (INTR), inflation (CPI), gold price (GP) and exchange rate (EXR) Oil prices (OIL). Unit root test is used for stationarity test; using the MIDAS model to nexus Pakistan equity market returns at different frequencies.

Keywords: MIDAS, Exchange Rate, Gold, Inflation, Interest Rate, GDP, oil, unit root test, OLS.

Contents

CHAPTER 1

INTRODUCTION

1.1 Background and Motivation of the Study

Over the course of the last two decades, the global financial markets, and notably the equities markets, have seen extraordinary changes. Because of these developments, there has been a discernible rise in the volume amount traded and the degree to which stock values are volatile. The policymakers face problems because of the practical repercussions brought about by these developments. Regarding their investment choices, the investors are required to accept a higher level of risk and unpredictability. Increasing amounts of capital from specialist institutional investors are flowing into emerging countries. This trend is expected to continue. Studying the fundamentals of macroeconomics and accounting, which are the forces that cause changes and drive the market, is necessary to make accurate projections about the probable movements of the stock market.

Inflation, GDP, interest rates, currency exchange rates, oil, and gold are all macroeconomic indicators that are often regarded as important predictors of stock market performance. Predictions values of macroeconomics factors on stock returns to reduce the risk before dealing in the equity market. The health of a nation's economy may be gauged by looking at how its stock market has performed. Researchers, analysts, investors, and policymakers have all been fascinated by the dynamic relationship between macroeconomic factors and stock prices since the 1970s. Numerous local and global macroeconomic variables can affect stock returns for corporations (Fama, 1981, Chen et al.,1986). According to Fama (1981), the share prices in every country's stock market are affected by various macroeconomic factors. Investors often assume that the market will follow suit if a country's economy is doing well and is predicted to develop rapidly.

In the context of declining performance in established markets, increased returns are within reach if developing countries provide an attractive opportunity for investment and the employment of capital. Nevertheless, investors confront difficulties in determining how, where, and with whom to invest their money (Wilton, & lsird, 2013) The capital market serves as the source of earnings and income for big businesses. Also, the capital market maintains liquidity, provides loan facilities, and forms capital for an extended period. That is why the capital market is vital to the economy's growth and is a significant player in the current global economy. The major economic variables improve the equity market and enhance the main economic

fundamentals: interest rate, inflation exchange rate, gold, oil, GDP growth, and monetary policies.

Expectations and other macroeconomic factors greatly impact the accuracy of return forecasts for the stock market. The state of the domestic economy heavily influences the stock market's health. However, due to globalization, changes in the local stock market may also be brought about by the policies implemented and anticipated to be enacted by other nations or by certain global occurrences, in addition to changes in domestic economic factors. Returns on stocks in a global economy are affected by variables such as interest rates, currency exchange rates, gold price, and stocks values in other equity markets. Changes in interest rates in other major economies also have a role in influencing the ebb and flow of foreign investment. Forecasting stock returns has long been among the most popular and significant study areas. Economists, econometricians, and statisticians have generated many prediction models that are now in use. Good selection of variables and effective usage of the data with varying frequencies are the two difficulties that prediction models need to handle to create reliable forecasts of the stock market (Andreous et al.,2013).

Since the 19th century, an enormous amount of theoretical and empirical study has been concentrated on determining the nature of the link that exists between the variables of macroeconomics and stock prices. Since then, people have argued whether fluctuations in stock prices cause shifts in economic activity or whether or not stock price fluctuations are the result of shifts in economic activity. However, there is a lot of conflicting evidence in the published research on whether specific events or economic variables are most likely to affect stock prices and the degree to which economic factors can exert their impact on stock prices. The discussion over the link between macroeconomics variables and the equities market growth is still difficult to settle, making it impossible to determine which factors have more influence. The debate has produced a lot of controversies. There have been many different kinds of arguments, both theoretical and empirical. There is one school of thought that advocates that change in the fundamentals of the macroeconomics do have an effect on stock prices but that the sign of the relationship and whether or not it is causal may not be the same across all studies because different sets of comparable macroeconomic variables and also different methodologies have been used for the research done in this field. Being different, the mixed data sampling (MIDAS)

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regression models, which were introduced by, are one promising technique that is capable of overcoming the differences of precious methods (Ghysels, Santa slara, and valkanov 2004) In their most basic form, MIDAS regressions are very economical and precisely specified regressions that are used to analyze mixed data.

Suppose it is intended to strike a compromise between keeping the specific timing information of the high frequencies data while at the same time processing the data quickly. It is intended to strike a compromise between preserving the unique timing information of the high frequencies data and cutting down on the number of parameters that need estimation to function properly. It is anticipated that it will have greater estimating and predictive abilities than other traditional models (Ghysels et al., 2004). Owyang (2010) used MIDAS models to make projections for quarterly series based on monthly or daily data. Alper, Fendoglu, and Saltoglu (2012) assess MIDAS volatility forecast performances of 10 emerging equity markets and find that the MIDAS model produces a better weekly volatility forecast than markets and GARCH (generalized autoregressive conditional heteroscedasticity) models. This conclusion was reached after the researchers found that the MIDAS model performed significantly better than the other two types of models. Experiments on backcasting, nowcasting, and forecasting were carried out by Kim and Swanson (2017) with the use of a real-time Korean GDP dataset and the mixed frequencies factor MIDAS model.

The Arbitrage Pricing Theory (APT) proposes that the return on investment is determined by both macroeconomic and microeconomic factors, with a special focus on the macroeconomic variables. The empirical power of the APT is superior to that of the CAPM on a fundamental and favorable level. Because it gives its users the ability to choose the components or variables that seem to provide the best explanation for the specific sample they are working with now (Groenewold and Fraser, 2017). This allows a researcher to pick and apply those "mixes" of macroeconomic factors that best fit and explain the changes in the specific stock market. This is important given the environment in which we are discussing this topic.

Markowitz's portfolio theory stated how investors could benefit by making a portfolio of different asset classes. Lesser correlation between securities would provide more return on investment. By selecting different assets, investors can design portfolio in a way that protects against risk in abnormal market situations. According to this theory, diversification can reduce

the unsystematic risk from the portfolio, so there remains only the systematic risk. Hence, diversification is holding the combination of those not positively correlated assets. So that portfolio risk can be minimized during adverse market situations.

Sharp (1964) suggested the Capital Asset Pricing Model (CAPM) study the linkage between asset return and the market. Portfolio theory was the base of his model, through which he explained how risk and return are interlinked. In this model, he explained the concept of the correlation coefficient. CAPM quantifies the total portfolio risk into two components, one is systematic, and another one is an unsystematic risk. It is considered that by investing in uncorrelated securities, one can reduce the unsystematic risk, but the systematic risk remains there. In the case of international diversification, one can reduce market risk to a specific level only when markets are not highly reliant. In Sharp view, diversification can only reduce industry or security-specific risk.

In such a situation, if markets are segmented, the covariance of a specific and global market cannot fully explain the return obtained on that market. Accordingly, the expected return is the same in interdependent markets as investors are supposed to bear the same risk. However, the return will vary in the case of segmented markets because, in such a scenario, the sources of risk are different. A stronger and more consistent level of interdependence is viewed as stock market integration. The inclusion of securities from different segregated markets from investors can protect their portfolios by assigning their investments across numerous markets, which do not suffer from spillover and contagion effects and most of all are not integrated. Diversification of a portfolio is not possible in the case of highly integrated markets. Markets that behave differently in adverse shock and have independent rises and falls are optimal markets.

1.2 Problem Statement

Equity market forecasters must deal with a scenario where not all data are collected simultaneously. Most financial variables (such as equities market return) are sampled daily or even more regularly, whereas most macroeconomics statistics (such as inflation) are sampled monthly or quarterly. Additionally, stock prices are seen as forward-looking because of the belief that they reflect future economic events (stock & Waston, 2003). This raises the question of whether low-frequency macroeconomic factors may be used to improve stock market forecasting, an area of study that is a matter of attention.

However, the most difficult part of equity market forecasting is figuring out how to make the most of the data at our disposal, especially the high-frequency data, without losing any potentially useful individual-level timing information. The data must all have the same frequency for traditional prediction models to work. High-frequency data is often averaged over longer periods so that it may be sampled at the same rate as lower-frequency data. However, individual timing information that may be useful for prediction is lost in every replication of a temporal aggregate. For better performance than traditional forecasting models, which need data with the same (low) frequency, consider using data with various frequencies. For this reason, any forecaster dealing with mixed frequency data must devote significant effort to developing an appropriate approach for dealing with high-frequency data.

1.3 Research Questions
The primary motive of the present study is to answer the following research questions:

1. Does any significant long-run relationship exist between macroeconomic variables (GDP, Interest rate, inflation, gold, oil, and exchange rate) and the Pakistani equity market?
2. Does any short-term relationship between macroeconomic variables (GDP, Interest rate, inflation, gold, oil, and exchange rate) and the Pakistani equity market?

1.4 Objective of the Study
The prime objective of this research study is to investigate the relationship among macroeconomic variables with varying frequencies of representing in predicting the Pakistani equity market case of varying frequency.

The specific objectives included in the research study are to:

1. To investigate the impact of the long-run relationship exist among macroeconomic variables (GDP, Interest rate, inflation, gold, oil, and exchange rate) and the Pakistani stock market
2. To investigates the impact of the short-term relationship among macroeconomic variables (GDP, Interest rate, inflation, gold, oil, and exchange rate) and the Pakistani stock market.

1.5 Contribution of the study
The current thesis is expected to add several primary contributions to the existing literature.

1. First, the current study contributes to the body of knowledge by looking at how stocks in developing countries like Pakistan relate to broader macroeconomic trends.

2. Second, this study analyses add to the current body of knowledge applying the MIDAS technique to predicting stock returns recorded at varied frequencies. It is also crucial for academics to assess macroeconomics performance by referring to high-frequency financial market information.

3. Third, this study examines investment methods since policymakers and governments need to consider the long-term impact of the macroeconomics variable. However, today's stock market index data should be analyzed for its impact on today's stock market return, which has shorter-term consequences.

4. This study provides strategies for portfolio managers, institutional investors, and brokerage firms on which combination of assets is more durable and holds value in the contagion scenario.

1.6 Scope of the Study

There are several studies in which the contagion effect is studied with different objectives and methodologies. So, it is one of the most important aspects of the scope of this study.

The scope of the research is as follows:

The focus of this study will be on the correlation among different assets classes during different crises in the world. The study will consider gold, oil, forex, and equity markets to accomplish the identified goals.

1.7 Significance of the Study

These real-time updates are especially helpful for central banks, financial institutions, and any other organization whose success is tied to the health of the economic cycle. Policymakers, investors, researchers, and portfolio managers in Pakistan may get useful information from this study. Knowing the direction of the link between economic activity and the stock market might improve policymakers' capacity to anticipate economic growth or contraction in Pakistan. This research will help with both forecasting and predicting. The research will provide policymakers

with context for identifying the factors that are their main concerns and likely to affect the stock market. This is of particular significance since the stock market is often believed to reflect modifications in the economy's local and global macroeconomics factors. A vast amount of theoretical and empirical work examines the connection between macroeconomic factors and stock prices dating back to the 19th century. Whether fluctuations in stock prices cause or contribute to shifts in economic activity has been hotly debated for decades. However, there is a significant discrepancy in the research as to which events or economic variables are most likely to affect stock prices and how much impact they will have. Despite widespread interest, the issue of how the stock market's growth relates to broader macroeconomic factors remains unresolved, and the direction of any underlying causation is difficult to nail down. Both theoretical and empirical arguments have been varied. Investors (mutual funds and institutional investors such as insurance firms and pension funds) may benefit from this research by better rebalancing their portfolios and developing techniques for diversifying their holdings geographically. Understanding the correlations between gold, oil, forex, and equities may be a great help regarding commodities, stock market investing and trading, and efficient hedging across markets.

1.8 Definition of Term

1. Inflation

Inflation is defined as continuous growth in a country's general price level of common goods and services (Hussain, 2012). According to kasidi (2013), a high inflation rate would bring the downfall of economic growth by several means, such as lowering the purchasing power of a nation's currency.

2. Exchange Rate

The value of one country's currency, measured in terms of that of another, is meant to be represented by the exchange rate (veli & serf, 2015).

3. The Rate of Interest

The cost of capital or the return on investment that investors expect to use their money over a predetermined time frame is referred to as the interest rate. The interest rate is typically used as a monetary policy tool by the central bank to control the amount of money in circulation and

investment.

4. Gold price

To make accurate economic forecasts, the price of gold is becoming more reliable as it maintains its consistent upward trend. Gold becomes a form of insurance whenever there is uncertainty regarding the economy. It offers the lowest possible risk to investors and is the best investment plan available. Gold is used not only in jewellery but also in various other fields, including industry and medicine. In addition, governments, households, institutional investors, and private equity investors all use gold for investment purposes.

5. Gross domestic product

In terms of money, the value of all the completed products and services created inside a nation's borders during a certain period is referred to as the country's gross domestic product (GDP). The total domestic product (GDP) is the sum of all private and public consumption, government expenditures, investments, private inventories paid in building costs, and the balance of commerce with other countries.

6. An index of the stock market

The performance of a segment of the stock market is measured using an index, and this index is known as the equity market index. It is computed using the prices of several different equities (typically a weighted average). It is a tool that investors and people in financial management use to compare the returns on different assets and to define the market.

7. Oil

Throughout millions of years, oil was produced from the remains of very small marine organisms. When these organisms passed away, their bodies sunk to the ocean floor, where they accumulated to create layers. These layers were eventually encased in silt throughout geologic time and subjected to intense heat and pressure. The extreme pressure and temperature conditions forced the animals to transform into oil and kill themselves.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Several studies have been conducted to check the link between the fundamentals of the macro economy and the behavior of the equities market and their effect on this behavior. The current body of literature provides abundant documentation of the empirical data supporting the existence of a link between factors and stock returns. Many macroeconomic variables, such as the exchange rate, have been the subject of investigation in several studies that have looked at the predictability of these variables. Several studies have been conducted to investigate the connection between the behavior of the equities market and the macroeconomic fundamentals, as well as the influence those factors have on the market. There is a wealth of documentation in the extant literature demonstrating the empirical proof of the link between macroeconomic factors and stock performance. Several studies have investigated the predictability of a wide range of macroeconomic variables, including the exchange rate, inflation, actual production, money supply, oil prices, foreign currency reserves, foreign direct investment, real estate prices, and payment conditions. Trade and the impact of the balance of trade on stock prices. . In India and Pakistan's equity markets, Abdalla and Murnde (1997) investigated the relationship between currency exchange rates and stock prices. To investigate the possibility of granger causality between stock prices and the exchange rate, the authors used a bivariate vector autoregressive model (BVAR). After determining the order in which the various series would be integrated, the author tested the integration method using the two-step Engel granger procedure. The authors started by developing a standard VAR for Pakistan, then moved on to developing an error correcting model (ECM) for India and Pakistan. They first determine the appropriate lag length of BVAR using the VAR model and then utilize that information to deduce granger causality for India and Pakistan. The author determines the optimal ECM lag length and analyses the resulting equations.

The authors concluded that the evidence on exchange rates' effect on stock prices was substantial and consistent with past research on developed economies. Maysami and Koh (2000) discovered the dynamic linkages between the exchange rate and Singapore stock markets. They assume that the conversion standard and Singapore's securities exchange level modifications are interrelated. It is challenging to ascertain which individual macroeconomic component might consistently indicate stock returns due to varying outcomes. Amadi, Oneyema, and Odubo

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(2000) used multiple regressions to estimate the money supply's function. Inflation, rates, currency rate, and stocks. Their investigation found that stock prices and macroeconomic variables are consistent with theoretical postulation and empirical findings in various nations; first, a popular approach is to cast the model in state-space form and utilize the Kalman filter for estimate and prediction.

Omran and Pointon (2001) also focused on how the inflation rate affected the Egyptian market's performance, and they found a negative association between the two variables. When inflation is high, buyers will have less money to spend since their buying power has decreased. As a direct consequence, individuals cannot purchase items because the price is unreasonable. Therefore, they cannot assist the firms, which will result in a decrease in the price of the stocks of the companies due to the decreased future cash flows. The primary stock index will inevitably decline at some point in the future when there are an adequate number of firms. According to Chaudhuri and Smiles (2004), there is a long-term association between the stock market index and actual macroeconomic exercises. Ghysels, SantaClara, and Valkanov's (2006) MIDAS technique link low-frequency to high-frequency data in a univariate context. Gan et al. (2006) examine the correlation between stock prices and macroeconomic variables and suggest a long-term relationship exists between stock prices and the fluctuation in the interest rate. This research focuses on New Zealand's stock market and suggests a relationship between stock prices and the change in the interest rate. Ratanapakorrn and Sharma (2007) Also provide substantiating evidence for this outcome. The nation's central bank is responsible for determining the interest rate, which will change over a certain amount of time. Because of the rise in interest rates, the number of businesses that borrow money from the bank has decreased. As a result, those businesses have had to reduce their expenditures to compensate for the decrease in the number of future cash flows. As a direct consequence of this, the company's stock will drop. If a significant number of firms see a fall in the price of their shares, then the primary stock market will be impacted.

MIDAS models are used for macroeconomic forecasting (e.g., Clements & Galvao, 2008, 2009, for early contributions). Using the cointegration test, Geetha et al. and Mohammad et al. (2009) also reported that the conversion scale had had a largely favorable impact on the increase in stock prices.

The GDP has almost little impact on the volatility of the equity markets. Non-linear MIDAS models need NLS estimation, which raises computing costs with several high-frequency explanatory variables. Foroni, Marcellino, and Schumacher's U-MIDAS model may be estimated using basic OLS and can handle high-frequency explanatory variables. It works best when the frequency mismatch is modest, like quarterly/monthly. More recently, the mixed-frequency literature has been extended to a Bayesian context; see Foroni, Ravazzolo, and Ribeiro (2015) and Pettenuzzo, Timmermann, and Valkanov (2016) for the estimation of MIDAS with Bayesian techniques, and Carriero, Clark, and Marcellino (2015) for an estimation method for U-MIDAS models that allows for stochastic volatility; the latter is essential for reliable density now casting. (2011) investigated the link between the stock market and the exchange rates of Malaysia, the United States, and China. In addition, you should assist them by investigating the possibility of the growth of the securities market in South Africa. His results show that bank loans to the private sector, stock exchange liquidity, gross residual speculation, GDP per capita, and the dependent variable all have a major impact on the growth of stock exchanges; nonetheless, Attari et al. (2012). Second, Ghysels (2016) presented a mixed-frequency VAR model in which the vector of dependent variables comprises high-frequency and low-frequency variables, with the former stacked according to the data release schedule. Simple OLS estimates the model, but stacking adds a repressor. Their findings reveal that the variables have a long-term cointegration connection since the Karachi securities exchange (CSE) deregulation in 1991, Cherin and Kirhner (2017). Olweny and Omondi (2011). analyzed macroeconomic factors' stock index influence. They undertake research in which EGARCH and TGARCH models are used to study the link between macroeconomic conditions and the equities market in Kenya for ten years, beginning in 2001 and ending in 2010. This analysis is based on data collected every month. According to their findings, the fluctuations in the equities market are continually influenced by changes in currency exchange rates, inflation rates, and interest rates.

2.2 The Macroeconomic Variables and Equity Market Returns

The macroeconomic variables such as the inflation rate, the gross domestic product, the interest rate, the money supply, the exchange rate, oil, and gold, are critical predictors of stock returns. Stock returns are influenced by expectations about the future values of macroeconomic factors. Therefore, macroeconomic variables serve as risk factors for portfolio investments. To reduce risk while investing in the stock market, it was vital to investigate the impact of macroeconomic

factors on stock returns. The financial market integration is increasing due to globalization. The variability in one market significantly influences other markets due to greater integration and interdependence. This integration of the international level causes the equity markets to be more conscious of comparison to prices of commodities. Furthermore, several financial crises and shortage of liquidity in financial markets make investors conscious of the risk of equity markets and trigger special attention to invest in alternative securities, e.g., gold, oil, and forex market, which provide a haven at the time of crises. This section will explain the empirical linkage among gold, oil, GDP, interest rate forex, and the stock market.

Investors must know the correlations among different asset classes to minimize the portfolio risk, and there must be a heterogeneous correlation. If the correlation is homogenous, then the whole purpose of diversification will decline. Gold has been considered a unique asset for portfolio diversification, especially during a crisis. The fact that gold holds value when the stock value falls has put investors' attention to using gold in their portfolio to minimize the risk.

2.2.1 Inflation Rate and equity Market Returns

Since Fisher (1930) proposed that stock assets are a good hedge against inflation, the link between the inflation rate and stock returns has always been very significant. However, empirical data shows that high and volatile inflation rates raise uncertainty and, thus, reduce stock values. The high pace of inflation raises uncertainty, increasing the risk premium sought by investors for holding equities and lowering stock prices (Malkiel, 1979). A further study confirmed that stock returns were adversely correlated with both the anticipated and unexpected inflation rate (Fama, 1981; Chen et al., 1986). Nevertheless, Caporale and Jung (1997) disproved the premise that stock returns and inflation were adversely connected, and Chatrath et al. (1997) and Adrangi et al. (1999) only partially support this theory in the emerging equity markets of India, Peru, and Chile, respectively. Numerous researchers found that increased inflation expectations positively affected economic activity during periods of a stable nominal interest rate (Coibron et al.). (2010).

Irum et al (2014) investigated the relationship between stock costs and growth using evidence from Pakistan. They demonstrated that growth harmed stock costs. Qamri, Abrar, and Akram (2015) investigated the link between growth and stock costs in Pakistan. The focus revealed a negative relationship between expansion and stock costs. The detailed exploration was

led by Kabeer et al. (2016) to measure the influence of macroeconomic determinants on capital market execution. The assessment found that growth has serious negative consequences. Irfan and Luqman (2013) investigated the relationship between the unpredictability of financial exchange and macroeconomic instability. They discovered that stock gains are unfazed by growth. According to Gul, son, and Ozmen (2020), interest rates influence inflation and the output gap in IT. It has a particularly short-term impact on inflation. abhoft et al. (2020) discovered that the response of non-traditional monetary policy on inflation spending in the euro zone has favorable effects on inflation expectation, which occurred with an increase in real GDP over the medium run.

2.2.2 Exchange Rate and Equity Market Returns

The theory indicates that variations in the exchange rate substantially impact a firm's returns via a foreign operation which creates volatility in stock prices. The degree and Direction of movements in share prices rely upon the type of the company. If a business is export-Oriented, then exports increase returns owing to the rise in the exchange rate. On the other hand, if a corporation relies upon imported raw materials, returns fall owing to a rise in the exchange rate and depreciation in the home currency. Researchers reported mixed outcomes. For example, Aggarwal (1981) observed a positive association between the exchange rate and US stock prices. Soenen and Hennigan (1988) observed a negative association between the two variables. The exchange rate is an essential variable in an economy; it plays a vital role in international commerce and economic growth. Variations in the exchange rate influence the securities market and trade volume. Ankar (2010), Both Kalchani (2012) and remain (2011)'s analyses demonstrated that there is, over the long run, a link between the exchange rate and the securities market. Connections between the currency rate and the securities market, According to Kalehani (2012) and Rehman (2011), an unstable currency rate in Pakistan poses several issues for all of the many stakeholders in the country, including the government, the business community, and others. Several studies have shown that maintaining a constant exchange rate has a beneficial effect on the economy. It tends to encourage the establishment of monetary authorities in an economy. According to Murrinde (2013). Connections between the currency rate and the securities market have negative relation.

2.2.4 Stock Market and Exchange Rate

This section explores the links between the stock market and the currency rate. Several methodologies, including the Portfolio Balance Approach, the International Trading Approach, and the Asset Market Approach, contribute to developing this connection. The growth of an economy can't be separated from the work of the financial and currency markets. The stock market's health is a major indicator of future economic growth. The stock market's performance is sensitive to changes in macroeconomic factors such as inflation and the currency rate. But fluctuations in the currency exchange rate value are also affected by movements in the stock market. In contrast to the two abovementioned theories, Frenkel's Asset Market theory (1976) stated the absence of any link between the equity market and exchange rate. In the available literature, two hypotheses characterize the exchange rate and stock market links. These hypotheses are International Trading Effect (ITE) and Portfolio Balance Effect (PBE) (PBE). According to International Commerce Effect (Dornbusch et al., 1980), the international level of trading provides the connection between these two marketplaces. The variances in exchange rates not only impact the international enterprises but also indirectly affect the local companies' market pricing.

According to the portfolio balance effect (Frankel, 1983), the stock price variation leads to exchanging rate fluctuation. This theory indicates that stock prices rise owing to the influence of certain external factors, which enhance local investors' capital and boost the demand for local currency per the investment portfolio equilibrium theory. Stronger demand for money increases the interest rate, which subsequently absorbs the foreign capital influx and causes the appreciation in the home currency. The first method concluded that variation in exchange rate caused the fluctuation in stock prices, whereas the second approach said that stock prices led to a fluctuation in the exchange rate. The effect of stock price variation on the exchange rate may depend on the stock market's performance (Gavin, 1989). However, the interest rate is a common factor that creates a relationship between these markets (Ajayi & Mougoue 1996). For instance, during a crisis, the lack of investors' confidence in the economy may lead to the displacement of assets. For this reason, investors change their portfolio preferences to other currencies-dominated assets, resulting in low demand for domestic currency. Some empirical studies explored the linkage between stock prices and exchange rates, employing different methodologies and

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datasets. Several studies Fang, (2002): Phylaktis & Ravazzolo, 2005: Moore &Wang, 2014; Rahman & Uddin, 2009; Khan & Ali, 2015; Huy, (2016); Türsoy, (2017) identified the link between stock prices and exchange rate in the scenario of normal market conditions.

It would be intriguing to explore the link between these asset markets behaving differently in turmoil time compared to the normal time period. This study will check the relationship between these two markets to find out whether there exists contagion or interdependence between these two markets at the time of abnormal shock in the market.

2.2.5 Stock market and exchange rate (SP and ER)

Abdalla and Murinde (1997) attempted a study in Pakistan, India, Korea, and the Philippines, to discover the linkage in the markets of SP and ER. Vector autoregressive model was applied to monthly data. Results revealed that except Philippines unidirectional relationship exists between ER and SP for all countries. For the first time, co-integration and granger causality tests were used by Bahmani, Oskooee, and Sohrabian (1992) to measure the interaction between SP and ER. Monthly data of the S&P 500 Index was used and established the lack of any significant link between these markets in the long run short run. Fang (2002) explored the effect of devaluation in the currency on the stock prices and variability in East Asian countries during the Asian crisis. The results denoted that due to the home currency's depreciation, stock volatility increases while the return of stocks decreases as well.

In 13 developing countries, Erbaykal and Okuyan (2007) explored the link between SP and ER. Results revealed that only in eight countries a significant and causal relationship exists between these markets. In five countries, it was found that ER changes due to a change in SP, whereas in three countries, a bidirectional relationship was found. Several types of research provide credence to this strategy: (Bhattacharya & Mukherjee, 2003; Franck & Young, 1972; Solnik, 1987; Ocran, 2010; Ratner, 196, and Fowowe, 2015). Solnik, 1987; Ocran, 2010; Ratner, 1996; and following the adoption of financial integration worldwide, Plenty of investigations have evaluated the link between SP and ER. There was some discrepancy in the findings of the several research that examined this correlation. In just a few studies, there was a positive correlation between SP and ER. The positive link connecting SP and ER suggests that owing to the growth in the currency value, the stock market prices go higher. Phylaktis and Ravazzolo

(2005) demonstrated a positive correlation between ER and SP in the long and short term. They evaluated the link among these markets in Pacific Basin nations by employing a Multivariate Granger causality and cointegration test. They found that the link between the SP and ER is positive; an increase in currency value produces an appreciation of SP. Sohail and Hussain (2009) have sought to study the relationship between ER in Pakistan along with other macroeconomic factors. To determine the long-run link, they also performed a co-integration test and discovered that all the macroeconomic factors along with the ER are positively related to SP. Asaolu & Ogunmuyiwa, 2011 established the link between SP and ER in Nigeria. They utilized the VECM and Johnson co-integration test to analyze the short and long-run links. The co-integration results confirmed the presence of the long run, whereas the results of VECM denote the absence of any causal link between these two markets. Akbar, Khan, and Khan (2012) applied the monthly data from 1999 to 2008 to discover the link between SP and ER in Pakistan.

Lean, Narayan, and Smyth (2011) attempt to discover the link between the markets of SP and ER in Asian countries. The study utilized techniques like Gregory and Hansen's co-integration and the Wasteland panel Lagrange multiplier (LM) co-integration test to observe the structural break between the variables. Results found that a significant link exists in these markets only for Korea and unidirectional causality from ER to SP. The result of the LM test indicates the lack of any link between SP and ER for all the countries. Iku and situation Demirci (2012) assumed that the expectation about the upcoming macroeconomic Situation induced a significant interaction between SP and ER. To analyze the role of capital flows Ukü and Demirci utilized the structural vector error correction (SVEC) model in emerging country's markets. Results found the lack of any link in the markets under consideration. Yusuf and Rahman (2012) attempted to explore the linkage between SP and ER in the five ASEAN countries by employing a Multivariate vector Autoregressive model. For Thailand, unidirectional and Malaysia bidirectional causality exists, whereas no relation exists for Indonesia, the Philippines, and Singapore. Rahman and Uddin (2009) observed the link between ER and SP in the markets of Pakistan, Bangladesh, and India. To analyze the relationship study used cointegration and the Granger causality test. The study concluded the absence of significant association in the markets of ER and SP.

The higher demand for local stock enhances the local currency demand, which consequently appreciates the local currency. Few studies supported the flow-oriented model (Moore& Wang, 2014; Phylaktis & Ravazzolo, 2005; Fang. 2002), and others supported the stock-oriented approach (Liang et al., 2013; Tsai, 2012; Walid et al., 2011; Zivkov, Njegic & Markelic, 2014). Seong (2013) studied whether a portfolio balance approach or international trading effect exists in a Malaysian context. He examined the ER reaction to fluctuation in the SM. To check the adjustment speed and long-run causal relation study used the VAR, ECM, and Angel granger test. Results revealed the negative link between ER and SP in the long run, which supported the Goods Market Approach. There also exists bidirectional causality between the SM of Malaysia and ER. According to the third approach, the "asset market hypothesis," no link exists between the markets of SP and ER. The exchange rate is an asset like other financial assets. Hence like other assets, the price of the future expected exchange rate would fix the current price of the ER. The factors/ news which affect today's exchange rate may be dissimilar from the factors which are affecting the prices of stock. So, under some circumstances, SP and ER are likely no relation.

Inci and Lee (2014) studied the influence of variations in SP on the ER in eight countries and sectors. Granger causality test specifies that the ER's lagged value is considerably linked to the stock prices. The study also found the bidirectional relationship between these two markets and showed a stronger relationship during the recession. In Romania, Saman (2015) investigated the relationship between SP and ER by using the time period of 2000 to 2014. The study also considered different phases of markets like global financial crises and Eurozone crises. Saman employs a threshold error correction model to identify the asymmetric relationship in bad and good times. Results revealed that in the long run, there is a lack of a significant link between the two markets. However, this relationship is very sensitive to bad or good news in the short run, especially during an extreme regime. In the dominant time of financial integration, few researchers were dedicated to investigating the dynamic link between SP and ER in the long and short run by applying ECM and cointegration methods.

In Pakistan, Khan and Ali (2015) studied the trend of causality between SP: variability in the ER. The study utilized the monthly data of Pakistan SP and Pakistan ER against the dollar from 1992 to 2013. For estimation of stationarity, the study employed the Philip Perron (PP) test.

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To examine the volatility, the study used the GARCH model. Findings denoted that there exists bidirectional causality between SP and the ER in Pakistan. Akdogu and Birkan (2016) conducted a similar study in emerging countries by applying several non-causality tests to explore the relationship. The study sample was 21 emerging countries listed in the MSCI index. The study denoted that out of 21, and a significant relationship exists only in 13 countries.

Despite much-written evidence linking SP to ER, investigations have produced contradictory findings. Given that a portfolio balancing impact does not always and everywhere and that foreign capital cannot be absorbed in a market where there is no variability, there is a rationale for the contradictory findings. Therefore, indirect linkages may not exist. However, a more subtle link appears when big sums of money enter or leave the market because of foreign investment possibilities that are readily apparent. So, the international trade impact persists during quiet periods, when there is no probability of foreign capital influx and outflow, and the market is not dynamic. However, when the market is more volatile, there is a bubble in the market, and a large amount of money will enter or exit the market. Therefore, the currency of the nation depreciates or appreciates.

Depression in the economy declines the stock prices, forcing investors to invest in foreign markets and depreciating the local currency. There are mainly five channels of spillovers that describe the relationship between SP and ER. The first channel describes the spillover effect from the ER to SP" (international trading effect). The second channel describes the spillover from SP to ER (portfolio balance effect). The third channel originates from monetary policy. Contagion between currencies is the fourth channel, and the last is cross-border contagion among the markets. Kubo (2012) identified that the portfolio balance effect exists in Indonesia, Thailand, and Korea, which explains that due to changes in the exchange rate, stock prices fluctuate

The further study discusses the linkage between stock prices and exchange rate. In the current era, particularly after the financial crises, the world's economies suffered a great depression. Moreover, the Eurozone crisis also negatively affected the world markets. A contagion phenomenon at the time of crises not only affects the stock markets but also affects the value of the currency. A decline in stock prices leads to crises sometimes.

2.2.6 Interest Rate and Equity Market Returns

The ability of an investor to alter the proportion of stocks to bonds in his or their portfolio is reflected in the link between the price of an investor's stock and the nominal interest rate. The value of assets is adversely impacted when there is an increase in the interest rate since this causes the needed return rate to rise. Specifically, as interest rates rise, investors are more likely to shift the composition of their investment portfolio away from equities and toward fixed-income securities and vice versa. As a direct consequence of this, it is anticipated that share prices would go down. According to Modigliani and Cohn's (1979) research, the interest rate is one of the most significant factors that determine the price of a stock. A fall in interest rates causes a rise in the current value of future dividends because of the compounding effect (Hashemzadeh and Taylor, 1988).

The research that was conducted in by Uddin and Alam (2007) on the Dhaka Stock Exchange investigates the linear correlations that exist between share prices and interest rates. When such share prices and changes in interest rates, when the share prices and changes in share prices, and when the share prices and changes in interest rates all occur simultaneously (DSE). It has likely been noticed that the Interest Rate has a significant negative connection with the Share Price and that Changes in the Interest Rate have an important negative link with Changes in the Share Price for every one of the examples, including the outlier. The interest rate is one of the macroeconomic key variables that directly influence economic development. It is common practice to refer to interest rates when discussing "the cost of capital," often known as "the price paid for utilizing money over time." The interest rate represents the cost to the borrower of borrowing money from the lender's point of view (borrowing rate). When seen from the lender's point of view, the expense associated with lending money is referred to as the interest rate (lending rate).

2.2.7 Gold Price and Equity Market Returns

Since 1971, the commodities sector has used gold in various capacities. Gold's significance in the modern world has grown directly due to the ongoing economic crisis that has gripped the global economy in recent years. The gold is being purchased using the investors' money. Gold is a kind of financial instrument that may be considered a commodity and a currency due to its dual

nature. In the past, it was used both as a kind of currency and a medium of trade. In modern times, it is used both as a monetary repository and a well-known vehicle for various investment forms. It is difficult to get, is very mobile, has high liquidity, and is uniform in nature, all of which contribute to its high demand. The supply and demand for the commodity and the government's policies on auctions all influence the price of gold. Throughout history, gold has been seen as a means of mitigating risk and increasing portfolio diversity (Ciner, 2001). However, the theoretical connection between gold and stocks is murky, and study is absent in this area. A rise in the price of gold draws investors into the commodities market, which may lead to a drop in investor preference for the equities market. This suggests that one should anticipate a negative link between precious metals like gold and silver and returns on equities markets (Baur and Lucey, 2010). Gold Plays an exceptionally critical job in the advancing economy. It's a paly important job in an economy. Gold keeps as safe against the monetary standards of the trade mechanism; it is a protected wellspring of speculation. The worldwide interest and supply decide the cost of gold. It has some degree of cost all around the world. Further, during financial emergencies, the worth of gold was observed. Numerous financial speculations showed that gold assumed an exceptionally significant part during monetary downturns; individuals will often contribute or purchase gold during financial emergencies. It assists individuals with alleviating the impacts of expansion. An individual begins putting resources into securities exchange and selling gold during a stable financial period. Baur and lucy (2010). Right now, the financial circumstance of Pakistan is capricious and, in the nation, has soared. Individuals in Pakistan are reluctant to put resources into securities exchanges. They put resources into gold in the nation has flooded to an extraordinary level.

2.2.8 Stock Market and Gold Market

In recent decades, emerging markets have shown speedy growth in value and volume, creating investment prospects. A haven is an asset negatively correlated with other assets or portfolios, especially during turmoil. In financial studies, special attention has been given to gold. Jaffe (1989) presented that investors can reduce the risk by adding gold to their portfolio to enhance the average return. Harvey (1995) identified that holding the security of emerging equity market in the portfolio increases the return. Moreover, foreign investors have the opportunity to reduce the risk by incorporating securities from emerging markets. Naranjo and Porter (2007) stated a

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very low correlation exists between asset return of developed and emerging markets. So, investors can benefit from diversification by incorporating the securities from emerging and developed markets. It can also be explained as portfolio investment increased significantly in emerging markets from US$15 billion in 2004 to US$197 billion in 2010 (IMF, 2011). Ranaldo and Söderlind (2007) stated that an asset could be a haven if it is negatively correlated with the referencing portfolio, suffering loss. Moreover, according to the financial time's Lexicon, a financial haven can be a currency, stock, or commodity favored during financial crises due to its stability, durability, and easy liquidation. This high growth causes a high inflow from developed to developing markets (Beckmann, Hielscher, & Pies, 2014). Research showed that after the implementation of financial deregulation, the countries' stock markets are now more sensitive to all internal and external factors. The emerging markets are linked with developed markets. Any bad news and event in the developed market thus affect emerging markets, creating volatile and uncertain scenarios. Due to uncertainty in financial markets, especially during the crises, there has been an intense rise in gold prices. On the other hand, the prices of all other assets, especially stock, exhibit losses. These market uncertainties raised risk and forced investors to look for an alternative haven.

At the time of financial crises, gold becomes more attractive due to the simplicity and easy determination of its value, offering investors a sense of certainty. Due to this, investors are now paying more attention to the nature of interdependence between the assets, particularly between stock market return and alternative assets, to achieve a risk-return trade-off from international diversification (Bekaert et al. 2014). The knowledge of the dependence structure of different assets is necessary for portfolio diversification, asset reallocation, and asset pricing. The dependence structure confirms how strongly different assets are correlated and how they can impact each other. Underlying assets must have a low correlation to lessen the likelihood of loss. Farming the dependence structure between the different assets is necessary to form an optimal portfolio. It is reasonable to pick those securities with independent rise and fall. Due to the upswing of gold prices during crises, it is interesting to explore that gold can be a haven for stocks of AEEMS at the time of crises.

Over the past few years, the dynamics of the world economy have been gradually changing and shifting from advanced economies to emerging markets. Investors are more

attracted to emerging economies because of their high investment potential. Among them are Brazil, Russia, India, China, and South Africa (BRICS have an important role as they are the most significant emerging market economies (Arif Iqbal, Ali & Sohail, 2017).

2.2.9 Stock Market and gold Price

The literature regarding gold and other precious metals has regained the interest of many researchers and practitioners. Lawrence (2003) inspected the linkage between the stock market and gold. He also considered other commodities like copper, oil, and zinc, intending to check the feature of gold as a risk diversifier. The study revealed that gold is a more valuable commodity compared to other commodities that act as a safe haven. Faugere and Erlach (2006) developed an asset pricing theory of gold, which considers gold a store of wealth. The study examined the linkages among gold, foreign exchange, inflation, and stock prices. The study discovered that the prices of gold are inversely related to the stock price-earnings ratio. Hillier, Draper, & Faff (2006) considered gold in the portfolio and explored that the portfolio with a moderate weight of gold performed better than other portfolios. Furthermore, the study revealed that the portfolio which contains the weight of gold performs better than the portfolio which focuses on only financial assets. By distinguishing between high and low volatility of the market Coudert and Raymond (2010), found that gold, platinum and silver have the features of safe haven especially at the time when the market is suffering from high volatility.

In a crisis scenario, investment in gold can provide investors some certainty due to its simplicity. Gold is also considered an inflation hedge due to its positive correlation (Bampinas & Panagio-tidis, 2015). By investing in gold, investors can maintain their purchasing power during crises (Goodman, 1956). The central bank also keeps gold in reserve for diversification and regains value during crises (Chen & Lin, 1014; Ciner et al., 2013; Kaufmann & winters, 1989; Kumar, 2014). Narayan and Sharma (2011) argued that it could be used as a safeguard during crises due to the negative correlation of gold with other assets. According to Ibrahim (2011), gold is taken as a haven in a crisis due to a standard of value serving as a medium of exchange.

The portfolio diversification concept states that investors could get diversification benefits at the international level by considering those assets in the portfolio with lesser

integration (Bai & Green, 2010; Chandar et al., 2009; Francis et al., 2008). It is observed that those assets with lesser correlation can be used as a haven during adverse market shocks. McCown and Zimmerman (2006) explored that gold has a feature of financial security. The study also presented that gold can be used as an inflation hedge. Further study revealed that gold could be considered a zero-beta asset as it has minimum market risk. Baur and McDermott (2010) examined gold's role as a haven asset. The study denoted that gold's role as a safe haven is more significant in developed markets than in emerging markets.

Moreover, they also observed gold's role during crises and found it a haven in the crisis scenario for developed countries. The study also distinguishes between stronger and weaker havens. A weak safe haven is an asset that is not moving alongside assets in the same direction whereas a strong safe haven means negative correlation with other assets during crises. Coudert and Raymond (2010) supported the findings presented by Baur and McDermott; in the same way, they also found out that at the time of uncertainty in the market, it performs like a strong haven only for a short period.

The link between gold interest rate and stock is also investigated by Anand and Madhogaria (2012). A study found that in china, investors prefer to invest in gold as compared to stock and bonds because investors believe that investment in gold is better and safer. Moreover, the study found an asymmetric behavior in investing in developed and developing countries. It was found that investors in developing countries prefer to invest in gold due to its safe haven feature during crises. In developed countries, investors are more practical than those in developing countries.

Hood and Malik (2013) investigated gold and another commodity in the US equity market as havens and hedges. They observed that among all commodities, only gold plays the role of a haven and hedge in the market of the US. Moreover, the results established that the volatility index for the entire sample was a haven and hedge. Moreover, the study also observed that at the time of extreme market volatility, the volatility index acts as a haven compared to gold. Barunik, Kocenda, and Vacha (2015) utilized a wavelet method to explore the dynamic relation of the gold and equity market from 1987 to 2012. Daily and intraday data were utilized for analysis. They explored that heterogeneous behavior exists among all the pairs of underlying study, but after the crisis of 2008, the correlation increased among all the pairs and became homogeneous.

The study suggested that gold and stock can be used in a well-diversified portfolio for a short-term investment horizon. It can be inferred from the above-cited literature that gold is a precious financial asset that can be used as a haven in the scenario of higher volatility in the market because it holds better value when the value of other stocks falls.

2.3.1 Oil prices and equity market returns

Oil is the main driver of the global economy. Industrial revaluation has invested the global dependency on oil price lite to affect the global economy. The literature regarding oil and other precious metals has regained the interest of many researchers and practitioners. Lawrence (2003) inspected the linkage between the stock market and oil. He also considered other commodities like copper, oil, and zinc, intending to check the feature of gold as a risk diversifier. The study revealed that gold is a more valuable commodity compared to other commodities that act as a safe haven. Faugere and Erlach (2006) developed an asset pricing theory of gold, which considers gold a store of wealth. The study examined the linkages among oil, foreign exchange, inflation, and stock prices. The study discovered that the prices of gold are inversely related to the stock price-earnings ratio. Hillier, Draper, & Faff (2006) considered gold in the portfolio and explored that the portfolio with a moderate oil weight performed better than other portfolios.

At the same time, Pakistan is an oil-importing country, which is why it has been hit hard by the variation in oil prices kilion and park (2009). By distinguishing between high and low market volatility, Coudert and Raymond (2010) found that gold, platinum, and silver have haven features, especially when the market suffers from high volatility. Narayan and Sharma (2011) argued that it could be used as a safeguard during crises due to the negative correlation of gold with other assets. According to Ibrahim (2011), gold is taken as a haven in crisis due to a standard of value serving as a medium of exchange. Ciner, grudger, and Lucey (2013), the fluctuation of a country's stock market and economy depends on the country, either importer or exporter of oil in the global market. The main reason is that all the factors of production are linked with the oil price. The central bank also keeps gold in reserve for diversification and regains value during crises (Chen & Lin, 2011; Ciner et al., 2013; Kumar, 2014).

A small change in oil price can affect the price of goods and services. As a result, its industrial penetration is very sensitive to the oil price. Investors must know the correlations

among different asset classes to minimize the portfolio's risk. There must be a heterogeneous correlation. If the correlation is homogenous, then the whole purpose of diversification will decline. For many years, gold has been considered a unique asset for portfolio diversification, especially during crises. The fact that gold holds value when the stock value falls has put investors' attention to using gold in their portfolio to minimize the risk. In a crisis scenario, investment in gold can provide investors some certainty due to its simplicity. Gold is also considered an inflation hedge due to its positive correlation (Bampinas & Panagio-tidis, 2015). Investors can maintain their purchasing power in times of crisis by investing in gold (Goodman, 2015). The central bank also keeps gold in reserve for diversification and regains value during a crisis. Furthermore, the study revealed that the portfolio which contains the oil weight performs better than the portfolio which focuses on financial assets only.

2.3.2 Stock Market and Oil Prices

Oil is a vital commodity for any economy, and all economies mainly depend on oil. Recently, oil prices depicted excessive uncertainty caused by economic, financial, and geopolitical factors. Since 1970 the price of oil has been fairly stable. However, the organization of oil exporting countries (OPEC) announced a price prohibition in 1973 during the Yom Kippur war, which enhanced oil prices. Many economies went into recession due to this change. At that time, the main oil price shock came during the war of Iran-Iraq, when KSA voluntarily closed down 3/4 of its production to prevent the oil price decrease. Due to this production shutdown, oil prices declined by 25%, and because of this fall in oil prices, Saudi Arabia left its role as a tramp producer from the list of OPECS to enhance the share prices. Other members of OPEC also followed the way of Saudi Arabia, which immediately led to an oil decline in the market.

Consequently, due to the collapse of OPEC for the first time, oil prices decreased largely in January 1986. The linkage between these markets was also studied by (Jones & Kaul, 1996). Although, in literature, numerous studies explored the linkages between oil and the equity market. Results presented that oil prices are negatively linked with other macroeconomic variables. Some other studies also observed the negative relationship between these two markets. However, current work shows limited studies concerning the find contagion effect in these markets. The pioneering study on this relationship was undertaken by Hamilton (1983). Hamilton inspected the association between macroeconomic variables and oil prices. The Persian

Gulf War, which started in august 1990 after Iraq invaded Kuwait and ended in February 1991, also created a large spike in oil prices. However, before the war, the price of oil was 24USS, which reached 45US$ during the war. At that time, to lower the price of oil, Saudi Arabia increased its production.

In a very short time, the oil price was volatile by over 50%. Till the 1990 war, conflicts in price and production were controlled and employed by OPEC (Sørensen, 2009; Hamilton, 2011), and this remained the main reason for the shocks in oil price. During the 1990s, most of the countries converge into industrial economies from agricultural economies. These economies utilized 17% of the world's petroleum in 1998, though; these economies increased global oil consumption by 69%. Most of the industrial economies are related to Asia. At that time, oil consumption in these economies was not significant, but it was believed that the consumption level would increase during the mid-1990s.

However, the happening of the East Asian crises disturbed the financial system of the majority of the economies. The expected growth in consumption by Asian economies disappeared, and oil prices declined from US21$ to US11$ by the end of 1998. After the end of the East Asian crisis, consumption of oil again appeared to increase as was before the crisis. Due to this increased consumption price of oil tripled, and by the end of 2000, it reached US35$. However, the attack of terrorists and tenth postwar US recession in 2001 led to a fall in oil price once again. A strike broke out in Venezuela between December 2002 and January 2003, which caused the stop in the production of oil. As a result, 2.1million barrels were eliminated per day. After the strike on Venezuela, the Iraq war started. Iraq produced 2.2 million barrels per day then, but due to war, this production was postponed between April and July 2003. Consequently, with these stops in production, oil prices changed modestly by having a minimal influence on oil supply.

These events led to the global economy's growth in 2004 and 2005, enhancing oil demand. The consumption of oil was raised by 5 million barrels per day. Due to this higher level of demand, prices of oil also increased. Till 2005, the demand and supply of oil were in line; however, Saudi Arabia refused to increase oil production soon after. Meanwhile, there was also instability between Nigeria and Iraq. Once again, all these factors produced a shock in oil prices as this shock was not due to geopolitical factors as compared to other shocks of history, so the oil

demand went on increasing till 2007 (Hamilton, 2011). The speculative bubble in the oil price was due to the dollar's investment in future commodity markets, which enhanced the oil price to US$ 122 in mid-2008, its peak level in history. In 2008 global financial crises hit the markets, and oil prices dropped to US39S, the worst decline in history. Results depicted those negative linkages exist between these two markets. Odusami (2009) examined the linkage of oil prices with the stock market in the US. High-frequency data was used from 1996 to 2005. Results denoted the presence of a significant and negative relationship.

Asterious and Bashmakova (2013) considered the European emerging markets to investigate the link between the equity market and oil prices by employing an international multifactor model. The study also utilized the panel data approach from 1999 to 2007. The negative beta value indicated that the oil price factor is vital to identifying the worth of the stock return. The study's outcome revealed that the equity market's response is negative. Either movement of oil prices is upward or downward. Babatunde et al. (2013) revealed that the positive response of the financial markets of Nigeria to the oil price shock is probably to be negative concerning the nature of the shock. Results indicated the presence of a significant and negative link between the variables. Dhaoui and Khraief (2014) studied eight developed markets from 1991 to 2013 and presented the negative linkages between the equity market and oil prices.

Muhtaseb and Al-Assaf (2017) employed the MTAR and TAR along with the ECM model to study the asymmetric relationship. Results identified that the reaction of equity return to oil prices is not alike. An upsurge and decline in the price of oil impact differently to equity stock

These variations in oil price have a major impact on the economy and macroeconomic variables because it is used in major production processes and as a final consumption good. This remarkable influence of oil price fluctuation on the economy caught the attention of scholars to study the link between oil prices, stock prices, and macroeconomic variables. Due to the latest financial and economic crisis, the researchers are most interested in exploring the relationship between stock market returns and oil prices. The connection between these two markets has caught the significant consideration of researchers due to its repercussions on portfolio selection, risk management, and international asset allocation.

Some studies presented a positive association between the equity market and oil prices. Sodarsky (2001) discovered the linkage between oil prices and oil and gas firms and denoted that these companies are positively affected by increasing oil prices. Basher and Sadorsky (2006) explored the influence of changing oil prices on the stock prices of different emerging markets. The study considered high-frequency data for the period 1992 to 2005. The study's outcome showed that changing oil prices considerably impacted the return of emerging markets. In the same way, Narayan and Narayan (2010) found a positive correlation between the two markets in the Vietnam market's context. A positive linkage between the equity market and oil prices was also presented (Faff & Brailsford, 1999; Arouri & Rault, 2012).

Moreover, a regime of low volatility is steadier than an excessive volatility regime, and a lesser volatility regime duration is also longer than a high volatility regime for all commodities and a stock market return. Hammoudeh et al. (210) also observed the influence of fluctuating world stock market return, federal funds rate, and oil prices on the volatility of 27 different sectors' returns in the US. The results of a GARCH model revealed that changing oil prices strongly influence the return of all the relevant sectors to oil and the opposite for all other sectors. By employing the asymmetric GARCH model, the study also considered the effect in the upper and lower regime. Results indicated that higher oil prices lead to lower return volatility for all sectors related to oil-consuming or oil-producing industries in an upward regime. In contrast, in a lower regime, a positive association exists between a decrease in oil prices and the return of all sectors.

Elyasiani, Mansur, and Odusami (2011) studied the variations in oil return and its volatility impact on the return and variability of thirteen US industries. Their results presented that fluctuation in oil price at the industry level leads to a specific risk. Furthermore, the results indicated that the variability of oil return has a robust effect compared to oil return. By using a multivariate vector autoregressive GARCH model, the transmission of instability among the stock prices and oil prices were also studied by Arouri, join, Khuong, and Nguyen (2011) in the market of the USA and Europe and found that the presence of volatility spillover from one market to another market. Diaz and Gracia (2016) also conducted a study in G-7 countries and discovered the negative response of these countries stick prices to the volatility of oil prices. The behavior of both markets doesn't need to remain the same at all times

Lee and Chiu (2011) developed a two-step model for studying the impact of oil price shocks on a stock's return. Ciner (2013) employed the frequency domain technique to check the link between oil prices and equity stock prices. The study revealed that not all shocks are alike. Shocks less than twelve months affect negatively, whereas persistent shocks for 12 to 36 months positively affect equity return. The Regime switching model was utilized to monitor the variability of oil prices. The study incorporated the jumps to analyze the asymmetric effect. The study revealed that variation in oil prices has an asymmetric impact on the stock return. Ajmi et al. (2014) directed a study in (MENA) countries. Their findings also supported an asymmetry relationship between these two markets.

Recently, Sim and Zhou (2015) applied a novel approach quantile on quantile to explore the association between oil prices and the equity market. The key benefit of using this approach is that one can easily capture the dependency between the equity market return and oil price shock. Results denoted that the impact of oil price on equity return is asymmetric as the positive shock has a different effect than the negative shock. The above-cited studies revealed significant negative and positive connections between these two markets. Moreover, this link is not the same for all economies. The oil price has an asymmetric association with stock prices, e.g., it is positively linked with oil-producing economies, and with oil-consuming economies, it is negatively linked.

2.3.3 Gross Domestic Product and Equity Market

Academic research about the relationship between economic shifts and economic growth may be traced back to the middle of the 20th century. To make sense of a connection of this sort, it is necessary to analyze the heading of causality and the kind of effect (both positive and negative) produced by financial analysts. Although it is not a new concept, the concept that financial business sectors may be related to financial activities has evolved through time, even though the likelihood that these two things might be connected has not (Schumpeter, 1911). According to Briotti's (2005) opinion, an interest rate increase might negatively impact the demand level. Level. Di Criovanni et al. (2009) Relationship, The pace of expansion, Turn the actual interest into a negative impact by inverting it. In numerous publications, it was found that the trade balance has a sizeable impact on the GDP of developing nations such as India and some other Asian nations (Prabhakar &2019's Rentala FDI is one of the most comprehensive indexes

because it includes the debt and securities markets, banks, mutual funds, pension funds, insurance market, and stock market). The results of this study and those of other researchers suggest that it has a significant and beneficial influence on the rate of economic growth in any nation (Tariq et al., 2020).

According to Naeem and colleagues (2021), there is an inverse link between GDP growth and interest rates. It was shown by using the history of Pakistan as a basis. They also said that the correlation between GDP and interest rates might be either short-term or long-term. The research that has been done up to this point has mostly focused on developing strategies for using high-recurrence data to investigate conjectures on low-recurrence elements. Another significant contribution was made by Zhayang zhang (2021), who presented a blended recurrence VAR model. This model allows one to address the expectations of high-recurrence factors by utilizing low-recurrence factors and the other way around. This was a significant step forward in the field. The writing has helped analyze major writing associated with the investigation, including speculative writing, stated, and emphatic. It has made it possible for the expert to discover the investigation gaps and legitimize the prospective obligations that may flow from the offer of potential contributions from the thesis.

2.3.4 Stock market and GDP

Similarly, aspects of the monetary framework may promote and generate changes in the business cycle (Ferreira da Silva, 2002), and soundness of the macroeconomic can be achieved via the monetary area, notably from loan cost-actuated shocks or liquidity shocks. One more significant aspect of the connection between financial business sectors and GDP expansion is that the expansion of the financial area can be driven by the increases in the demand for financial administrations that come about because of financial development. This is an important aspect of the connection between financial business sectors and GDP expansion (Rousseau and Vuthipadadorn, 2005). Briotti (2005) opined that raising interest rates can negatively affect demand. They attributed this to the volatility of the financial exchange. It is interesting to note that other people have uncovered concrete evidence of a two-way link between the unpredictability of GDP growth and the instability of the stock exchanges. For example, Leon and Filis (2008) showed that GDP shocks cancel out the volatility of the securities market. Despite this, the volatility of the securities market may contribute to an increase in the volatility

of GDP. Regarding the unpredictability of the economy, Diebold and Yilmaz (2008) trace a unidirectional influence from the unpredictability of the gross domestic product to the instability of the financial exchange. A favorable influence on yield development instability was seen by Caporale and Spagnolo (2009).

Leve, Di Criovanni et al (2009) Relationship the -growth rate Inverse the interest real negatively effect. More recently, Antonios (2010) suggests that risk improvement via financial exchange reconciliation might move along asset allotment and affect banking duties, impacting real GDP growth. Antonios makes this recommendation in light of recent events. In addition, Wu et al. (2010) discovered that the influence of a securities exchange enhancement on natural outcome was in the opposite direction in the short run compared to its impact in the long run. According to their findings, the liquidity of the financial exchange has a significant impact on economic development. Still, the capitalization of the stock market and the stock market's liquidity both have favorable long-term effects on monetary growth.

Naeem (2021) said That There was an inverse relationship between interest rate and GDP growth rate. It showed on the bases of the history of Pakistan. They also said that the relationship between interest rate and GDP may be short or medium-term. This may become possible due to the availability of finance to domestic manufacturers from various monetary systems. In the near term, financial institutions that do not have complete protection will have unpredictable credit and poor result growth to compensate for the risk they face during times of financial emergency. However, monetary organizations will be freed from emergencies and experience steady growth in the long term.
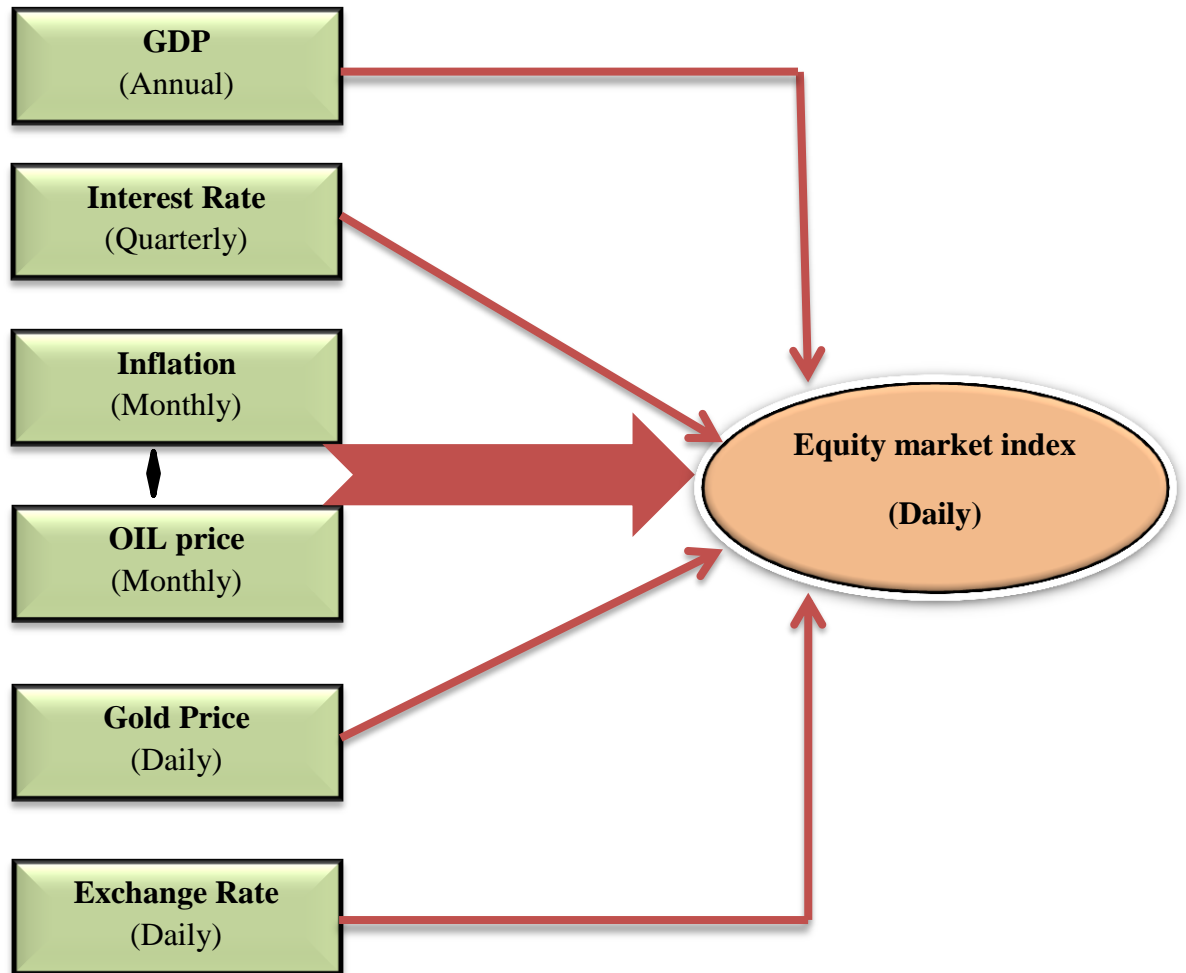
2.3.5 Evolution of Econometric Techniques to Estimate Correlation

Most people and companies frequently maintain and monitor their portfolios of financial assets. Understanding the reliance structure of different assets is crucial for portfolio diversification, asset reallocation, and asset pricing. Now investors are paying greater attention to the nature of dependency between the assets, notably between stock market return and an alternative asset, to accomplish the risk-reward tradeoff from international diversification (Bekaert et al. 2014). (Bekaert et al. 2014). The dependency structure indicates how strongly different assets are connected and how they might affect one other. For risk management, underlying assets must

have a low correlation to limit the possibility of loss (Mensah & Alagidede, 2017). (Mensah & Alagidede, 2017). Designing the dependency structure among various assets is crucial to establishing an ideal portfolio. It is sensible to choose those securities with a low or negative correlation. Thus, it is necessary to quickly and reliably estimate financial correlations for risk planning and policy-making reasons.

The necessity for researching correlation in the world of finance was established by Markowitz (1952) regarding portfolio management. Initially, Markowitz (1952) developed the notion of portfolio diversification. According to this, investors are obliged to invest in several securities instead of one security so that one may lessen the risk. Moreover, the correlation between the securities should be low or negative for a greater return. Since then, various methodologies have been developed to analyze the degree of correlation between the financial variables. In the foundational paper of Engle (1982), classic time series methods such as autoregressive moving average for the mean have been extended to substantially equivalent models for the variance. Univariate autoregressive conditional heteroscedasticity (ARCH) and generalized ARCH (GARCH) models are currently commonly applied to explain and estimate the deviations in time series data. Traders and management are generally concerned with gauging the risk of the market. Jorion (1996) created the notion of Value at Risk (VAR), which is increasingly widely used to quantify risk management. Volatility models are the foundation for Forecasting VAR. The classic volatility model is the generalized autoregressive conditional heteroscedasticity (GARCH) model of Engle (1982) and Bollerslev (1986). (1986). The execution of this model provides a basis for presenting the family of univariate and multivariate GARCH Models. Furthermore, conditional VAR predictions were first established due to these family models.

2.4 Theoretical Framework

GDP (Annual)	
Interest Rate (Quarterly)	**Equity market index** (Daily)
Inflation (Monthly)	
OIL price (Monthly)	
Gold Price (Daily)	
Exchange Rate (Daily)	

Building on the review of the extant literature discussed above, the study's main hypotheses is as follows.

H1: inflation rate has significant impact on the equity market index.

H2: interest rate has significant impact on the equity market index.

H3: Gold price has significant impact on the equity market index.

H4: Oil price has significant impact on the equity market index.

H5: GDP has significant impact on the equity market index.

H6: Exchange rate significant impact on equity market index.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

A comprehensive overview of the research methodology is discussed in the current chapter. Section 3.1 considers the philosophical approach of the thesis, whereas 3.2 and describes the research design. Section 3.3 of this chapter explains the sample markets and data description. The study uses descriptive statistics and correlation analysis to analyze the variables' behavior and level of association.

The research method is an aggregate of key ideas normally used to explore a problem's solution scientifically and planned way. Precisely, Moutan and Marais (1988) have discussed "a research process is in all of its broadness and complexity, the various techniques and methods that are employed, the rationale that underlies the use of such method, the limitations of using each method and technique, the role of propositions and assumptions in selected techniques and methods, the influence of methodological preference on the type of data analysis and subsequent interpretation of findings and so on." The description, as mentioned earlier, is sufficient to outline the course of action for the data gathering procedures, the study plan, and data analysis.

3.2 Philosophical Assumptions Underpinning the Current Thesis

This thesis aims to determine the dynamic correlation between interest rate, GDP, exchange rate, gold, oil, and the forex market. The researcher admits the imaginations of the functionalist and interpretive paradigms as Johnson and Duberley (2000) reported that "by accepting the assumptions that underpin the sociology of regulation, the assumptions that constitute the sociology of radical change are denied." The reason for the rejection of the humanist and structuralist paradigm is that they assume that it is the basic objective of the o change society in some way.

The present thesis is realism. The thesis, in particular, used quantitative research methods based on secondary data, so output are presumed to be generalizable for other analogous markets; thus, this thesis appears to arise from the functionalist paradigm". Additionally, specifying the purpose of the current study, the researcher considers that variations in prices of the, interest rate, and exchange rate, gold, oil and forex markets signify a significant reality that human insights of socially constructed events in real. Price changes are notable because they affect people's wealth and the regional economy. As these nations' economies have

liberalized and overseas investors have been encouraged to buy shares, fluctuations in share prices may have worldwide effects.

This thesis' epistemological assumptions are positivist. Positive epistemologies seek regularities and causal linkages between social factors to explain and anticipate social events, according to Burrell and Morgan (1979). This research uses historical data to evaluate the link between interest rates, gold, oil, and the currency market. The researcher should analyze share prices since they inform market participants. These nations' political and socioeconomic issues should affect stock prices. This supports a deterministic view of human nature. Stock exchange decisions are partly in their hands. It supports a voluntarism understanding of human nature. This research has an intermediate determinism-voluntarism stance. This argument takes a middle ground between determinism and voluntarism concerning human nature. Burrell and Morgan (1979) advocate that social scientists "take an intermediate stance that accounts for both situational and voluntary aspects in accounting for human behaviors."

Giving a cursory glance at the researcher's assumptions about ontology, epistemology, and human nature, it becomes clear what research methodology would be appropriate. The current study uses quantitative methods for analysis and assumes that the results can be generalized. The current thesis locates itself within the functionalist paradigm. To conduct their research, the authors relied on realist ontology, a positivist epistemology, a position that strikes a balance between the deterministic voluntarist account of human nature and a nomothetic technique, and an intermediate view. In contrast to the subjective judgments that are unique to certain investors, the findings of an inquiry into the dynamic correlation in these markets should be useful for all investors.

3.3 Research Design

After a detailed literature review, the study applied a quantitative approach. This approach can examine and gather the results and find the linkages between variables of interest. Data can be generalized in terms of numbers in the quantitative approach. The quantitative methodology should be applied to get better findings of the research problem through the numerical tendency of quantitative data (1998; Mertens; 2003; Adore Newman, Ridenour & DcMarco, 2003). The next section presents the dataset and econometric techniques used for estimation.

3.4 Data Description

This research examines the interrelationship of interest rate, gold, oil, and FX markets. To detect contagion and interdependence among interest rate, gold, oil, forex markets, daily, monthly, yearly quarterly, data from 2011 to 2021 of stock indices, forex, oil, and gold interest rate, GDP is used, which includes GFC and Eurozone crises. Rigobon (2002) found that using either local or dollar indices did not affect the final findings. Hence dollar indices are used for all market data. Gold was priced using the US dollar-dominated market. Spot daily WTI crude oil prices are used to calculate GDP in dollars per barrel, and the US dollar index is used to calculate exchange rates. Data from all the markets are obtained from Bloomberg (2018). Data on crude oil prices are taken from the Energy Information Administration website. GDP, CPI, and interest rate data are taken from the data stream eikon effect.

To incorporate the impact of an event on the relationship between different assets class, it is required to divide the data into pre and post-windows. Normally, the event study methodology is used to determine the influence of some announcements on the market behavior. For the first time, James Dolley (1933) used the event study methodology to find out the impact of stock split announcements on the return of the stock. Nowadays, event study methodology is the most widely used technique to analyze the effect of various corporate announcements like stock splits, dividend announcements, bonus shares, and some economic events like budget announcements, policy announcements, political events, terrorist attacks, financial crises, and oil shocks, on stock return. Different researchers used event methodologies to study stock return behavior before and after the event. For example, the 9/11 attacks in September (Cartaer and Simkins, 2004; Suleman, 2012), positive political news (Kongprajya, 2010), negative political news (Lin & Wang, 2003; Mei & Guo, 2002), and general elections (Vuchelen, 2003; Person, 2012; Jones, 2009; Anderson et al., 2008; Peel and Pope 1993; Hensel & Ziemba. 1995; Bialkowski et al., 2008; Kithinji and Ngugi, 2013).

3.5 Econometric Technique

In the field of finance, statistical models provide help in the process of decision-making. Descriptive statistics is the discipline of quantitatively describing the main features of variables. It describes and summarizes the behavior of the variables employed in the study. Moreover, to discover the level of relationship among the variables, the study undertakes the simple

correlation OLS, unit root test, and MIDAS model. Correlation coefficients have a momentous importance in this study as these coefficients provide essential statistics on the pattern of correlation among GDP, inflation, interest rate, forex, oil price, gold price and stock return series over time. So, to find out the time varying correlation coefficients, this study makes use of the MIDAS model to analyze the results of low to high-frequency data. This study is conducted to observe the presence of contagion and the interdependence effect.

3.6 Data Analysis

The quantitative data analysis uses pooled ordinary least square regression model OLS, random effect regression model REM, fixed effect regression model FEM, and Unit root test MIDAS model. The data has been analyzed using (STATA AND EVIEWS) software, and the statistics included are as follows:

3.5.1 Descriptive Statistics

Because it is a quantitative measurement, it is the most prominent aspect of our acquired data. Bridge sampling relies on this method, which is not grounded in probability theory. It gives an overview of the sample and the relationships between the findings. It's a double-edged sword. This statistical information presents fundamental data about variables and emphasizes significant connections between them.

3.7 Regression test

The study used a regression test to establish the most appropriate model. It describes the relationship between variables. This test's main goal is to determine how quickly one variable may affect another. Data assessment is based on r square, t-statistics, and coefficient. The r squared values range from 0 to 1, with 0 being the mean and 1 being the standard deviation. Sign of coefficient is used to measure the relationship between variables. A negative sign denotes a negative link, while a positive sign suggests a positive correlation between variables.

3.8 Co-linearity test

The study has used correlation and variance inflation factors to detect the problem of co-linearity. A substantial correlation between various measurements of variables brings up the issue of co-linearity, which argues that independent variables are not independent.

3.9 Correlation matrix

The study used correlation analysis to define the potency of the link between the variables (Tabachnick and Fidell, 2007). The correlation's positivity and negativity may represent the positive and negative relationships. A positive correlation indicates that if one variable grows, the other variable likewise increases when there is a positive relationship between the two variables. If there is a negative correlation between two variables, it indicates that as one variable increases, the other variable tends to decrease. The correlation coefficient is calculated when a correlation is being determined, and its value may vary from +1 to -1. The value +1 demonstrates a perfect correlation between the two variables, which indicates that if one variable goes up, the other variable follows the same track exactly. The correlation coefficient measures how strongly two variables are related linearly to one another.

3.2.1 Unit Root Test

Time series analysis is needed to ensure the variables aren't lagging. "If mean and variance are constant throughout time and the autocorrelation relies solely on time, it is stated to be stationary" Gujarati and Dawn (2009). The estimation of false regression, leading to misleading test statistics, is a common consequence of non-stationary data. The data's stationarity can profoundly affect how the series behaves. For non-stationary series, the persistent shock will always be infinite. For time series data, the existence of unit root in linear stochastic process implies the presence of non-stationary in the data. If two variables are trending over time, even if unrelated, the R2 will be greater. This raises the issue of whether or not the R2 is meaningful (Engle & Granger, 1987). Because the typical 't-ratio' will not follow the t-distribution if the regression is not stationary, this suggests that the null hypothesis that the regression parameter is constant should be rejected. Consequently, non-stationary regression yields inaccurate estimates and a muddled grasp of the data.

3.2.2 The Augmented Dickey-Fuller (ADF)

In the process of checking the stationary of the series. The first model is the Augmented Dickey-Fuller (ADF) test which Dickey and Fuller developed. This test is directed by 'augmenting' the preceding equation by adding the lagged value of the dependent variable ΔYt. It has the feature of testing the more extensive and complex time series data.

The equation of the ADF unit root test is given by:

$\Delta yt = \alpha + \alpha_1{}^2 + \sqrt{}_2 \ -1 + Ey_1 \ Ayt- + \ldots\ldots n$

While in this equation, Yt refers to the level form of the series (PSX, GOLD, INTEREST RATE, EXCHANGE RATE, GDP, CPI, OIL) and the first difference of the series (APSX, AGOLD, AINTEREST, AINFLATION, AEXCHANGE, AGDP,). Here a0 denotes the intercept term, alt refers to the trend variable, & Yt-1 refers to represent the lagged level, whereas it signifies the white noise error term.

3.2.3 Phillips-Perron (PP)

Phillips-Perron (PP) test is an alternative test. One can minimize the serial correlation in error term by adding the lagged difference term of regression and the ADF test. In the meantime, in the PP test, one can lessen the serial correlation in the error term by using the nonparametric statistical method without adding lagged difference terms.

$\Delta Yt = \beta' \ Dt + pYt{-}1 + \varepsilon t\ldots\ldots\ldots\ldots\ldots\ldots$

Besides, both ADF and PP tests are similar and typically give the same result. First, unlike the ADF test, the Phillips-Perron test does not need to determine a lag time (Gujarati & Dawn, 2009). Furthermore, when the series possesses time-independent heteroscedasticity and serial correlation, the PP test across ADF, which is the PP test, provides a more robust estimate. Also, the characteristics of the null and alternative hypotheses are identical across the two tests. Both tests have the same characteristic, where the null hypothesis is that the series has a unit root, and the alternative is that it does not.

3.3 Midas model

A common time series regression model includes data taken at the same frequency. The idea of designing regression models incorporating data with various sample frequencies is relatively unexplored. We describe numerous techniques to generate such regressions. The methodology used to conduct this kind of statistical analysis is known as a Mixed Data (sampling) regression (henceforth MIDAS\ regression at a broad level, the interest in MIDAS regressions addresses a problem often encountered in practice where the vital information is high-frequency data, yet the variable of interest is collected at a lower frequency. Ghysels, SantaClara, and Valkanov (2004) One example refers to models of stock market volatility. The low-frequency variable is, for instance, the quadratic variation or another volatility process over an extended future horizon corresponding to the period to maturity of an option. The high-frequency data set represents previous market information at the tick-by-tick level. Ghysels et al.,(2004)

CHAPTER 4

DATA ANALYSIS AND RESULTS

4.1 Chapter Overview

This chapter investigates the correlation between macroeconomic variables and the return on the stock market. This study has followed an organized sequence of procedures, including quantitative analysis. The first step is to determine whether or not the data are stationary. Second, descriptive statistics are used on the data to investigate the statistical patterns that have been uncovered. In descriptive statistics, the data distribution is analyzed to determine the mean, the median, and the standard deviation, among other metrics. i.e., correlation analysis, co-linearity test, unit root test, regression test, MIDAS regression test.

4.2 Table1 Descriptive Statistic

Variable	Mean	Std. Dev.	Min	Max
PSX	32324.83	1155.475	52876.46	10842.26
GP	1437.335	234.992	1068.25	1968.56
OIL	68.363	23.388	16.550	113.73
CPI	106.536	24.368	66.01	165.23
INTR	9.028	2.557	5.895	13.725
EXR	116.15	25.93	84.2	178.3
GDP	262.381	33.678	213.59	314.57

The results show that PSE mean is 32324.83 with a standard deviation of 1155.73, having 2727 daily observations; another variable, INTR, has the return of 9.027727 with a standard deviation of 2.557, having 44 quarterly observations. The gold price value depicts 1437.433 mean and 234.992 standard deviations for Gold with 2871 observations. The mean of oil is 68.363, and the standard deviation is 23.050 for 132 observations. GDP has a return of 262.381 with a standard deviation of 33.67850 with 10 annual observations, whereas the CPI mean is 105.9995 along with 24.102 standard deviations for 144 observations. Those highlight results have a significant effect on PSX.

4.3 Table 2 Correlation matrix

	PSX	CPI	GOLD	OIL	GDP	INTR	EXR
PSX	1						
CPI	0.799	1.000					
GOLD	-0.747	-0.450	1.000				
OIL	-0.016	-0.368	-0.517	1.000			
GDP	0.592	0.870	-0.421	-0.169	1.000		
INTR	-0.752	-0.950	0.331	0.395	-0.818	1.000	
EXR	-0.396	-0.642	-0.068	0.709	-0.348	0.716	1.000

4.3.1 Correlation matrix results

Based on the sample data, the degree to which two variables are connected to each other and the method in which this relationship manifests itself are both defined by the correlation coefficient. It conveys the magnitude and direction of the correlation between the variables in a certain data set sample. The correlation results show in Table 2 PSE is dependent variables which correlate from the interest rate, gross domestic product, inflation, gold price, oil price and exchange rate; it shows that the macroeconomic variables have relationship with PSX, has positive relation with CPI, (r= 0.799, p<0.00) GDP, (r= 0.592, p<0.00) and negative relation with OIL, (-r= 0.016, p<0.00) INTR, (-r= 0.752, p<0.00) EXR. (r= 0.799, p<0.00) GP, (-r= 0.749, p<0.00). The table shows the summary of the dependent variable and dependent variable.

4.3.2 Summary of correlation matrix results

PSX

CPI +ve correlation   **INTR**   -ve correlation

GDP +ve correlation   **GP**   -ve correlation

OIL -ve correlation   **EXR**   -ve correlation

It means that when PSX and CPI have a positive correlation, PSX and INTR have a negative correlation, PSX and GDP have positive relation, PSX and gold price have a negative relationship, PSX and OIL have a negative correlation, and PSX and EXR negative correlation.

4.4 Table3 Variance Inflation Factor VI

Variables	VIF	1/VIF
PSX	3.21	0.638
INT	3.446	0.184
GDP	3.09	0.324
CPI	3.005	0.333
GP	2.982	0.315
OIL	3.788	0.281
EXC	2.631	0.465
Mean	3.254	

4.4.1 Variance Inflation Factor Result VIF

The change expansion factor was used in the test to see if there was an overlap between the independent and dependent factors. The test for multicollinearity was done with the help of the fluctuation expansion factor.

It figures out which factors have strengths in common and shows that information. The table shows that all of the qualities are lower than the average cutoff number of 10, which shows that multicollinearity doesn't seem to be a problem (Welsh, 1980).

In VIF, the mean of independent variables is less than 10, so independent variables have no problem. The accepting limit is 10 according to (Welsh, 1980).

4.5 Table4 Unit root test

	Unit Root Test (ADF)				Unit root test (PP)		
	level***	1st diff**	2nd diff***		level***	1st diff**	2nd diff**
PSX*	0.9410	-45.4008	-24.3137	**PSX**	0.941	-45.4	-24.31
INT*	-0.7822	-3.7289	-8.0508	**INT***	-0.908	-3.729	-8.051
GDP	0.6443	-1.6499	-3.1854	**GDP**	0.6443	-1.665	-3.252
CPI*	9.4583	-3.2567	-8.1860	**CPI***	8.3544	-7.964	-79.73
GP	0.2786	-54.0410	-19.9555	**GP**	0.3239	-54.12	-860.5
OIL*	-1.1059	-8.2816	-9.2136	**OIL***	-0.761	-7.534	-30.78
EXR*	3.9176	-33.1426	-21.2461	**EXR**	3.6068	-61.1	-794

P value is less than ** 5 or equal to 5 ***

4.5.1 Unit root test results

Table 4.4 shows ADF and PP unit root test results. After the initial difference, ADF is stationary. Phillips Perron Root predicts only lag. Schwarz info Test (PP) also shows ADF test results. All macroeconomic variables and the PSX index are stationary, meaning all variables in level are unit stationarity, with 1 percent and 5 percent significance levels. This exam is for long-term relationships between the stock market, and macroeconomic variables are shown. (Christopher Gan et al., 2006). This study used the ADF test to assess stationarity. Initial research variables were log-transformed. Schrooten (2005) advised using the variable's log form for model definition, smooth data pasting, and precise parameter estimations. According to the results, all variables have a unit root at level form. While, at the level of difference, they become stationary.

4.7 Regression analysis

We obtain the following results by using the regression model for all the gathered observations. This test aims to unearth an independent variable's impacts on other variables. Data evaluation is found on r square, t-statistic, and coefficient. The value of r square is represented in percentage and is in-between 0 to 1. A coefficient symbol is used to measure the relation amongst variables. While negative mark depicts an indirect relationship, and the positive symbol displays a direct association between variables. The following equation scrutinizes the association between measures of PSX and macroeconomic performance time series data.

$$PSX = \beta_1 \, CPI_{it} + \beta_2 \, GDP_{it} + \beta_3 \, INTR_{it} + \beta_4 \, GDP_{it} + \beta_5 \, OIL_{it} + \beta_6 \, EXR_{it} + \varepsilon_{it}$$

PSX demonstrates dependent variables; I for period t. and E represent error term, also called disturbance term.

4.7.1 Table 5 Regression Analyses

Dependent Variable: PSX	COEF.	P-value	R square
PSX	-70.487	.501	92%
GOLD	-9.683	.181	
OIL	-5.032	.192	
CPI	37.019	.595	
INTR	-90.098	.306	
EXR	117.598	.376	
GDP	-3.87	.212	

4.7.2 Regression analyses Results

The above Tables show 92% variation in dependent variable (PSX) exists. The coefficient value tells us about the unit change in the dependent variable because of an independent variable. The table shows that 1 unit change in PSX will cause -70.487 unit changes in gold and in oil changes -5.032 and 37.091. and the unit change of CPI is 37.019 and INTR -90.098, EXR 117.598. The values show a positive relationship between PSX and CPI, EXR, and negative relationship between OIL, GDP, GOLD, and INTR. The value of R square is 92 percent, it mean it effect 92%, which is much higher than other macroeconomic variables that may affect the PSX. Furthermore, the p-value is greater than 0.05, meaning that the relationship between these variables is insignificant. Thus all the independent variable's value is greater than 0.05 so we can conclude that a significant difference exists among exixting variables.through this analysis of each hypothesis, goodness of fit, individual significant and cofficant analyses of each independent variables and over all insignificantof the model examined.through the above analyses, H1, H2, H3 and H4,H5, and H6 were tasted.

4.8 Table 6: Mixed Data Sampling (MIDAS)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8058.1500	3400.000	0.0000	1.0000
INT	95.4490	22.040	4.3307	0.001
GDP	-501.9980	5502.000	-0.0009	0.039
CPI	-204.8482	79.821	-2.5663	0.010
GP	90.4416	115.495	0.7831	0.043
OIL	-17.4849	3.667	-4.7675	0.001
EXC	-47.3183	190.625	-2.2941	0.022

R-squared	0.2980	Mean deviation var	0.0229
S.E. of regression	0.9163	Akaike info criterion	18.5998
Sum squared resid	1055.1890	Schwarz criterion	18.7234
Log likelihood	-4356.9400	Hannan-Quinn criter.	18.6484
Durbin-watson stat	1.9877	S.D.dependent Var	0.9633

4.8.1 MIDAS results

The MIDAS regression model is applied to variables including stock market price (daily), gold price (daily), GDP (annually), interest rate (quarterly), inflation rate (monthly), oil prices (monthly) and exchange rate (daily), The MIDAS regression results show the table no 3 PSX is a dependent variable with measured from the interest rate, gross domestic product gold prices oil prices exchange rate:it shows that exchange rate, gold price, inflation rate, interest rate, the gross domestic product have the significant relationship except for interest rate. R- Squared shows the proportion of the dependent variables explained by the independent variables. R-squared value is 0.2980 rounds about 3. This represents that the model is fit according to the P value; the value of P is 3. It's a significant and best fit of Adjusted R – square challenges to correct R- square more closely and the adjusted R-square value is 0.2980 rounds about 3. which means the 30 percent affects those variables. Another factor may affect, so the given variables affect 30 percent.

through this analysis of each hypothesis, goodness of fit, individual significant and cofficant analyses of each independent variables and over all significantof the model examined.through the above analyses, H1, H2, H3 and H4,H5, and H6 were tasted.

4.9 Results

So according to MIDAS regression test results are following.

Table 7 Dependent Variable: Equity market index

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8058.1500	3400.000	0.0000	1.0000
INT	95.4490	22.040	4.3307	0.001
GDP	-501.9980	5502.000	-0.0009	0.039
CPI	-204.8482	79.821	-2.5663	0.010
GP	90.4416	115.495	0.7831	0.043
OIL	-17.4849	3.667	-4.7675	0.001
EXC	-47.3183	190.625	-2.2941	0.022

4.10   Table 7.1 Hypothesis Accepted/ Rejected

H1: inflation rate has significant impact on equity market index.   Accepted

H2: interest rate has significant impact on equity market index.   Accepted

H3: Gold price has significant impact on equity market index.   Accepted

H4: Oil price has significant impact on equity market index.   Accepted

H5: GDP has significant impact on equity market index.   Accepted

H6: Exchange rate has significant impact on equity market index.   Accepted

According to midas regression all the hypotheses are accepted and significant impact on equity market index.

4.9 Discussion

Every hypothesis was tested by dissecting the relevant observational data and determining if the hypothesis was genuine or invalid by descriptive analysis, correlation analysis, and regression analysis, MIDAS regression was performed. Speculation is based on hypotheses such as the compromise hypothesis, the exchange rationale hypothesis, the cautious thought process hypothesis, and the supporting advantage hypothesis.

4.2.1Equity market index

On the observational side, we discover a significant and measurable relationship between restrictive means and contingent differences by employing a different dataset, test period, and boundary loads than Ghysels, Santa-Clara, and Valkanov (2004). It demonstrated that the theory was correct. According to the correlation table and MIDAS regression test table, there is a positive fluctuation in equity market index and other macroeconomic variables. Where 30% change due to those selected factors. These results show that it has a long-run relationship. There are certainly some areas that remain unrest. These areas are concerned with multivariate and tick-by-tick applications and the treatment of long memory, irregularity, and other common time series concerns like (partial) cointegration.

CHAPTER 5

CONCLUSION, RECOMMENDATIONS, AND DIRECTION FOR FUTURE RESEARCH.

5.1 Conclusion

In recent decades, the literature on financial market correlation has focused on capturing the time-varying features of this critical measurement. This led to the introduction of several new models, once claimed to be a better fit for the task than the other. This study examines the contagion and interdependence among gold, oil, forex, and the Pakistan equity market.

Results reported a significant rise in the correlation between equity markets. The upward movement in the correlation at the time of crisis provides evidence for the presence of a contagion effect in the emerging markets of Pakistan. Additionally, the study analyzed the correlation between equity markets and commodities (gold, oil) and forex markets. Results revealed that the dynamic correlation between oil and equity markets significantly increased during the crisis. Furthermore, the study found a lack of contagion in the needs of gold and forex as the dynamic correlation of these markets was insignificant at the time of crisis. Based on this empirical investigation, an overall conclusion can be drawn that shocks are responsible for the increased correlation between the markets, indicating the increasing dependence of equity markets at the time of crisis. This increase in dynamic correlation at crisis time leads to the reduction of portfolio benefits, which are required more by the investors than. This reduction in the portfolio of equity markets is not a good sign for investors. In the last one- or two-decade, stock markets have been highly volatile due to the number of stock market crashes, which made investors more cautious and fearful about future market development.

Moreover, this study concludes that a contagion effect in the equity market during a crisis increases the risk of portfolio diversification. So, investors should move or rebalance their portfolios by adding some safer assets to achieve the purpose of diversification. At the time of crisis, substitute investments are required, which provides safer heaven at the time of adverse shock in the market. The results reported that the dynamic correlation between the gold and forex market was not increased significantly during the crisis. Hence, investors can choose gold and forex as stock alternatives for safer investments in turmoil.

Last but not least, the increase in the correlation of equity markets may weaken the emerging markets against external shocks. The decision-makers in emerging markets should also design the policies by focusing on internal and external factors because emerging markets are strongly linked with the global market. Hence, the global financial landscape has changed, and

the emerging world is no exception. Moreover, a dynamic correlation between equity markets increases at the time of crisis, nullifying diversification's purpose. It is suggested that investors (mutual funds and institutional investors' e.g., insurance companies and pension funds) should incorporate gold and forex in their portfolios to reduce the risk of higher correlation between equity markets, especially in a crisis scenario.

5.2 Limitations of the Study

Although this study analyzed the contagion and interdependence among commodities, forex, oil gold and equity markets by considering the Pakistani equity market, many areas can still be researched in the future. The contagion study can be done by using more frequency of the data and methodology. We have used the mixed data in this study by applying the MIDAS and OLS regression. The small area of research was conducted only in Pakistan. We have a short period of time along with limited resources to maximize the validity of this study one can increase the number of the counter is in the future.

5.3 Directions for Future Research.

Future studies should incorporate other techniques like frequency framework domain, copula approach, time-frequency approach, and Skewed-t Density Approach. By combining these techniques, one could understand the effect of the crisis and the persistence of changes in correlation. Secondly, the velocity at which the problems affect the correlations could be an exciting area of focus. Third, the research could be done for more than one country and adding more commodity to gain better consensus.

Fourth, the system trading in the steady or transient unpredictable process is taken into account by our RS-GARCH-MIDAS model. If a MIDAS relapse occurs, one may want to push system swapping in the drawn-out section. An important step in the boundary evaluation process is to address the severe problem of non-union (Gu'erin and Marcellino, 2013). Fifth, to study the restrictive connections at various frequencies, system exchanges may be imposed on multivariate GARCH-MIDAS models such as DCC-MIDAS (Asgharian et al., 2015; Conrad et al., 2014) and DECO-MIDAS (Boffelli et al., 2015).

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